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t

GENERAL VIEW  
OF THE  
**AGRICULTURE**  
OF  
**STIRLINGSHIRE**

WITH  
OBSERVATIONS ON THE MEANS OF ITS IMPROVEMENT,

DRAWN BY V\* NK TKt COtStDUATSOtC Or TJtt  
**BOARD OF AGRICULTURE**  
AND  
**INTERNAL IMPROVEMENT**

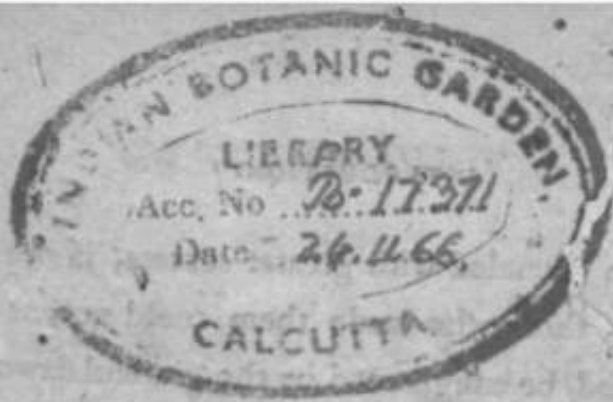
WITH A MAP.



By **PATRICK GRAHAM, D. D.**  
MINISTER, OF ABERFOYLE.

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## INTRODUCTION.

THE Reporter has just reason to apprehend that, in a volume of such multifarious contents, many errors will be found both in point of *opinion* and of *art*.

From *the firmer* of these little danger can arise. The speculations which have been thrown out may be footed or rejected at the pleasure of the reader. Speculation, in matters of science, has frequently been the means of eliciting new and important lights in subjects the most interesting to the human mind. « I feel not much reverence," says the ingenious and lamented Dr Beddoes, " \* \* \* < < who pique themselves upon Pure experience. In most *iaBmee*.- (speaking of *med.cme*) " a \* < < < tal deliberation of some sort must precede prescription, and here the discrimination on o pvsions^ habituated to speculation will have a. superiority of skill over chance, and their fertility of resource^ will appear to peculiar advance." And

" e cannot ^surprised that these should not

M have

« have been {tended with greater success\* if we con-  
 « sider that those who made them could not, at that  
 « early period, be enlightened by the grateful dawn of a  
 " probable *theory* ; and that having no well defined end  
 « in view, they could not vary their means with suf-  
 « ficient intelligent\*\*"

With respect to errors in point of *fact*, the Rep'---\*  
 ter will only presume to say, that he has employ cd all  
 the caution and diligence of which he is capable, in  
 avoiding them\* His sources of information have been  
 very abundant; and he is deeply sensible that, without  
 the communications, both oral and written, which he  
 has received from gentlemen of all ranks, and residing  
 in every district of the county, he could never have  
 executed this\* work, such as it is. These communica-  
 tions were furnished with a liberality which does honour  
 to-their authors; and the Reporter will ever reflect, with  
 high satisfaction, on his having had the good fortune  
*to* be the instrument of calling them forth. He has?  
 sow only to request that his friends, to whom he is so  
 much indebted, will accept of this expression of the  
 grateful sense which he entertains of their goodness\*

Oct. 17. 7  
 1821. 7

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AGRICULTURAL SURVEY  
OF  
STIRLINGSHIRE.

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CHAP. I.

GEOGRAPHICAL STATE AND CIRCUMSTANCES,

---

SECT. J.—SITUATION AND EXTENT.

HERE is no correct map of Stirlingshire. In 1745 a survey was made of this county, and a map published by William Edgar\*, some copies of which are still to be met with. This map was republished in 1777, by Mr Nimmo in his General History of Stirlingshire, without any geographical alteration. Since that period Mr Ross published a map of this county upon a large scale but it abounds with inaccuracies. Mr Arrowsmith's excellent Map of Scotland represents this county with tolerable

correctness. By the help of all these, assisted by actual observation, the map of Stirlingshire, representing the soilgy which is now offered, was constructed.

Stirlingshire is situated, according to the most accurate calculation that can be made, between  $55^{\circ}. 56'$  and  $56^{\circ}. 16'$  N. Latitude; and between  $3^{\circ}. 35'$  and  $4^{\circ}. 40'$  West Longitude |o m Greenwich, Its greatest length, measured from the point where the \*iver Almond crosses the public road, near Linlith<sup>^</sup>ow, on the east, to a line passing north and south along the shore of Lochlomond, near the barracks of Inversnaid, on the west, is 45 statute miles:—Its greatest breadth from north to south is about 21 miles, making a superficial extent of 945 square miles. But as the breadth of Stirlingshire is very far from being''uniform throughout, it may be taken at a medium at 14 statute miles, making 630 square miles. The average' square contents of the several parishes, and parts of parishes, of which this county consists, having been at the same time diligently calculated, the result, which is 660 square miles, corresponds pretty nearly with the above estimate : and it is presumed that, by dividing the difference, we shall come very near the truth. The superficial contents of the county will then be 645 square miles, equal to 412,800 English, or 328,300 Scots acres nearly.\*

Stirlingshire

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\* Mr Belschcs *ol* Greenyards, in a report of this county presented to the Board of Agriculture i<sup>^</sup> 1796 states its extent to be 704 statute miles, or 358,336 Scots acres. There is reason to believe that he has \$pmewhat exceeded in his calculation.

Stirlingshire is bounded on the north) throughout its whole exteiht, by the shire of Perth, and^by the river and,Firth of Forth ; excepting that the whole parish of Alva, in this county, lies in an isolated situation, on the north of the Fogth, and surro^anded by the counties of Perth and Clackmanan;—and that those parts of the parishes of Logie and Lecropt, which ^Alpng to this county, lie also on the north of the river, ^n the bosom of Perthshire : it is bounded on the east by the Firth of Forth, and by Linlithgowshire ; on the south by Lanarkshire and Dunbartonshire; and on the west by Dunbartonshire and Lochlomond.

It may be permitted to observe that Stirlingshire, with its rich mountain pastures, rising to a height of more than 3000 feet above the level of the sea, and its fertile plains sinking within a few feet of the same level ;—its extensive natural woods, and thriving plantations ;—the ornamented seats of noblemen and gentlemen ; and the beautiful lake of Lochlomond\* adorned with islands, possesses a degree of interest to which few counties in Britain can lay claim :—And if to its natural advantages, we add the interest arising from the abundance and variety of valuable minerals which are contained in the bowels of the earth; the important public works and manufactures that are carried on; the commerce of a sea port which is necessarily arising to a high degree of consideration in the trade even of this trading country ; together with the perfection to which agriculture has been carried, or may be carried in tl^s district; it "will be allowed that an account of Stirlingshire, if properly executed\* merits the attention of the political economist, the natural historian, the merchant, and the agriculturist.

## SECT. IX.—DIVISIONS\*

1. *Political*\*—Stirlingshire constitutes a portion of the district anciently occupied by the Damnii of d tolo-my 5 which comprehended not only this county, but also Clydesdale and Menteith.

The public functionaries of the county are a Lord Lieutenant, a sheriff-depute, and a sheriff-substitute. Previous to the Fox or Grenville administration, the counties of Stirling and Clackmanan were united under the jurisdiction of one sheriff-depute, with two substitutes\$ the one residing at Stirling, and the other at Alloa. But, during the above administration, a sheriff-depute was appointed to Stirlingshire alone, and another to the counties of Clackmanan and Kinross ;—» it is not even alleged that any inconvenience arose from the former arrangement.

Stirling is one of the towns which compose the Western Circuit; and is visited twice a year by the Lords of Justiciary. It is one of the boroughs of that district which, in electing a member to serve in parliament, includes also Culross, Inverkeithing, Dunfermline, and Queensferry. The county sends a member to parliament. The freeholders entitled to vote at the election are about 100.

Stirling is the only royal borough in the county: there are several boroughs of barony; the most const\*  
derable

derable<sup>#</sup> of which are Falkirk, St Ninians, Kilsyth, Campsie, Kip<sup>^</sup>en, &c.

The tonly other political division of the county, which seems to merit notice, is that of th« ↓ different districts in which the monthly\*meetings of the Justices of peace are held ; these are Stirling, Falkirk, Campsie, and Balfron,

2. *Ecclesiastical.*—The ecclesiastical divisions of the counties of Scotland ve seldom regulated with any degree of uniformity. In no county, perhaps, is this irregularity more remarkable than in Stirlingshire. Some parishes in this county are connected not only with diffefent synods, but even with different presbyteries, whose seats are fixed in other counties. The same want of uniformity of arrangement extends *to* parishes which lie partly in Stirlingshire, and partly in adjacent shires.

The following table will show at one view the ecclesiastical divisions of Stirlingshire, with their various arrangements.

| <i>Parishes.</i>                               | <i>Presbyteries.</i> | <i>Provincial Synods.</i> |
|--|----------------------|---------------------------|
| 1* Stirling, . . . .                           | Stirling. .          | Perth & Stirling.         |
| 2. St. Ninians, . . . .                        | Do. . .              | Do.                       |
| 3. Gargunnoch, . . . .                         | Do. . .              | Do.                       |
| 4. Larbertd?Duni <sup>^</sup> acc, .           | Do. . .              | Do.                       |
| 5. <sup>Alv</sup> », . . . .                   | Do. . .              | Do.                       |
| 6. <sup>Air</sup> to, . . . .                  | Do. . .              | Do.                       |
| 7. Bothkennar, <sup>7</sup> <sup>^</sup> . . . | Do. . .              | Do.                       |
| 8. Denny, ,, . . . .                           | D«. . .              | Do.                       |

| <i>Parishes,</i>                                       | <i>Presbyteries.</i>             | <i>Provincial Synods.</i> |
|--|----------------------------------|---------------------------|
| 9- Kippfm. p;trily i:"}<br>Perthshire, . }             | . Dunblane, Perth & Stirling     |                           |
| 10-Licw >r,iraitlyinj<br>Pia iibhire, . J              | * ^ o. . . U o#                  |                           |
| 11. Lo>le, partly in!<br>Pevihfchire, . " }            | " n o * * * i o.                 |                           |
| 12. Baldernock, . . .                                  | Dunbarton. Glasgow & Ayr         |                           |
| 13. Balfrou, . . .                                     | Do. . . Do.                      |                           |
| 14. Suc-hapun, . . . .                                 | X) o < . . Do.                   |                           |
| 15. &ry Dcn, . . . .                                   | Dr. . . Do. '                    |                           |
| 16. Fiulry, . . . .                                    | ] o. . . Do.                     |                           |
| 17-Killcarii, . . . .                                  | . Do. . . Do.                    |                           |
| 18. Straht'lanc, . . . .                               | Do. . . Do,                      |                           |
| 19. New Kilpatrick, partly I<br>in Duiibartonshiiiv, 3 | I D o. . . D o.<br>* ' .         |                           |
| 20. Campsie, . . . .                                   | Glasgow, . Do.                   |                           |
| 21. Krlsyth, . . . .                                   | Do. . . Do.                      |                           |
| 22. Falkirk, . . . .                                   | Lh. Iithgow. Lothian & Tweedak-. |                           |
| 23. Muiravonaide, . . . .                              | Do. . . Do.                      |                           |
| 24. Pohnont. . . .                                     | Do. . » Do.                      |                           |
| 25. Slamunan, . . . .                                  | Do. . . Do.                      |                           |

THUS it appears that there are 21 parishes situated wholly in Stirlingshire; and four situated partly in that, and partly in other counties. With regard to the discrepancy of their ecclesiastical distributions it may be added, that little inconvenience arises from it in the administration of the policy or discipline of the church. The order of ecclesiastical procedure, in the different presbyteries and synods, being regulated through the whole church by the same laws, is uniform; and the sentence of an ecclesiastical court having no civil effect,

that

that of the civil magistrate, in the district in which he presides, is not in any respect affected by it.

Some parishes in this county are attached to the commissariat of Dunblane, and others to that of Stirling. Campsie, joined to Ffomilton, forms a distinct commissariat.



#### SECT. IV. CLTMATK.

In describing the climate of any district, it would seem, that, besides the latitude in which it is situated, the principal circumstances to be taken into the account are its position with respect to the adjacent seas, together with the various elevations of its mountains and vallies.

The latitude of Stirlingshire has been stated to be from  $55^{\circ} 56'$  to  $56^{\circ} 16'$  North. But forming, as it does, the isthmus of Scotland, washed on the east by the German ocean, and stretching on the west almost to the Atlantic, this county enjoys that peculiar mildness of temperature, which is the effect of the vicinity of the sea. Snows seldom fall to a great depth, or lie for a long time upon the ground. The severity of frost and snow seldom occurs before Christmas.

The various elevations of different parts of this county will appear from the following table:



*Fed above the level of the*

|   |      |
|---|------|
| Carses of Falkirk, Bothkennar, &c. from 112 to  | 20   |
| Height of Airthy                                | 70   |
| Highest elevation of the great canal, . . . . . | 162  |
| Land in tillage on the verge of Slamannan-      |      |
| moss, . . . . .                                 | 82   |
| Kilsyth hills, . . . . .                        | 1360 |
| Campsie Fells, . . . . .                        | 1500 |
| Bencloch in Alva, . . . . .                     | 220  |
| Denomocj, . . . . .                             | 262  |
| Lochlomond, . . . . .                           | 22   |

The western part of the county is more rainy than the eastern, on account of the vicinity of the sea and the height of the mountains. Benlomond, towering without a rival at the western extremity, attracts the clouds, which burst in torrents upon the adjacent valleys,—taking their course, according to the occasional current of the winds, either towards the east, by the Strathblane and Campsie hills, or towards the north-east, along the mountains of Perthshire. The eastern parts of the county are warmer than the western, on account of their smaller elevation above the level of the sea.

The prevalent winds, as throughout the rest of Scotland, are from the south-west, as will be seen by the annexed tables :—From that quarter too proceeds our most violent storms and our heaviest rains. Even in the carses of Falkirk and Bothkennar, the trees and Ledge-rows grow with a marked inclination towards the north-east. In spring the eastern parts of the country are frequently annoyed with cold and piercing winds

winds from the east which, passing over a wide continent covered during many previous months with snow, have not had time to imbibe warmth and moisture from the narrow sea which they had swept in their course. These winds are often accompanied with a thick fog or haze, there called *eastern haars*, which is unfriendly to health and vegetation. This haze seldom extends to the western parts of the county, being intercepted by the high grounds that intervene.

It is regretted that no register of the quantity of rain that falls in this district annually has been discovered by the reporter. He adopts the account given in a former report by Mr Belsches, by which it appears,\* "that, for the space of five years, beginning with 1776, the annual average number of days on which there was rain, was 206; and the average quantity of rain that fell in one year 50\* inches!"

When this estimate of the quantity of rain that falls in Stirlingshire is compared with the ascertained quantity that falls in adjacent situations, it would seem that it is near the truth. The quantity of rain that falls at Glasgow is 31 inches,\* at Dalkeith it is 25.124.f It may be proper to add, that the quantity of rain that falls annually in the western district of this county is certainly much greater than that which falls in the eastern part—the former may be considered as approaching to the Glasgow estimate—the latter to that of Dalkeith.

The

The reporter has the satisfaction to add tables of the winds, of the weather, and of the thermometer, for 14 years, and of the barometer for 11 years, kept with the utmost accuracy by his respected friend Dr Macfarlane, minister of Drymen, on the south-west verge of this county, at an elevation of about 70 feet above the level of the sea. It is true that these tables cannot be considered as applicable, with any precision, to the eastern parts of the county ;—but it may be observed, that besides their value in reference to general science, they may be considered as a nearly just estimate of the objects to which they relate throughout that district of Scotland, at least which lies between 56°. and 56°. 40'. north, lat. and between Stirling on the east, and the Atlantic sea on the west;—a district which includes the western parts of Stirlingshire, almost all Dunbartonshire, the southern and western parts of Perthshire, and a considerable portion of Argyleshire.

From these tables, which will naturally suggest to the scientific reader so many important conclusions, the following remarks obviously occur, viz.

1. That on an average of 14 years, the wind
 

|  |       |
|--|-------|
| blows between N. and E. . . . .          | 105   |
| . . . . . from between N. & W. . . . .   | 91    |
| . . . . . from between S. & E. . . . .   | 29 J. |
| . . . . . from between S. & W. , . . . . | * 137 |
  
  2. The average of days completely fair for 14 years 158
 

|  |            |
|--|------------|
| . . . . . of showery days . . . . .        | 171 }<br>? |
| . . . . . of days completely wet . . . . . | 34         |
- Days in the whole year more or less rainy . . . 205 J
- 3.

3. The average greatest heat for 14 years  $75^{\circ}$   
 . . . . . of greatest cold. . . . .  $16^{\circ}$   
 . . . . . average heat of the year . . . . .  $45^{\circ}$
4. The average height of the barometer for 11 years  
 was. . . . . 29<sup>9</sup>/<sub>16</sub> inches.

It may be concluded, upon the whole, that this is rather a showery than a rainy climate. The number of days *completely wet* is very inconsiderable, when compared with that of those *completely dry*: yet it appears that *some rain* falls on a number of days, not intfc h less than two-thirds- 6f the whole year. The quantity of rain which is thus distributed through about 205 days is not much more than 80 inches; whilst at Calcutta,\* the immense quantity of 81 inches falls on an average in about 78 days\*

This gradual distribution of showers and rain appears admirably calculated for the nature of the soils which characterise that district of Scotland now under our consideration.—These consist chiefly of mountain pastures, which require a shower almost every day to preserve them in verdure, or of light arenaceous earth of little depth, which stands in need of frequently renewed supplies of moisture. /These showers, accordingly, are only htirtful in the season of hay-making or of harvest; and it is the business of the prudent husbandman

bandman to adapt the season of these operations as much as possible to the ordinarily observed course of the weather. In a climate so changeable as this, it is the business of the farmer to remark, to watch, and guard against the effects of the weather, especially in harvest, when the inadvertence or delay of a single day or even of a few hours, may be attended with the most fatal consequences. In such a climate every farmer should be somewhat versed in the ordinary prognostics of the weather. Long experience has given rise to a set of maxims on this subject, which are not unworthy of the attention of the physiologist, whilst they are the common guides even of the most illiterate.

Thus, in the upper parts of Stirlingshire, the adjacent mountains, towering to the height of more than 3000 feet, serve to indicate by their phasis the approaching weather. When dry vapours prevail in the atmosphere, they produce a haziness around distant objects, which occasions their outlines to be seen faintly and indistinctly. This appearance of the distant mountains is considered to portend fair weather. When, again, the atmosphere is saturated with moisture, it acts as a lens or magnifier\*—the distant mountains seem to approach the eye, and the outline of the objects on their surface becomes distinct. This appearance indicates the approach of rain.

This is given merely as an instance of the proper sagacity which the farmer should employ in judging of the weather. Many others might be adduced ; but it is sufficient to observe, that, as every districc of country has its own peculiar phenomena of the weather, it belongs

belongs\* to every one to study those of that in which he himself resides ; and, from a series of observations, to draw\* the just conclusions. The agriculturist should, for this purpose, be provided with those instruments which science has invented to assist in so material an investigation. He should, have a barometer, and know the use of it,—to this he may add a thermometer and a hygrometer.

TABLE



TABLE I.

| YEAR<br>AND<br>MONTH, | WINDS.                       |                             |                              |                              | Thermo-<br>meter.   |         | Weather.                        |                         |                                  |
|-----------------------|------------------------------|-----------------------------|------------------------------|------------------------------|---------------------|---------|---------------------------------|-------------------------|----------------------------------|
|                       | No. of days<br>from N. to F. | No. of days<br>from N to W. | No. of days<br>from S. to E. | No. of days<br>from S. to W. | Greatest<br>height. | Lowest. | No. of days<br>completely fair. | No. of days<br>showery. | No. of days com-<br>pletely wet. |
| 1795.                 |                              |                             |                              |                              |                     |         |                                 |                         |                                  |
| January . . *         | 10                           | 0                           | 0                            | 3                            | 33                  | 7       | 7                               | 3                       | 3                                |
| February . . .        | 24                           | 1                           | 1                            | 2                            | 36                  | 6       | 14                              | 9                       | 5                                |
| March . . . . .       | 10                           | 10                          | 3                            | 8                            | 46                  | 17      | 11                              | 10                      | 10                               |
| April . . . . .       | 9                            | 9                           | 4                            | 14                           | 48                  | 33      | 10                              | 15                      | 5                                |
| May . . . . .         | 4                            | 13                          | 5                            | 9                            | 64                  | 39      | 13                              | 16                      | 2                                |
| June . . . . .        | 10                           | 3                           | 2                            | 15                           | 71                  | 48      | 16                              | 9                       | 5                                |
| July . . . . .        | 6                            | 14                          | 1                            | 10                           | 75                  | 49      | 17                              | 10                      | 4                                |
| August . . . . .      | 3                            | 2                           | 4                            | 22                           | 76                  | 48      | 13                              | 13                      | 5                                |
| September . . .       | 8                            | 2                           | 9                            | 11                           | 69                  | 42      | 14                              | 15                      | 1                                |
| October . . . .       | 10                           | 3                           | 7                            | 11                           | 59                  | 42      | 6                               | 16                      | 9                                |
| November . . .        | 9                            | 9                           | 0                            | 12                           | 52                  | 17      | 16                              | 10                      | 4                                |
| December . . .        | 6                            | 11                          | 3                            | 11                           | 54                  | 33      | 5                               | 20                      | 6                                |
| 1795 . . . . .        | 109                          | 71                          | 39                           | 128                          | 76                  | 6       | 142                             | 146                     | 59                               |
| 1796.                 |                              |                             |                              |                              |                     |         |                                 |                         |                                  |
| January . . . .       | 3                            | 4                           | 8                            | 16                           | 52                  | 35      | 11                              | 13                      | 7                                |
| February . . . .      | 11                           | 6                           | 7                            | 5                            | 52                  | 33      | 8                               | 17                      | 4                                |
| March . . . . .       | 16                           | 3                           | 4                            | 8                            | 52                  | 29      | 20                              | 10                      | 1                                |
| April . . . . .       | 12                           | 8                           | 3                            | 7                            | 66                  | 40      | 18                              | 11                      | 1                                |
| May . . . . .         | 16                           | 7                           | 3                            | 5                            | 67                  | 35      | 12                              | 13                      | 1                                |
| June . . . . .        | 2                            | 11                          | 0                            | 17                           | 71                  | 43      | 10                              | 13                      | 2                                |
| July . . . . .        | 2                            | 7                           | 5                            | 17                           | 72                  | 48      | 6                               | 22                      | 3                                |
| August . . . . .      | 1                            | 9                           | 1                            | 20                           | 74                  | 46      | 17                              | 14                      | 0                                |
| September . . .       | 9                            | 7                           | 5                            | 9                            | 70                  | 46      | 15                              | 15                      | 0                                |
| October . . . .       | 2                            | 15                          | 5                            | 9                            | 59                  | 30      | 17                              | 10                      | 4                                |
| November . . .        | 11                           | 13                          | 3                            | 3                            | 47                  | 25      | 18                              | 10                      | 2                                |
| December . . .        | 13                           | 9                           | 3                            | 2                            | 47                  | 19      | 20                              | 10                      | 1                                |
| 1796 . . . . .        | 100                          | 99                          | 49                           | 118                          | 74                  | 19      | 172                             | 168                     | 26                               |

|           |  |                                  |                                   |  |
|-----------|--|----------------------------------|-----------------------------------|--|
| 1797      | 3 8 0 0<br>3 S<br>g. "                                 | 1<br>i * s<br>-1                 | 5 E                               |  |
| 98        | 12<br>15<br>14<br>9                                    | No. of days from<br>N. to E.     |                                   |  |
| O         | - * tn -SJ -*J OS 00 Oj 00 00                          | 1<br>1                           | No. of days from<br>N. to W.      |  |
| M<br>CO * | 5<br>5<br>5<br>5<br>5<br>5<br>5<br>5                   | No. of days from f<br>S. to E.   | E.<br>00                          |  |
| tc        | s & to O CT-O O. #.                                    | No. of days from<br>S. to W.     |                                   |  |
| to        | &> t>. Oi O; O; ^1 CT<br>a; o c w a to N               | 1<br>1                           | Greatest he%lit.                  |  |
| O         | oa O C7: to +0 C W ^ o. to to c>.                      | 1                                | Lowest.                           |  |
| 1rt       | to C& ** 05 On oo a* r * , 03 k>                       | 8                                | Wo. of day6 com-<br>pletely fair. |  |
| i>        | 18<br>7<br>11<br>20<br>14<br>19<br>15<br>10<br>6<br>15 | No. of days<br>showery.          |                                   |  |
| 43        | 5<br>3<br>1<br>1<br>5                                  | No. of days com-<br>pletely wet. |                                   |  |

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E.

TA L II.

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her.



TABLE I.

| Year and Month. | In.                       |                           |                           |                           | Thermo-meter.    |         | Average height for the month. | Weather.                     |                      |                             |
|-----------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|---------|-------------------------------|------------------------------|----------------------|-----------------------------|
|                 | No. of days from N. to £. | No. of days from N. to W. | No. of days from S. to E. | No. of days from S. to W. | Greatest height. | Lowest. |                               | No. of days completely fair. | No. of days showery. | No. of days completely wet. |
| 1798            |                           |                           |                           |                           |                  |         |                               |                              |                      |                             |
| Jan.            |                           |                           | 4                         | 11                        | 48               |         |                               | 7                            | 19                   | 5                           |
| Feb.            |                           |                           | 2                         | 16                        | 50               |         |                               | 15                           | 7                    | 6                           |
| March           |                           | 1                         | 2                         | 12                        | 54               |         |                               | 16                           | 15                   | 0                           |
| April           |                           | 1                         | 7                         | 15                        | 67               |         |                               | 12                           | 16                   | 2                           |
| May             |                           | 1                         | 0                         | 14                        | 64               |         |                               | 21                           | 10                   | 0                           |
| June            |                           | 1                         | 1                         | 15                        | 74               |         |                               | 17                           | 12                   | 1                           |
| July            |                           | 1                         | 2                         | 23                        | 70               |         |                               | 10                           | 18                   | 3                           |
| Aug.            |                           | 1                         | 1                         | 20                        | 69               |         |                               | 19                           | 10                   | 2                           |
| Sep.            |                           | 1                         | 0                         | 22                        | 67               |         |                               | 9                            | 17                   | 4                           |
| Oct.            |                           | 1                         | 4                         | 13                        | 62               |         |                               | 12                           | 16                   | 2                           |
| Nov.            |                           | 1                         | 4                         | 14                        | 59               |         |                               | 12                           | 16                   | 2                           |
| Dec.            | K O M M                   |                           | 4                         | 5                         | 45               |         |                               | 17                           | 12                   | 2                           |
| 18              |                           | 80                        | 71                        | 53                        | 179              | 74      | 0                             | 9                            | 9                    | 9                           |

TABLE IV.

| Year                          | 1801 | 1802 | 1803 | 1804 | 1805 | 1806 | 1807 | 1808 | 1809 | 1810 | 1811 | 1812 | 1813 | 1814 | 1815 | 1816 | 1817 | 1818 | 1819 | 1820 | 1821 | 1822 | 1823 | 1824 | 1825 | 1826 | 1827 | 1828 | 1829 | 1830 |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| No. of days above 40°         | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  | 135  |
| No. of days from N. to W.     | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   | 64   |
| No. of days from S. to N.     | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   | 63   |
| No. of days from 40° to 50°   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   | 75   |
| Lowest.                       | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   | 17   |
| Average height for the month. | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 |
| No. of days completely fair.  | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   | 14   |
| No. of days showery.          | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| No. of days completely wet.   | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |

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TABLE. V

| Year<br>and<br>Month | Winds.                    |                           |                           |                           | Ther<br>in.-t.-r |         | Weather.                     |                     |                             | Baro<br>mm "HT.                      |
|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------|---------|------------------------------|---------------------|-----------------------------|--------------------------------------|
|                      | No. of days from N. to E. | No. of days from N. to W. | No. of days from S. to E. | No. of days from S. to W. | Greatest height. | Lowest. | No. of days completely fair. | No. of days cloudy. | No. of days completely wet. | f =<br>Average height for the month. |
| <b>1801</b>          |                           |                           |                           |                           |                  |         |                              |                     |                             |                                      |
| Jan.                 | 5                         | 13                        | 0                         | 13                        | 48               | 31      | 6                            | 22                  | 3                           | 29 <sup>10</sup>                     |
| Feb.                 | 13                        | 7                         | 1                         | 7                         | 51               | 29      | 9                            | 12                  | 7                           | 29 <sup>17</sup>                     |
| March                | 4                         | 12                        | 1                         | 11                        | 54               | 27      | 10                           | 19                  | 2                           | 29 <sup>0</sup>                      |
| April                | 5                         | 11                        | 0                         | 14                        | 63               | 28      | 19                           | 11                  | 0                           | 29 <sup>13</sup>                     |
| May                  | 8                         | 4                         | 4                         | 15                        | 68               | 43      | 9                            | 14                  | 1                           | 29 <sup>17</sup>                     |
| June                 | 4                         | 12                        | 0                         | 14                        | 71               | 51      | 21                           | 9                   | 0                           | 29 <sup>22</sup>                     |
| July                 | 14                        | 4                         | 2                         | 11                        | 73               | 44      | 13                           | 16                  | 0                           | 29 <sup>27</sup>                     |
| Aug.                 | 8                         | 9                         | 4                         | 10                        | 71               | 50      | 56                           | 5                   | 0                           | 29 <sup>30</sup>                     |
| Sept.                | 10                        | 4                         | 7                         | 9                         | 67               | 40      | 16                           | 10                  | 2                           | 29 <sup>33</sup>                     |
| Oct.                 | 6                         | 7                         | 1                         | 17                        | 62               | 36      | 10                           | 15                  | 1                           | 29 <sup>34</sup>                     |
| Nov.                 | 6                         | 11                        | 0                         | 14                        | 53               | 22      | 13                           | 11                  | 3                           | 29 <sup>35</sup>                     |
| Dec.                 | 10                        | 13                        | 1                         | 7                         | 42               | 21      | 14                           | 13                  | 4                           | 29 <sup>39</sup>                     |
| <b>1801</b>          | 91                        | 107                       | 21                        | 145                       | 74               | 41      | 168                          | 165                 | 0                           | 29 <sup>30</sup>                     |
| <b>1802</b>          |                           |                           |                           |                           |                  |         |                              |                     |                             |                                      |
| Jan*                 | 7                         | 7                         | 0                         | 17                        | 47               | 19      | 12                           | 13                  | 0                           | 29 <sup>33</sup>                     |
| Feb.                 | 4                         | 9                         | 0                         | 15                        | 51               | 27      | 10                           | 13                  | 0                           | 29 <sup>34</sup>                     |
| March                | 0                         | 12                        | 0                         | 19                        | 51               | 30      | 8                            | 20                  | 0                           | 29 <sup>35</sup>                     |
| April                | 2                         | 9                         | 0                         | 17                        | 55               | 37      | 6                            | 14                  | 0                           | 29 <sup>36</sup>                     |
| May                  | 9                         | 15                        | 3                         | 4                         | 78               | 29      | 20                           | 11                  | 0                           | 29 <sup>37</sup>                     |
| June                 | 11                        | 12                        | 0                         | 17                        | 6*               | 36      | 11                           | 14                  | 3                           | 29 <sup>38</sup>                     |
| July                 | 4                         | 10                        | 0                         | 17                        | 66               | 32      | 9                            | 20                  | 2                           | 29 <sup>39</sup>                     |
| Aug.                 | 6                         | 5                         | 4                         | 10*                       | 70               | 50      | 11                           | 15                  | 4                           | 29 <sup>40</sup>                     |
| Sept.                | 10                        | 7                         | 2                         | 15                        | 67               | 35      | 13                           | 11                  | 3                           | 29 <sup>41</sup>                     |
| Oct.                 | 10                        | 6                         | 0                         | 15                        | 63               | 36      | 7                            | 19                  | 5                           | 29 <sup>42</sup>                     |
| Nov.                 | 27                        | 0                         | 3                         | 0                         | 51               | 25      | 10                           | 9                   | 1                           | 29 <sup>43</sup>                     |
| Dec.                 | 10                        | 4                         | 3                         | 14                        | 41               | 23      | 14                           | 11                  | 0                           | 29 <sup>44</sup>                     |
| <b>1802</b>          | 100                       | 91                        | 17                        | 166                       | 78               | 36      | 141                          | 186                 | 33                          | 29 <sup>40</sup>                     |

TABLE VI.

| Year and Month. | Winds.                    |                               |                           |                           | Thermometer.     |               | Barometer. | Precipitation.                 |                                  |                                  |
|-----------------|---------------------------|-------------------------------|---------------------------|---------------------------|------------------|---------------|------------|--------------------------------|----------------------------------|----------------------------------|
|                 | No. of days from N. to E. | No. of days from N. to W. ~6* | No. of days from S. to E. | No. of days from S. to W. | Greatest height. | Least height. |            | No. of days for which it fell. | No. of days for which it snowed. | No. of days for which it rained. |
| 1803            |                           |                               |                           |                           |                  |               |            |                                |                                  |                                  |
| Jan.            | 22                        | 2                             | 4                         | 3                         | 46               | 34            | 29.14      | 1                              | 14                               | 3                                |
| Feb.            | 3                         | 7                             | 0                         | 8                         | 45               | 21            | 29.19      | 1                              | 15                               | 4                                |
| M. of v.        | 10                        | 9                             | 0                         | 10                        | 55               | 25            | 29.00      | 1                              | 12                               | 4                                |
| April           | 3                         | 11                            | 2                         | 14                        | 63               | 36            | 29.00      | 8                              | 21                               | 10                               |
| May             | 7                         | 10                            | 0                         | 10                        | 59               | 38            | 29.00      | 1                              | 15                               | 0                                |
| June            | 7                         | 13                            | 1                         | 9                         | 60               | 39            | 29.00      | 1                              | 10                               | 2                                |
| July            | 3                         | 1                             | 4                         | 20                        | 75               | 48            | 29.00      | 2                              | 11                               | 0                                |
| Aug.            | 3                         | 9                             | 2                         | 15                        | 70               | 45            | 29.00      | 12                             | 14                               | 5                                |
| Sep.            | 4                         | 10                            | 3                         | 15                        | 66               | 34            | 29.00      | 17                             | 13                               | 0                                |
| Oct.            | 4                         | 10                            | 3                         | 15                        | 66               | 34            | 29.00      | 17                             | 13                               | 0                                |
| Nov.            | 13                        | 7                             | 3                         | 7                         | 45               | 24            | 29.00      | 13                             | 15                               | 3                                |
| Dec.            | 31                        | 3                             | 2                         | 5                         | 48               | 15            | 29.00      | 10                             | 15                               | 3                                |
| 1813            | 101                       | U3                            | 23                        | 128                       | 75               | 15            | 29.00      | 1                              | 170                              | 27                               |
| 1804            |                           |                               |                           |                           |                  |               |            |                                |                                  |                                  |
| Jan.            | 8                         | 1                             | 10                        | 12                        | 50               | 8             | 29.55      | 8                              | 20                               | 34                               |
| Feb.            | 15                        | 2                             | 3                         | 3                         | 46               | 17            | 29.00      | 15                             | 10                               | 10                               |
| March           | 10                        | 4                             | 8                         | 8                         | 50               | 24            | 29.00      | 9                              | 15                               | 60                               |
| April           | 10                        | 4                             | 0                         | 3                         | 57               | 27            | 29.00      | 6                              | 24                               | 0                                |
| May             | 5                         | 4                             | 9                         | 10                        | 66               | 44            | 29.00      | 10                             | 15                               | 3                                |
| June            | 10                        | 5                             | 0                         | 8                         | 71               | 46            | 29.00      | 10                             | 15                               | 4                                |
| July            | 10                        | 5                             | 0                         | 8                         | 72               | 48            | 29.00      | 16                             | 15                               | 0                                |
| Aug.            | 10                        | 5                             | 0                         | 11                        | 68               | 48            | 29.00      | 16                             | 19                               | 0                                |
| Sep.            | 10                        | 5                             | 0                         | 11                        | 71               | 44            | 29.00      | 14                             | 16                               | 0                                |
| Oct.            | 6                         | 4                             | 8                         | 13                        | 35               | 36            | 29.00      | 13                             | 23                               | 2                                |
| Nov.            | 23                        | 0                             | 1                         | 4                         | 51               | 25            | 29.00      | 13                             | 14                               | 3                                |
| Dec.            | 22                        | 0                             | 1                         | 4                         | 44               | 15            | 29.00      | 19                             | 11                               | 1                                |
| ISO ±           | 127                       | 52                            | 114                       | 74                        | 8                | 29.00         | 146        | 200                            | 20                               |                                  |

TABLE VI].

| Year<br>and<br>Month. | Winds.                            |                  |                  |                  | Thermo*<br>meter.    | fiaru*<br>met<T        | Weath               |   |                   |
|-----------------------|-----------------------------------|------------------|------------------|------------------|----------------------|------------------------|---------------------|---|-------------------|
|                       | S<br>No. of days from<br>N. to E. | from<br>S. to N. | from<br>E. to W. | from<br>W. to E. | Temp.<br>in<br>shad. | Barom.<br>in<br>inches | State of<br>the sky | No. of days<br>with<br>showery<br>weather |                   |
| 1805                  |                                   |                  |                  |                  |                      |                        |                     |   |                   |
| Jan.                  | 17                                | n                | 4                | 8                | 46                   | V                      | 29 <sup>ti</sup>    | 12  |                   |
| Feb-                  | 7                                 | 10               | o                | 9                | 47                   | 22                     | 29 <sup>70</sup>    | 11  |                   |
| March                 | 8                                 | 7                | 7                | 9                | 51                   | 32                     | 29 <sup>70</sup>    | 11  |                   |
| April                 | 10                                | 6                | 7                | 7                | 58                   | 33                     | 29 <sup>B1</sup>    | 12  |                   |
| May                   | 14                                | 9                | —                | 8                | 61-                  | 33                     | 29 <sup>79</sup>    | 15  |                   |
| June                  | 4                                 | 7                | 2                | 12               | 74                   | 42.                    | «y"4                | 12  |                   |
| July                  | 1                                 | ii               | 3                | 16               | 74                   | 53                     | 29 <sup>79</sup>    | 11  |                   |
| Aug.                  | 1                                 | 7                | 3                | 20               | 69                   | 47                     | 29 <sup>7*</sup>    | 11  |                   |
| Stpt.                 | 6                                 | 7                | 1                | 10               | 71                   | 42                     | 29 <sup>3J</sup>    | 11  |                   |
| Oct.                  | 13                                | S                | —r               | 5                | 58                   | 29                     | 25"                 | 21  |                   |
| Nov.                  | 11                                | 10               | 4.               | 5                | 54                   | 30                     | 29 <sup>p#</sup>    | 20  |                   |
| Dec.                  | 6                                 | 16               | —                | 9                | 51                   | 2a                     | 29 <sup>71</sup>    | 13  |                   |
| 1805                  | 103                               | 105              | 33               | 124              | 7;                   | 29                     | 29                  | 16"O                                      | 134               |
| Sort                  |                                   |                  |                  |                  |                      |                        |                     |   |                   |
| Jan.                  | 7                                 | 11               | 2                | 11               | 47                   | 34                     | 29 <sup>1*</sup>    | 10  |                   |
| Feb.                  | 7                                 | 6"               | 4                | 11               | 45                   | 14                     | 29 <sup>68</sup>    | 8   |                   |
| Marcli                | 16                                | 10               | 3                | 9                | 53                   | 22                     | 29 <sup>73</sup>    | 19  |                   |
| April                 | 13                                | 8                | 1                | 8                | 63                   | 27                     | 30 <sup>9</sup>     | 18  |                   |
| May                   | 18                                | 7                | 1                | 5                | 7 <sup>t</sup>       | •H                     | 29 <sup>72</sup>    | 22  |                   |
| June                  | 3                                 | 10               | 2                | 15               | 69                   | 42                     | 29 <sup>70</sup>    | 15  |                   |
| July                  | 7                                 | 6                | 4                | 11               | 71                   | 50                     | 29 <sup>74</sup>    | 10  |                   |
| Aug.                  | 7                                 | 6'               | 2                | 10               | 71                   | 50                     | 29 <sup>74</sup>    | 31  |                   |
| Sept.                 | —*                                | 9                | —                | 21               | &o                   | -H                     | 29 <sup>89</sup>    | 9   |                   |
| Oct.                  | 16"                               | 7                | 8                | -                | 60                   | 3?                     | 2 <sup>^4</sup>     | 17  |                   |
| Nov.                  | 3                                 | 9                | 2                | id               | 53                   | 31                     | 29 <sup>58</sup>    | (i  |                   |
| Dec,                  | 6                                 | 9                | 1                | 15               | 5 <sub>4</sub>       | SJ                     | 2y <sup>1^</sup>    | 5   |                   |
| L80(>                 | 11                                | 93               | 33               | 134              | 17"                  | 14                     | 29                  | 15.0                                      | 18 <sup>C</sup> 0 |

.TABLE Viir.

| Year  | Wind*                     |                           |                           |                           | Thermometer. |         | Barometer. | Frosts       |       |       |
|-------|---------------------------|---------------------------|---------------------------|---------------------------|--------------|---------|------------|--------------|-------|-------|
|       | No. of days from N. to E. | No. of days from N. to W. | No. of days from S. to E. | No. of days from S. to W. | Highest.     | Lowest. |            | No. of days. | Days. | Days. |
| 1807  | 7                         | 9                         | 2                         | 13                        | 48           | 19      | 29.72      | 8            | 15    | 5     |
| Jan.  | 7                         | 9                         | 2                         | 13                        | 48           | 19      | 29.72      | 8            | 15    | 5     |
| Feb.  | 4                         | M                         |                           | 10                        | 50           | 22      | 29.84      | 8            | 10    | 1     |
| March | 12                        | 11                        | 1                         | 7                         | 49           | 25      | 30         | 15           | 13    | 2     |
| April | 6                         | * 9                       | 3                         | 12                        | 47           | 28      | 29.84      | 11           | 15    | 4     |
| May   | 17                        | 7                         |                           | 7                         | 75           | 34      | 29.14      | 14           | 13    | 4     |
| June  | 9                         | 7                         | 1                         | 13                        | 79           | 44      | 29.34      | H            | 19    |       |
| July  | 5                         | 7                         | 0                         | 13                        | 70           | 47      | 29.19      | H            | 18    | 0     |
| Aug.  | 6                         | 6                         |                           | 17                        | 71           | 45      | 29.77      | 7            | 20    | 0     |
| Sept. | 6                         | J2                        |                           | 12                        | 50           | 35      | 29.70      | 9            | 17    | 4     |
| Oct.  | 9                         | 8                         |                           | 14                        | 61           | 38      | 29.84      | 5            | 19    | 1     |
| Nov.  | 11                        | 15                        | 4                         | 43                        | 19           | 29.41   | 29.41      | 15           | 13    | 2     |
| Dec.  | 7                         | H                         | 2                         | 8                         | 48           | 19      | 29.84      | 16           | 10    | 5     |
| 1807  | 99                        | 119                       | 21                        | 126                       | 75           | 19      | 29.72      | 130          | 194   | 41    |
| 1808  |                           |                           |                           |                           |              |         |            |              |       |       |
| Jan.  | 3                         | 17                        |                           | 11                        | 46           | 19      | 29.76      | —            | 18    | 0     |
| Feb.  | 4                         | 17                        |                           | S                         | 53           | 22      | 30.14      | [4           | 15    |       |
| March | 26                        | 3                         |                           | 2                         | 52           | 29      | 30.14      | 23           | 8     |       |
| April | 8                         | 14                        | 2                         | ti                        | 56           | 31      | 29.14      | IS           | 16    |       |
| May   | 7                         | 3                         | 4                         | 1?                        | 71           | 45      | 29.19      | U            | 15    | 5     |
| June  | 9                         | 6                         | 4                         | 11                        | 75           | 44      | 29.84      | J7           | 12    |       |
| July  | 10                        | 3                         |                           | *12                       | 80           | 42      | 29.40      | 14           | 12    |       |
| Aug.  | 5                         | 5                         |                           | 18                        | 68           | 43      | 29.70      | S            | 20    |       |
| Sept. | 12                        | 9                         | S                         | 7                         | 66           | 41      | 29.70      | 13           | 15    |       |
| Oct.  | 13                        | 18                        | 2                         | 11                        | 53           | 33      | 29.52      | 10           | 15    | 6     |
| Nov.  | 13                        | 7                         |                           | iO                        | 52           | 26      | 29.54      | 14           | 12    | 4     |
| Dec.  | L4                        | 9                         |                           | S                         | 52           | 1       | 29.55      | 13           | 12    | 1     |
| 1808  | 111                       |                           | 17                        | 121                       | 80           | 19      | 29.84      | 156          | 171   | 39    |

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TABLE IX.\*

| Years.               | vWids                          |                                |                                 |                                  | 'Chi rno-     |                | ! Barmn ier.                         |                              | YY. ath                          |                                    |                                    |
|----------------------|--------------------------------|--------------------------------|---------------------------------|----------------------------------|---------------|----------------|--------------------------------------|------------------------------|----------------------------------|------------------------------------|------------------------------------|
|                      | B<br>No. of days from N. to E. | 3<br>No. of days from N. to W. | Zi<br>No. of days from S. to E. | 128<br>No. of days from S. to W. | 72<br>Highest | 19<br>Lowest   | 30<br>Greatest being during the year | 28<br>Lowest during the year | 29<br>Average Le during the year | 146<br>No. of days during the year | 140<br>No. of days during the year |
| 1795                 | 10*                            | 71                             | 3.9                             | 128                              | 72            | C              | —                                    | —                            | —                                | 146                                | 140                                |
| 1796                 | 1(X                            | 9i                             | 49                              | Ufa                              | 74            | 19             | —                                    | —                            | —                                | 178                                | 16»                                |
| 1797                 | 9*                             | 80                             | 3S                              | 140                              | 72            | 20             | —                                    | —                            | —                                | 137                                | 10J                                |
| 1798                 | 87                             | 7i                             | 28                              | 175                              | 74            | 10             | 30 <sup>31</sup>                     | 28* <sup>fl</sup>            | 29 <sup>61</sup>                 | 167                                | J£9                                |
| 1799                 | I3i                            | 64                             | 23                              | J43                              | 76            | 17             | 304 i                                | 28 <sup>73</sup>             | 29 <sup>61</sup>                 | 177                                | 146'                               |
| 1800                 | 12<                            | 78                             | 23                              | 144                              | 76            | is             | 30 <sup>1*</sup>                     | 28 <sup>60</sup>             | 2c«J                             | 192                                | 157                                |
| 1801                 | 92                             | 107                            | 21                              | 14.5                             | 74            | 21             | 30M                                  | 28 <sup>45</sup>             | 29* <sup>o</sup>                 | 1fa                                | 16.                                |
| 1802                 | 86                             | 9<                             | 17                              | 166                              | 78            | 1              | 3015                                 | 28 <sup>19</sup>             | 2J <sup>(to</sup>                | 141                                | 180                                |
| J803                 | 101                            | 113                            | 23                              | J2S                              | 75            | 1 <sup>s</sup> | 3019                                 | 2S <sup>3?</sup>             | 2 s io                           | 16'S                               | ioV                                |
| 1804                 | 125                            | 71                             | 52                              | 114                              | 74'           | 8              | 30* <sup>b</sup>                     | 28 <sup>83</sup>             | 29 <sup>73</sup>                 | 14(i                               | 200                                |
| 1803                 | iOL                            | 105                            | 33                              | 121                              | ?4            | 22             | 30 <sup>68</sup>                     | 2« <sup>Ts</sup>             | 29 <sup>74</sup>                 | 160                                | 1S4                                |
| 1805                 | 103                            | 9«                             | 30                              | K;I                              | 72            | U              | 30 <sup>2*</sup>                     | 2** <sup>1</sup>             | 29'»                             | 150                                | 1SQ                                |
| 180?                 | m                              | L19                            | 21                              | 120                              | 75            | 19             | 30 <sup>61</sup>                     | 3gi«                         | 29 <sup>7J</sup>                 | 130                                | 194                                |
| 1808                 | M7                             | 1IJ                            | 17                              | 121                              | so            | 18             | 30»i                                 | 28 <sup>53</sup>             | 2y <sup>^</sup>                  | Lo6                                | 171                                |
| Average of 11 Years. | 10ot                           | 91                             | 29 <sup>1</sup>                 | 137                              | 75            | 10             |                                      |                              |                                  | 15&                                | 171 <sup>1</sup>                   |
| Average at 11 Years. |                                |                                |                                 |                                  |               |                |                                      |                              | 20 <sup>c8</sup>                 |                                    | j                                  |

## SECT. IV.—SOIL.

The soil is the foundation as well as the nurse of vegetation ; and a proper knowledge of its various characters and qualities may well be considered as the first study of the agriculturist. It is in the substratum of the soil **that** plants spread their roots ; search for their food ; and seek for support against the blast. Without entering into a philosophical discussion concerning the food of plants, it may be permitted to observe, that water or moisture constitutes a very essential part of it. That soil then is the best, all other things being equal, which is best calculated to receive and to retain that quantity of moisture which is necessary to feed the vegetables that grow on it, as well as to absorb and throw off what is superfluous, and would prove hurtful. A soil consisting chiefly of silica or sandy **particles** receives, but cannot retain the quantity of moisture proper for vegetation : a mere clay, and, still more, a till, are impervious to water ; it stagnates at the surface, and prevents the **growth** of **plants**. The siliceous soil may be corrected by the admixture of iron ores, and of adhesive earths :



clay and till may be corrected by pulverization', by exposure to the atmosphere; and by the admixture of siliceous and calcareous substances.

Stirlingshire exhibits every variety of soil, the *chalky* alone excepted, that is to be found in the island. In describing these, the most natural method seems to be to carry the reader, by a topographical *coup cToeil*, through the various districts of this county, delineating, as we pass along, the different soils; and endeavouring, from time to time, to give interest to the picture, by introducing a slight sketch of the appearances and productions of the country.

TOPQ.

## TOPOGRAPHICAL VIEW

OF

## STIRLINGSHIRE,

WITH A SKETCH OF ITS SOILS\*.

BEGINNING by the western part of this county, the parishes of Buchanan and Drymen form an irregular four sided figure, the greatest length of which extends from west to east about 18 miles : the greatest breadth of this trapezium, at the western extremity, is no more than three miles and, at the eastern, about eleven. It is bounded on the west by Lochlomond, through the extent of about 15 miles : one half of this beautiful lake, throughout this extent, is justly claimed by Stirlingshire, including the islands belonging to his Grace the Duke of Montrose, with the sole exception of the romantic island of Inchmurrin, the property also of his Grace, and his deer parks, but belonging to no parish or county, as far as has been yet ascertained. **The principal islands** in Lochlomond undoubtedly belonging to **Stirlingshire**,

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More it will be proper to take recourse to the map which accompanies this report.

lingshire, are *IncJicaiUich*, or the Nun's Iffend, chiefly covered with oak ; *Inchjad*^ and *Inchcr*^*in*^ mostly arable ; with nuny is'ets of smaller size.

The banks of the lake are beautifully skirted with \ aluable coppice woods, chiefly consisting of \*oak, but intermixed with ash, birch, and alder : The northern side of this district, lying along the water of Duchray, is also skirted with wood, though more sparingly. Patches of arable ground, of an arenaceous soil, occur, from time to time, along the banks of the lake, and of the river. By far the greatest portion of this district is mountainous, and fit only for pasture. Some meadows, producing natural grass, occur in the vallies : Berlomond is almost free from heath : it is covered with a grassy s^vard, which affords the finest pasture for sheep. The lower mountains are mostly heathy: the soil is principally 2 thin covering of moss, with a subsoil of reddish and tiily earth : the pasture which *ih&e* afford is of an inferior kind.

It may be observed, however, that the pasture 011 these heathy mountains is yearly improving, since the almost universal introduction of sheep. In spring, it is the general practice to *set* fire to these extensive heaths, which is permitted until the 5th day of April; after which day, the burning of heath is prohibited by act of Parliament, on account of the game. The first year after the heath is burnt, tender shoots of that plant spring up, intermixed with herbage, affording a grateful pasture to cattle. The sheep continually brousing on these tender shoots, especially in winter, prevent thfc heath ever after from attaining its fo^mer luxuriance ; and, in pi ocess of time, it disappears altogether. Many mountains,

mountains, which, in the memory of man\* were covered with coarse heajh, and of little value for pasturf, are now entirely green, and covered with rich herbage.

The banks of the Endric, and of the Blane, which falls into it, present two beautiful varies or straths, the prevailing soil of tdfch is either a fine light loam, or a sharp quick arenaceous mould.

At Killearn, that chain of mountains which extend from Dunbarton to Stirling, after being interrupted)? the valley of the Blane, re-commences; and stretchng eastwards, in different divisions, under the various denominations of the Killearn, the Campsie, the Kilsyth, the Dundaff, Fintry, and Gargunnock hills, or more generally, under that of *the Lennox hills*, constitutes the most valuable pasture lands in Scotland. The soil of these mountains is chiefly arenaceous, mingled with till: moss earth also frequently occurs. There is almost no heath: on the Dundaff hills, indeed, a stunted heath occupies a considerable space > but still the pasture is excellent. The different plants, which chiefly constitute the herbage, will be afterwards enumerated.

Directing the eye eastward, along the northern exposure of these mountains, an extensive district of near 20 miles, presents itself towards Stirling, consisting of the parishes of Balfron, Killearn, Kippen, and Gargunnock: this track of country slopes gently from the mountains on the south, to the river Forth, on the north; the soil improving in fertility as it retires from the mountains. On the high grounds of Balfron and Kippen, we meet with a heatly muir or moss of great extent, which seems to be a continuation of tfe muirs of Buchanan and Drymfi:, stretching eastward? from Bei^lomond.-\*-

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The subsoil of this elevated stretch of ground is, almost throughout, either an impervious till, or\* still more impervious rock of a reddish kind of free-stone. Though the greatest part of this district is held under tillage, the disadvantages under which it lies from the coldness of the bottom, and from the difficulty of pawing off the moisture, are very considerable. This soil is particularly unfavourable to turnip husbandry. Excepting in a few patches of dry gravelly soil, which occur from time to time, the culture of turnips is considered as injurious. The only way in which it would seem that turnip husbandry can be advantageously attempted in such soils is, by taking them up with dry weather, in the end of autumn, and by stacking them; and then, by setting up the ground immediately in ridges, that the water may run off.

As you descend towards the banks of the Forth, rich clay or carse ground occurs, interrupted, at times, by considerable patches of moss, with a subsoil of the same clay or carse.

On each side, and in the interstices, or interruptions of this chain of mountains, several beautiful vallies or *struifis*, as they are called, occur, of more or less value in an agricultural point of view. The narrow, but fertile vale of Fintry, consists chiefly of an arenaceous soil, with some instances of loam, on the banks of the Endric.

A ride through the vallies which intersect the Lennox hills, is rendered interesting by various objects of high importance to the agriculturist. In travelling eastwards from Fintry towards Denny, we find the lower grounds adjacent to the Endric, which has its rise in  
these

these hills much injured by the overflowing of the river, and by the confluence of mountain streams. The **soil** is light and sandy and the low grounds are covered, throughout a considerable extent, with large stones, and coarse gravel, carried down by the torrents. Nor does it seem practicable to remedy this evil by enlarging the river, on account of the shallowness of the channel, which, for about three miles, is almost on a level with the adjacent fields; and even though the channel were dug, at a great expence, to a sufficient depth, the first land flood would **inevitably** choke it up with the stones and gravel which are carried down by the **domain** streams.

About three miles beyond-Fintry, the Endric forms a **magnificent cascade** falling irregularly over a precipice of 91 feet high, and **foraighing** to the lover of picturesque scenery, a picture not often to be met with even in Stirlingshire. Beyond this elevation, the country changes its character. The soil **becomes** thin, and the climate cold and bleak: still the **herbage is rich\*** and well adapted to pasturage, in which, accordingly, it is principally employed.

The river Carron, celebrated in ancient history and in song, as well as in the annals of modern **manufacture**, has its rise in these mountains, in the vicinity of the source of the Endric; the former flowing into the Firth of Forth, and the latter into **that** of Clyde. Near the source of the Carron as soon as it reaches the **vailey**, the Carron Bog, as it is called, presents to the **traveller** the prospect of the most extensive natural meadow **dial** \*  
\*s to be met with, **perhaps**, in Scotland. « **Its length** is four miles: it is, in some places, two miles in **breach** and

and in no place less than one \* " It may be reckoned to contain' near 3000 Scots acres. " L affords sustenance during the winter to the cattle of the surrounding farms. This remarkable meadow, besides its utility, adds great fertility and beauty to the general face of the country. The scene it exhibits during the months of July and August, of twenty or thirty different parties of people employed in hay-making, is certainly Very cheerful; and, during the winter, the greater part of it being overflowed by the Carron, which runs through the middle of it, and which is then industriously led over its whole extent, to fertilize it for the ensuing crop, it assumes the appearance of a large and beautiful lake In both situations, it affords an agreeable relief from the bleakness of the country around it \*."

Immediately after passing Carron bog, the banks of the river become extremely romantic. Clumps of natural wood/chiefly oak, assisted by plantations of larch and Scots fir, adorn the shelving rocks, and give interest to the numerous cascades which are heard tumbling under their covert.

Passing along the Carron, towards Dunipace and Larbert, the soil rapidly improves, from a clayey till to a rich and fertile loam, The country now opens towards the Forth. The extensive carse of St' Niniaift, Airth, Allothkennar, Falkirk, and Polmont, meet the eye, presenting a scene, which, for industry, population, and culture, may vie with any in Great'Britain.

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len's sesrts, with their ornamented environs \* **thrivai** towns and villages ; important manufacturing-establishments ; and especially fertile fields, loaded with abundant crops, and daily improving under the hand of **skili** **tod** industry, constitute the principal objects in this light y interesting prospect.

If again we take the route by the beautiful valley that opens by vStrathblane, and Campsie> to Kilsyth, the richness of the pastures, and the **increasing** fertility of the soil, offer still more important objects of attention than t lie Carron Bog and the DtindafK hills.

**I** At its western extremity, iK's valley is very narrow;

in some places, it is not more than half a mile broad. The soil is chiefly a sharp arenaceous earth. On the banks of the Blinne a light loam prevails. The gener; sou\* of the mountains has been already described, as coasting partly of peat earth ; but chiefly of a reddish arenaceous earth, and of a stiff till. The native vegetables of these pastures v. ill be afterwards enumerated.

**I** The chain of mountains which traverses this district from west to east, declines gradually in height, in that direction, from the **Oampsie Felfe**, which are estimated at ] 500 feet, by **the** Kilsyth hills, of about 1300 feet, to Denny, where their character, as mountains, is lost.

The valley that extends from Strati iblane towards Kilsyth, is bounded on the south by a lev; hill, covered in a great part **with** stunted heath, and terminating abruptly on the east, in the romantic promontory of Woodhead, On the southern slope of **this** lull lies, with a fine exposure, the parish of 1 **ioc2**, containing much land of excellent quality, both loamy and naceous: the subsoil abounding in coal and lime-

Advancing



Advancing eastwards, by Campsie, the valley widens. After parsing the promontory of Woodhead, the whole is a continued plain, beautifully undulated with gentle eminences and easy declivities. The general character of the soil is siliceous, or arenaceous, with an admixture of loam. • Towards Kilsyth, the grand canal, from time to time, meets the eye, on the southern verge of the county. The great road to Falkirk has its direction in a line nearly parallel to the canal; and frequent marks of commercial activity gratify the traveller. On the Kelvin, to the west of Kilsyth, a rich track of clay, loam occurs, which is now held in the highest state of cultivation by Captain Davidson, and of which an account will afterwards be given.

In the neighbourhood of Kilsyth, at Dullater Bog, the highest level above the sea occurs, through which the grand canal passes: it is of 162 feet. It is remarkable (but this may be remarked in similar situations in almost every country in Europe) that, at this highest level, the character of the soil is changed; and that at the point where the Banton-coal-work iron-railway crosses the road, (which appears to be the highest ground in this district, the Kelvin running to the west, and the Bonnie, to the east) the soil, which, to the west, is a rich and clayey loam, becomes, towards the east, thin, channelly, and siliceous.

With regard to the soil of the low grounds, and narrow vallies of the western district of Stirlingshire, it may be observed in general, that every river has formed, in proportion to its extent, a quantity of loamy soil, by its alluvion; and the smaller mountain streams have generally formed, at their *embouchures* a proportioned extent

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\*tent of grrtvclly or arenaceous soil. These gravelly-soils are, for the most part, extremely fertile : they are well suited to the culture of barley, oats, turnips, and potatoes : they require abundant manure; and they speedily exhaust it.

The soil of the isolated portions of Stirlingshire which lie on the north of the Forth, consisting of the whole parish of Alva, and of a part of the parishes of Lecropt and Logie, is, in the low grounds, partly clay ortcirse, and partly loam. The mountain\* of Alva are entirely green, and covered with rich herbage, with the exception of about 1000 acres of moss, which, appear to be irreclaimable, on account of its great depth, and the want of a level by which it might be drained.

*Vlat/, or Carse.\**—The distinguishing soil of the richest portion of Stirlingshire, and perhaps of Scotland, is its clay-soilj here usually denominated *case* or *kerse* land. This remarkable soil extends along the banks of the Forth, in this county, from the neighbourhood of Buchlyvie on the west, to its junction with Linlithgowshire on the east; through an extent of about 28 miles. Its breadth varies from \ mile, to 44 mites ; the average breadth may be about 2 miles, making 56 square miles, or 28,500 Scots acres of carse soil nearly. If all the carse lands, which skirt the Forth on both sides \*, be

en into the account, it may be computed at the average

That fs, iit the counties, of Purkli, Clackmannan, Lin\* lithgow, and Stirlil<sup>h</sup>\*

range length of 34 miles, by 6 in breadth ; amounting to 204 square miles, or 10\$800 Scots acres nearly, and unquestionably constituting the richest and most important district of Scotland, in an agricultural point of view.

This soil is evidently alluvial; and the substances which are found in it, as well as the aspect of the higher grounds by which it is bounded, indicate that, at some former period, it was covered by the sea. The soil itself consists of the finest particles of earth, without the smallest stone or pebble except what may have been accidentally carried thither. The soil of the best quality, when first taken up from its bed, is of a bluish colour, and of a soapy or mucilaginous consistence. That which has been long exposed to the sun, and to the elements, by cultivation, assumes a darker hue, or hazle colour ; and, in point of friability, approaches to the character of loam. Beds of shells, particularly oysters, and others which are usually found in the Firth, occur from time to time, from a few inches to four feet in thickness. Throughout the whole of these corses, patches of till occur, especially in the district to\* the westward of Stirling. Indeed, as we ascend the Forth towards the west, this soil becomes gradually of inferior quality. These corses are elevated from 12 to 20 or 25 feet above the level of the sea at high-water.

At the same time that it is evident<sup>0</sup> that this soil is alluvial, there seems to be room to Question whether this deep and extensive tract of clay, stretching along both sides of the Forth, is to be attributed solely to the deposit of that river through the course of ages. The cause appears to be altogether inadequate to such a prodigious

digious, effect. The Clyde, which runs through a course at least as long, and carries an equal body of water to the sea, has formed no alluvial land at its embouchure ; and it will probably be found that no river that runs westward has, before its alluvion, formed any considerable deposit of soil. The quantity of earthy particles that are carried down by rivers and streams from the mountains is much less than has been generally imagined.

It would seem, that at some distant period, the waters of the German Ocean had regurgitated to the westward, and covered, for a considerable time, those plains\*, depositing there the rich particles of soil with which they were, in consequence of some revolution of nature, copiously impregnated. If any stress could be laid on the universal tradition of the country, it would lead to the belief that this whole plain, as far west as Gartmore, was formerly covered by the sea.

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\* The same observations apply to the Curse of Gowrie, in Perthshire.

+ It may be permitted to observe that all the phenomena of the caracs may be easily explained, by adopting the theory of the ingenious Mr Kirwan, concerning the deluge, which he supposes to have been brought about by the supernatural pouring in of the waters of the Pacific Ocean towards the North-east. In this direction, he remarks, that we find the summits of all the high mountains in the world broken over and tumbled down ; we find the south-west side of the rocks of the mountains washed bare, and an accumulation of soil on the east or north-east; Leaving this theory to its own merits,

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Every appearance which this district exhibits seems to confirm this belief. The depth of the soil is very great; in some places, it is 30 feet and upwards. In digging a coal-pit, on the estate of Carron-hall, the slimy earth, or sleet, as it is here called, the same in consistence with that which covers the Firth at low-water, was found at the depth of 26 feet \ it burst in upon the pit, crushing the wood of three inch plank, which was employed to line it; and it was found necessary to line it with stone. In the Carse of Gowrie, a stratum of peat-  
moss

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it may be noticed that it is on the eastern side of every continent that we meet with extensive tracts of alluvial soil\* Sir George Staunton informs us, that, on the eastern coast of China, there is an extent of 200 miles of this soil: we find a tract of the same extent on the eastern coast of America; we meet with it, on a smaller scale, in the carses of Perthshire and Stirlingshire.

If Mr Kirwan's theory be adopted, does it not follow, that when the dashing torrent from the S. W. of which this globe every where exhibits such striking traces, had reached any sea which lay in its course, the German Ocean, for example, a considerable time must elapse before it could communicate its impulse to the waters which it found at rest; that, during this suspension of motion, it must have regurgitated on the land which it had left behind it; and that even some centime\* may have elapsed before the waters regained their ancient and their present level? During this interval, the ocean, loaded with the spoils, vegetable and terrene, of the continents which it had swept in its course, would gradually deposit on the coasts to the north east the rich materials which it had carried along with it\*

moss is found 19 feet under the surface, full of the roots of large trees, deer's horns, and large bones (all probably antediluvian) in the superior strata no vegetable exuvia are found ; they consist solely of particles of fine earth \*. In the Carse of Falbirk, there has been lately found, under a covering of moss, a bed of clay marie, 6 feet thick, and below that another bed of moss.

The nearer the sea, it is observed, that the better and deeper the carse soil is. All along the coast of the parishes of St Ninian's, Airtb, Bothkennar, Falkirk, and Polmont, the Firth is so shallow that an extensive tract is laid dry at low-water } this has encouraged most of the adjacent proprietors to reclaim many^ hundred acres from the sea by *embankments*, of which an account will be given under that head. Let it suffice, at present, to observe, that in 1788 Lord Dundas reclaimed 90 acres on the norjh side of the Carron where it enters the Firth. In 1806, he gained 24 acres in the parish of Airth. In Bpthkennar he is now about to reclaim 60 acres, where about 500 more may be easily gained. About 400 acres have been recovered from the sea by other proprietors in this district; and further additions will, no doubt, be soon made, by this process, to the productive soil of Stirlingshire, and of the adjacent counties.

The soil thus acquired from the sea is found to be superior in quality to the rest even of the carse land. The first year, it is fallowed, in order to expose it to the sun and frost, and to bleach out the saline particles with

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which\*

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\* Stat; Ace, Vol. XIX. p. 557.

which it is too copiously impregnated. After this operation, with an ordinary dose of lime, it will yield the richest crops for upwards of a dozen of years, without any further, manure.

*Peat earth or moss.*—The only other species of soil which remains to be noticed in Stirlingshire is peat-earth, or moss as it is called in Scotland.

In the mountainous district, at the western extremity of the county, much of this soil is found, consisting partly of mossy strata of considerable depth, as on the lower part of the eastern shoulder of Benlomond ; and partly of a thin superficial covering of peat earth, incumbent on a clayey till, or gravelly subsoil. Of this last kind an extensive tract occurs, stretching from Drymen, by the higher grounds of Balfron and Kippen, as far as Gargunnoch ; another mossy tract occupies the western part of the parish of St Ninian's. A tract of moss of considerable depth, commencing in the parish of Muiravonside, extends as far as Cumbernauld in Dunbartonshire.

Though a great portion of the shallow mosses are, in some measure, inapplicable to the purposes of husbandry, and though these moorish tracts, through their whole extent, are of inferior value, yet they must not, without many limitations, be indiscriminately classed under the denomination of *wastes*. The greatest part of these grounds furnishes pasture for sheep; the muirs of St Ninian's and Gargunnoch especially are reckoned excellent pasture grounds, as well as those in the western district of the county.

Perhaps,

Perùr-ps the only grounds in Stirlingshire that may be accounted absolute *xcastcs* are the mosses uf .Muiravon-side and Slamannan in great part; the thousand acres of moss in the mountains of Aha, of which mention has been made; and the small patches of deep or flow moss, as it is called, which ore found in the lower district of the county, on the banks of the Forth, of which \<j shall now take notice.

Of this last kind of mosses there arc three in the lower part of the parish of Kippen, one of 200 acres, one of 150, and one of about 70. There were formerly some other mosses in this line of country > but these, with a great part of those that remain, have been removed, und they will all be soon removed, in the manner which shall afterwards be described. In the fertile parish of Airth there is a moss of between 400 and 500 acres, of which the late Lord Dunmore cleared away 100 acres upon the Kersie estate; and his son, the present Earl, is now prosecuting the undertaking with increased ardour. All these mosses are incumbent on a clay or carse soil.

That all of these, together with the still more extensive moss of Blairdrummond, in the county of Perth, and on the northern bank of the Forth, had their origin in the overthrow of vast forests which formerly occupied this extensive plain, is the generally received and probable opinion. There is even reason to believe, were this the proper place for discussing the point, that this forest formed a part of the *Sylva Caledonia*, which was cut down in the time of Severus, by the-Roman soldiers, in order to deprive the natives of those fastnesses frflm which they used to sally forth to annoy the legions.



These mosses consist of two strata, the upper one is formed of a light spongy peat earth, of a whitish colour, and extending to the depth of 5 or 6 feet. It is evidently an accumulation of sphagnum, comarum palustre, and other coarse aquatic plants. It is neither useful as fuel or as a manure. Below this is found a stratum of 4 or 5 feet of black compact peat earth, which is used for fuel, and which, when mixed with clay or dung, makes a good manure for a clayey soil. Below these strata of peat, a rich clay soil appears, precisely of the same quality, and upon the same level with the adjacent carse.

On the surface of this clay, the remains of the ancient forest present themselves, and impress the mind with a very striking idea of its magnificence. The remains of birch, alder, willow, and hazle, occur in a decayed state, and are easily removed. But the oaks are almost entire: the *white* 'woody as it is called, or the outermost circles of the tree, only are decayed; whilst the *red* remains, and is likely to remain, if not exposed to the air, for ages. These trees are of great length, some of them 60 feet in stem. They lie in every direction, which seems to indicate that they were not overturned by a tempest, but by the hand of man. The roots still remain entire beside them, with their fangs deeply and firmly fixed in the soil. Five or six of these roots may sometimes be found in a piece of ground of not more than 20 yards in diameter; and one is surprized to observe that trees of such magnitude grow so close to one another. A fine specimen of this appearance may be seen below the village of Kippen, on the farm of Mr. George Galhraith.

With regard to the respective number of acres, of each of these deferent kinds of soil, of which? Stirling\* shire consists, it is impossible to form a precise estimate.

Considering Stirlingshire as containing about 328,000 Scots acres, the following estimate is probably a near approximation to the truth:

|   | <i>Acres.</i> |
|---|---------------|
| 1. The carse soil has been already estimated at   | 28*500        |
| 2. Loamy and arenaceous soil, under cultivation . . . . .   | 80,000        |
| 3. Mountain and valley pastures, partly moorish, including woods, a few small lakes, rivers, roads, towns, and villages . .                                   | 202,500       |
| 4. Deep mosses, at present waste, including those of Airth, Alva, Kippen, Muiravon-side, Slamannan, and the impracticable mosses of Buchanan and Drymen . . • | 17,000        |
| Total acres   |               |
|   | 328,000       |

Before quitting the subject of the soils of this ^oun-ty, it may be permitted to add, that nature furnishes<sup>1</sup> us with a method of judging of them which, though little attended to, might be turned to good account by the agriculturist; and this is by the native vegetables which soils of a particular 'quality are disposed to produce. In-deed, it may be o&erved, that a moderate and easily acquired, but *scientific* acquaintance with the native plants of his `country, is more necessary to thè husband-man than even \*o the apqthecary. A few examples  
which

which occur every day to an observer in Stirlingshire will serve to illustrate this topic.

Land that is mossy, or the subsoil of which is moss, naturally produces the eriophorums, carexes, droseras, and anthericum ossifragam, with the different kinds of heath.

Spouty and wet soils produce the pinguicula, the viola palustris, triglochin, water cresses, bidens, caltha.

Land, the subsoil of which is tilly, and impenious to water, may be known by the abundant production of junci of various kinds, particularly, on elevated situations, the juncus articulatus or spret.

Thin and exhausted soils, held in cultivation, produce the rumex acetosella, or sheep's sorrel, the geranium dissectum, achillea ptarmica, &c.

Many soils in this district, and probably overall Scotland, that are naturally of good quality, but let out in grass in an impoverished state, are over-run with the serratula arvensis, the too well known "cursed thistle," the onopordum, still more pernicious where it fixes, but happily not so abundant; and the senecio jacobea, or rag-weed. Even the *habit* of this last may serve, in some measure, to indicate the quality of the soil. Wherever it grows tall and luxuriant, the soil is good; wherever it is low and stunted, the soil is poor.

In the fine corses of Falkirk, Bothkennar, and Airtli, the introduction and dissemination of the tussilago farfara is noticed and regretted by the most intelligent agriculturists with whom the reporter has had an opportunity to converse; and they will forgive his embracing this occasion of attempting to put them upon their guard against its pernicious qualities. The root of this plant is of such a nature as to render it almost inextermirable.

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It is broken over by the smallest impulse: the least portion of it, left in the ground, becomes a new plant, it belongs to the *syngenesia* class; and its seeds are very numerous. They are furnished with wings (pappus) by which they are easily conveyed, by the winds, over a great space. The leaf is broad, and covers much ground. The clay soil, too, is the proper nidus of the tussilago.

It is difficult to say what is the most promising method of exterminating this noxious plant. To attempt it by removing every fragment of the root from the soil seems to be impracticable. The most successful method, reasoning analogically, probably is to nip off the flower attentively, before it has ripened the seeds, the multiplication of the weed will be thus prevented; and by successive preventions of perfecting the seed, the plant will at length die.

Light loamy soils, on the banks of rivers, may be marked in early spring, by a scanty verdure, and by the abundant appearance of the *equisetum arvense*.

Thin soils, which have been laid down in bad order, may be distinguished by the almost total failure of plants useful for pasture; and by the prevalence of vegetables of the musci order, as polytrichums, (perhaps the mark of the very poorest soil) mniums, bryums, and hypnums.

Were a character to be offered of the *best pasture soils* of this country, by an enumeration of the native vegetables which they generally produce, the reporter would presume to suggest the following, nearly in the Linnaean order; premising that it is the *quality* of the soil, and not the *value* of the plants that is *principally* meant to be indicated:

|                               |                         |
|-------------------------------|-------------------------|
| <i>Of the Grasses.</i>        | <i>The Tormentilla,</i> |
| The Anthoxanthum,             | Ranunculus ficaria et   |
| Aira,                         | acris,                  |
| Poa,                          | Thymus,                 |
| Festuca,                      | Euphrasia,              |
| Alopecurus,                   | Melampyrum,             |
| Holcus, &c.                   | Lathyrus,               |
| <i>Of other Plants.</i>       | Orobus tube/osus,       |
| The Flantago lanccolata,      | Vicia,                  |
| Galium,                       | Various trifolia,       |
| Lithospermum,                 | Polygala,               |
| Bunium,                       | Hieracium,              |
| Primula veris,                | Hypochaeris,            |
| Campanula,                    | Lapsana,                |
| Linum catharticum,            | Gnaphalium dioicum,     |
| Oxalis.                       | Bellis perennis.        |
| Lychris dioica et flos cuculi | Orchides varise.        |



#### SECT. v.—MINERALS-

THERE are few districts in Scotland that abound more in minerals of various kinds than the county of Stirling. Great and valuable as its surface produce is, it may<sup>1</sup> be questioned whether the produce of its subterraneous treasures are not nearly equal. The riches and abundance of its minerals have given occasion to the establishment of many important branches of manufacture which add considerably to the national wealth.

1. *Coal*.—This important mineral may be considered as the basis of national improvement and of arts.

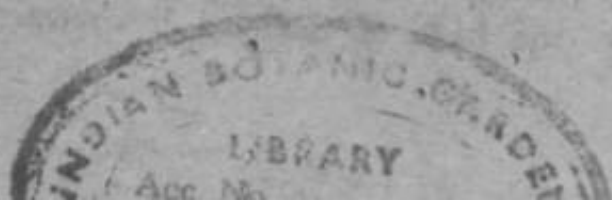
'W herever

Wherever this fuel abounds, comfort prevails, and manufactures encrease. To render sedentary occupations practicable upon a large scale, warmth is necessary; and if we have surpassed the nations of the Continent in manufactures of every kind, it y> to the abundance and general diffusion of coal over our island, that our success is to be, in a great measure, attributed.

The northern boundary of that great belt of coal wh.ch extends from Kintyre on the west, to Fifeshire on the east, in an oblique direction, appears to run in this county along the southern base of that chain of mountams which has been described under the appellation of <sup>the</sup> Lennox hills, and which re-commences beyond Stirhng, in the Ochilb. To the north of this <sup>TM</sup>ge of mountains, coal has not been discovered, though repeated trials have been made. One may be mentioned in particular, which was made several years ago. with great attention, by Peter Speirs, Esq. of Culcruich, about a mile to the northward of Culcruich fouse. The appearances of the strata were very fayourable i but after Toring to the depth of about 32 fathoms, no coal was found; and no further search was <sup>made</sup> f.

There is a tradition prevalent in the western parts of <sup>th</sup> \* county, that, about a century ago, a trial for coal <sup>w</sup> M made near <sup>of</sup> ,uchlyvie, on the estate of Mr Graham <sup>W t m o r e</sup> i that the miners actually found coalj but that

\* Whilst thi, report is in <sup>It pres</sup>», the <sup>author</sup> lca,,, that Mr Speirs, is engaged i ««\*ift«.trW. with so,,, prospect of success: of this, he able to give some account in an Appendix.



that they- were bribed by the laird of Bannockburn to conceal their discovery, lest his own sales might suffer by it. After some enquiry, the reporter can find no just foundation for this tradition.

The parishes which lie to the north and west of this line of coal, lie under great inconvenience from the distance and high price of fuel.

> To the south of this line, coal abounds almost everywhere. It is impossible, in such an extensive range of this useful mineral, to ascertain the quantity or the value of what is raised. Some documents to shew its quality and abundance in different districts of the county must suffice.

To begin by the west, there is a valuable coal wrought in the parish of Baldernock; the seam is from 3 to 4 feet in thickness. It lies between two strata of limestone, the upper one blue, and of fine quality; the under one whitish, and of less value. This coal resembles that of Newcastle.

The parish of Campsie has long been celebrated for the abundance and quality of its coal. The disposition of the belts of coal in this parish is somewhat remarkable. A mile to the eastward of the church, at the base of the Campsie hills, one belt of about 1000 yards in breadth commences, and is continued to the eastward through the whole extent of the parish. Another belt, of still greater extent, encircles the lesser hills, or eminences to the south. The coal of the latter is of a superior quality to the other.

In the northern belt, the coal is found at the depth of from 7 to 15 fathoms; in the southern, from 15 to 22 fathoms. The ordinary thickness of the seams is from

from 42 inches to 4 feet. The adjacent strata nearly resemble those of the Baldernock coal-works.; except that here, between the upper stratum of limestone (which is 4 feet in thickness) and the coal, there is found uniformly a stratum of schistus *of* slate, from 4 to 15 feet in thickness. A white limestone, of inferior quality, is found, as before, below the coal. The dip of the seam of coal, inclining in general towards the south east (which is the actual inclination of the ground) is from one foot in three, to one foot in twenty.

The Campsie coal contains a great proportion of sulphur : it cakes, or runs into one mass, in the chimney: It lasts long; but it does not burn with so bright a flame as the coal of Bannockburn\*

In 1793, it was estimated that above 20,000 tons were raised annually from the Bannockburn pits ; and that, at that rate, three acres of the subterranean seam were annually exhausted •, and it is not improbable that this calculation was just. It may be affirmed at present, that from the erection and enlargement of villages, and from the rapid extension of various manufactures in the neighbourhood, more than 40,000 tons are annually raised, a circumstance which seems to threaten, at no very distant period, the total consumption of coal in this district. But it is certain that coal abounds to a much greater depth than any of these mines have been hitherto carried; and that by the perfection to which steam engines, and other necessary machinery, have been brought, the coal can be got at far below the levels that are now wrought

The parish of Kilsyth abounds in coal. That which is found in the west barony is of very superior quality:

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The Eanton coal, which is found in the East Barony, is what is called \$ *blind coaly* and bears a near resemblance to the Kilkenny coal. It contains little or no sulphur ; and but a very, small proportion of bituminous substance. This coal is found to be the most proper of all others for smithy forges; for furnaces ; and for all metallurgical operations, where there should be little smoke or flame. Accordingly, it is exported in great quantities, by the canal, from which it is distant only about a mile, to England, to Ireland, and formerly to Russia. This important mine is much incommoded with water, which is carried off with a great expence of machinery ; but as the machinery is of the very best construction! it is found effectual to remove the evil completely.

All the coal that has been hitherto wrought in Kilsyth lies, as in Campsie, near the surface, from 4 to 16 fathoms. There is no doubt that it extends to a yet-greater depth; and that, at some future period, it will become necessary to work it by the assistance of steam engines.

In the parish of Denny, in the same tract of country, coals are found in sufficient abundance to supply the inhabitants and the adjacent country. From Banknock coallery, much coal of excellent quality is exported to Glasgow by the canal. 12 cwt. of this coal is laid down at Denny for six shillings.

The parish of St Ninian's, throughout its whole eastern district, abounds with coal; and there, coalleries are carried, on upon a very extensive scale. Those of Bannockburn, Auchinbowie, and Heanmuir, are the most ancient, and perhaps the most frequented; new pits

pits are opened up from time to time. It is a consolatory consideration, to Scotland that the coal of this district seems to be inexhaustible- Its quality too is of a very superior kind. It burns with a bright flame; emits great heat; and is impregnated with a very small proportion of sulphur. The coal of this district supplies the southern parts of Perthshire, and the northern part of this county besides its own immediate consumption, and a considerable exportation by the Firth.

In the parish of Airth, there is a coal of excellent quality found under the rock, in the hills of Airth and Dunmore, as well as in the flat fields around. It is only in the hill of Dunmore that coal is taken up at present the seam is from 3 to 4 feet in thickness. It was on the Dunmore colliery that the *second* fire engine was erected in Scotland.

Coal abounds every where in the parishes of Bothwell, Falkirk, and Polmont. It is found also in Muiravonside, Besides the Dunmore colliery, there are extensive works on the estates of Mr Bruce of Kinaird, and Mr Dundas of Carron-hill. The coals are of excellent quality, and are sold from 8 to 9 shillings per ton. Besides supplying the numerous and populous villages and manufacturing establishments in the neighbourhood, a very considerable quantity of coals is exported from this last mentioned district. From Mr Dundas's pits alone are generally shipped, at Carron shore, about 30,000 tons. They are carried from the pit to the shipping place by an iron rail-way which originally cost L.700 per mile. Before this rail-way was constructed, the rate of carriage to the shore was 1 shilling-

ling per ton: they are now carried for 2 penci per ton—Thus the saving of carriage to the shore, for one year, may be estimated at L.1250.

In the parith of Polmont, the Carron company hold a coal-work in lease at the annual rent of L.1,200 \*.

*Limestone.*—This mineral, so essential to agricultural improvement, abounds in the southern and eastern districts of this county. In many instances, as has been stated already, it accompanies coal in two strata, the one above the coal, and the other below; the former being always of the best quality. The lime-works of Campsie and Kilsyth, and those of Sauchie and Murray's-hall, in  
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The reporter has to regret that in investigating the coal works of this county, which occupy such an important part in its internal economy, as well as in his enquiries concerning some of its great manufacturing establishments, he has experienced, for the most part, a jealousy of the object of these inquiries to which no circumstance in the conduct of the Board of Agriculture, or, as he hopes, in his humbler researches, could possibly give rise. A more enlightened view of the object of these reports will soon dissipate these unfounded alarms; and the liberal conductors of these establishments will take pleasure in diffusing every information which may tend to benefit their country. Information concerning peculiar and secret processes, it would be improper to require, and unreasonable to expect. It may be perhaps accounted singular, that in the landed agricultural interest, no twos of this jealousy have occurred.

the neighbourhood of Stirling, have been long celebrated for the quality as well as the quantity of lime which they produce.

Lime-shells, or calcined lime, is now sold at Baldernock, Campsie, and Kilsyth, by the chalders of 32 firlots, wheat measure, at the price of 19 shillings per chalders.

At Saurhie and Murray's-hall, it is sold by the chalders of 24 firlots, pease measure \*, for 15 or 16 shillings per chalders. The quality of the lime at all these places may be judged of by adding, that when fully slacked, it doubles its bulk.

The eastern district of Stirlingshire, on the Firth of Forth is chiefly supplied with lime, by water carriage, from Lord Elgin's works on the opposite coast. The present price of lime shells at these works is Is. 6d. per boll, of 4 firlots, pease measure, or a trifle more than 4 Winchester bushels; it is put on board at that price free of expence to the purchaser; and from this price there is a deduction given of 10 per cent, for ready money. The freight to the landing places on the coast below Falkirk, and in that neighbourhood, is 6d. per boll. The expence of lock-dues, and landing, is about 10 per cent, of the prime cost.

*Free-stone*\*—Freestone, of various quality and appearance, also abounds in Stirlingshire. It frequently accompanies coal and lime-stone. In the western parts of

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\* The firLOT of pease-measure contains 9i Scots pint\*.

the county, a reddish free-stone is found in plenty, which is easily wrought \ but its appearance in buildings of any elegance displeases the eye; this is removed by painting, or casting them with lime.

The free-stone of iCilsyth is of a remarkably fine quality, its general colour is a beautiful white; but it is sometimes tinged with various shades of brown and yellow, and adorned with delicate vegetable impressions. When taken from the quarry, it is soft and easily wrought; but, by exposure to the air, it gradually hardens, and becomes susceptible of a fine polish. It is held in high esteem, not only for the pavement of streets, but also for ornamental work, as vases, columns, and fretted, work. Its vicinity to the great canal renders its conveyance to Glasgow easy and cheap and it is accordingly conveyed thither in great quantities.—When its value becomes better known, the demand for it will undoubtedly increase from the most remote parts of the kingdom. The stratum or post, as it is here called, of this quarry, is from 10 to 15 feet thick, and may be considered as inexhaustible.

*Iron-stane.*—Iron-stone, which is found in various places in Scotland, as well as in England, occurs in Stirlingshire in inexhaustible quantities. There is, indeed^ no reason to doubt that this circumstance, together with the abundance of coal, and the convenience of water carriage, was the chief motive for determining the site of the *Carron works*\* the distinguishing manufacture of this county. Indeed, it is said} that the ingenious Dr Roebuck, one of the first projectors of these magnificent works, after having examined the greatest part of the

the island, before he made his choice, fixed upon this spot as the most convenient. The propriety of his choice is unquestionable.

Besides the supplies of iron-stone which the company receives from England and from Fifeshire, they receive great quantities from the parish of Kilsyth by the canal; Mr Kincaid of Kincaid, in Campsie parish, furnishes annually 8000 tons by contract with the company. Iron-stone is also found in the parishes of Baldernock; Denny, and Muiravortside. To obtain an estimate of the quantity of this mineral annually furnished by this county is impossible. The veil of secrecy which is thrown over this important manufacture appears to be impenetrable; and perhaps, in some points of view, it ought to be so.

Before quitting this part of the subject, however, it may be proper to take notice of a particular species of iron-stone which is found upon the estate of Sir Charles Edmondstone, in the parish of Kilsyth -, and which is considered as the most valuable of all others. It is called ball-iron-stone. The balls, or rounded masses of which it consists, are uniformly of the same shape, which is that of a flat topped loaf, or apple pudding — They are of all sizes, from a quarter of an inch to a foot in diameter. When broken, or cut asunder, they exhibit within a variety of partitions, which are generally filled with spar; though they are sometimes empty, and excavated like a honey-comb. They are the richest in ore of any that are found. They are disposed in strata at unequal distances. The balls of each stratum are, for the most part, of the same size, those of the uppermost strata smaller, those of the lower, larger.

*Basaltes.*—This species of rock occurs in \* Stirlingshire in great profusion, and in great perfection. Indeed, it may be remarked that the rocks throughout that whole line of mountain which extends from Dunbarton to Stirling, partake more or less of the basaltic character. It appears, in some places, in a state of perfection and beauty which is surpassed only by the wonders of Staffa. There is, in particular, in the parish of Fintry, " a grand range or colonnade of basaltic pillars, which rise in a hill called *Dunn* at the end of the hill of Fintry. It consists of 70 columns in front of a gigantic stature; some of them separating into loose blocks, and others, apparently without joint, from top to bottom. They stand perpendicular to the horizon, and rise to the height of 50 feet. Some of them are square, others pentagonal and hexagonal. On the east side of the range, the columns stand separated from one another by an interstice of 3 or 4 inches.—These interstices gradually lessen towards the west, till nothing but a seam is discernible; and then, all is blended in one solid mass of rock, which is much honey-combed, and has the appearance of having been ignited \* "

*Granite.*—Granite has always been considered as one of the mineralogical productions of Stirlingshire. A seam of stone, in Kilsyth, from 20 to 30 feet in thickness, of which many thousand tons are annually conveyed to Glasgow by the canal, for paving the streets, has

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\* Stat. Acc of Fintry, Vol. XL p. 382.

has hitherto been denominated *granite*. The mineralogical knowledge of the reporter does not enable him to say whether this rock be true granite \ or that species of stone, which Dr Thomas Thomson of Edinburgh would term *Syenite*, from its being of the same composition with the rocks of Syene in Upper Egypt, of which so many celebrated monuments still exist. It is probable that this rock is syenite.

In the Halestain burn, in the parish of Kilsyth, the celebrated German mineralogist, M. Raspe, found large masses of gray and variegated dull coloured flint; yellow and red jasper, with nodules of agate and porphyry. This jasper, which is of a very fine grain, has long ago found its way to the lapidaries and seal engravers of Edinburgh and London \*

METALS.—*Copper*.—In 1791 Mr Raspe examined a vein of copper in the parish of Kilsyth, which had been wrought about 60 years before by the *York Building Company*. He found in the drift that had been wrought « a vein of reddish heavy spar, or vitriolated barytes." Upon entering the mine, which, he observes, " had been preposterously shut up/' he found promising appearances of copper : and, it may be added, that the opinion of such a skilful mineralogist surely furnishes a strong encouragement to proceed in the research.

Copper has also' been found in the Ochil hills in this county. In the parish of Logie, a copper mine was  
D 4 wrought



wrought\* sortie years ago, with great prospect of success. The hopes of the undertakers were, at one time, encouraged by meeting with a very rich vein ; but, after working for some time, it disappeared and the search for copper has been abandoned.

*Silver and Cobalt.*—Silver ore has been found in the parishes of Logie and Alva\* On the estate of Aithrey, now the property of Sir Robert Abercromby, in the years 1761-2-3-4, a company of gentlemen from England, in copartnership with the proprietor, wrought a silver mine, from which were extracted 50 barrels of silver ore, of which 4 barrels made a ton; and each ton was valued in London at L. 60 sterling. One Dr Twisse, to whom the ore was consigned, becoming bankrupt, the adventure was abandoned.

In the parish of Alva, a very valuable vein of silver was discovered about the commencement of the last century, by Sir James Erskine of Alva, in the glen or ravine which separates the *Middle-hill* from the *Wood-hill*. It made its first appearance in small strings of silver ore, which, being followed, led to a large mass of that metal. A part of this had the appearance of malleable silver; and was found upon trial to be so rich as to produce 12 ounces of silver from 14 ounces of ore. Not more than L. 50 had been expended when this valuable discovery was made. For the space of 13 or 14 weeks, it is credibly affirmed that the proprietor obtained ore from this mine to the value of L. 4000. per week. When this mass was exhausted, the silver ore began to appear in smaller quantities \* symptoms of lead, and of other metals, presented themselves ; and the

the search was, for the present, abandoned. The communion cups of the parish of Alva are made of this native silver\*

About the year 1759, Charles Erskine of Alva, Lord Justice Clerk, in company with some other enterprising gentlemen, renewed the search for silver ore in these lulls with considerable industry and exertion. The course of the vein was pursued a great way beyond the old workings. A shaft was made to the depth of several fathoms, immediately below the waste, from which the rich mass of ore that has been mentioned was taken, and a drift carried on upon that level in the direction of that vein. None of these operations, however, were; on that occasion, accompanied with success. But in driving a level, at a considerable distance, nearer the the bottom of the hill, for the purpose of carrying off\* the water from the works that were situated above, a large mass of *cobalt* was discovered, a great part of which was employed in the manufacture of porcelain which had been established about that time at Preston\* pans in East-Lothian. When this cobalt is deprived of the *arsenic* with which it is strongly impregnated, and otherwise properly prepared, it produces a powder of a beautiful deep blue, with which a variety of useful and ornamental pieces of china and glass have been coloured. There is, indeed, reason to believe that the cobalt of the hills of Alva is, in no respect, inferior to that which is procured from the mines of Saxony.

Very considerable quantities of cobalt were, at the same time, extracted from the heaps of rubbish which had been thrown out 50 years before by Sir James Erskine in working his silver mine

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The working of all these mines has been for some time abandoned ; but during the period that they were wrought, a very accurate survey of the different veins of metals which had been discovered was made by an agent of the company, who was well qualified for the task. From this survey, or register, it appears that there are in the parish of Alva no fewer than 14 or 15 mines containing lead, copper, iron, cobalt, and silver \*. It is to be hoped that these subterranean treasures; which promise to add so considerably to the national wealth, will soon be more successfully and completely explored;

At the Spout of Balagan, in Strathblane parish, where, in a perpendicular rock of 100 feet, over which falls a magnificent cascade, no fewer than 192 alternate strata of earth and lime-stone present themselves, are found some thin strata of alabaster of the purest white. There were also found near the same place, amongst the rubbish thrown up by an inundation, some rich specimens of antimony f.

#### SECTION

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- This account of the mines of Alva is abridged from the  
Stat. Ace. Vol. XVIII. p. 140, &c.

f Stat. Ace. Vol. XVIII. p. 578.

## SECT. VI.—WATER.

STIRLINGSHIRE is abundantly supplied every where with water, from *streams* and *rivers*, from *lakes* and *ponds*, and *springs*. This is what might be expected in a mountainous district narrowly circumscribed by two seas.

To begin again by the west, this county is bounded, through about 15 miles of its extent, by Lochlomond, the noblest and the most beautiful of the lakes of Britain. This lake, emptying itself into the Clyde by the Leven, affords a convenient conveyance, by vessels of little draught of water, for the valuable wood and oak bark that is annually sent to market from the upper parts of Stirlingshire, as well as for the wool that is produced on its mountains; and the inhabitants of these districts receive, in return^ Coal and lime, and the productions of the low country. Lochlomond is above 100 fathoms in depth at the base of Benlomond, and about 2fc fathoms towards the lower extremity, as the reporter had an opportunity of observing, many years ago, in accompanying his much respected friend Dr Stuart of Luss, whilst sounding amongst the island\* of this lake.

Besides Lochlomond, there are several small sheets of water interspersed throughout Stirlingshire, which, though of an incopsiderable extent, serve to give diversity to the" scene. The superficial extent of all of these

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put together does not exceed 1,300 Scots ac\*£S. The most considerable of these small sheets of water are Lejh Coulter in St Ninian's,; a piece of water in thd friuirs of Slamannan ; Bardowie loch in Baldernock 5 the canal reservoir at Kilsyth (which is of 70 acres) the loch of Antermony, &c.

This county is most copiously watered by rivers and streams. The Forth has its source in this county from a spring in the northern side of Benlomond, near the summit of the mountain. It traierises StiiHngshire for 10 miles from its source, under the appellation of the *Water of Duchray*, augmented, as it proceeds, by numberless mountain streams. It then enters into Perthshire, where it receives an accession equal to the volume of its own water's, in the river which issues from Lochard in Aberfoylc. It there assumes the name of the *Aveudoty*, or Black Riven After a course of about five miles, it again joins Stirlingshire below Gartmore house, where it obtains the flame of *Forth*> Which it henceforth retains.

From this point, the Forth uniformly bounds the county of Stirling on the north, except in the few instances, that have been noticed, of some isolated tracts which lie to the north of that river.

A few miles above Stirling, the Teath or Teith, the Taichus of the historian Buchanan, and the Avon Thaich of the Highlanders, a large and beautiful river\* risihg in Perthshire, notwithstanding its undeniable superiority, s;nks both its waters and its name in the Forth.

As far as Stirling, the river is navigable to vessels of about 70 tons burden j but this navigation is<sup>4</sup> rendered extremely inconvenient by the numerous windings (here called

called *links*) of the Forth. The line of the river from Alloa is reckoned near 20 miles; whilst the distance, in a direct line, is scarcely seven.

After a course of about 7 miles from Stirling bridge the river stretches out into a firtTi of several miles in breadth, affording facilities for navigation, and for commerce, upon an enlarged scale. The sea-port of Grangemcuth, especially, situated in the most favourable position for the navigation of the German seas, as well as for its communication with the Atlantic by the great canal, promises to rise into a high degree of consideration and opulence.

The river Carron famed in Celtic antiquities, has its rise in the parish of Fintry; and, after taking its course through the parishes of Denny, Larbert, Bothkennar, and Falkirk, empties itself into the Forth at Grangemouth. The Carron, at full tide, is navigable for vessels of 200 tons burden as far as the village of Carron-shore, the shipping place of the Carron company, in the vicinity of the iron works, and less than two miles from \* its confluence with the Forth. By the river Carron, from Carron-shore rhe most important facilities are afforded, to the company for importation, and for exportation.

In the same parish of Fintry, at no great distance from the source of the Carron, the Endric has its rise, running westward through the parishes of flalfron, KiU learn, (where it receives very considerable re-inforcements from the Blane, the Dault, &c.) Crymen, and Buchanan\* it falls into Lochlomond to the westward of Buchanan house, thereat of the Liuke of Montrose.

The Kelvin has its rise fe the parish of Kilsyth; it is augmented in its course by numerous mountain streams.

as the *Red-burn*, and the Luggie from the south 5 the Shaw-end, the Colzeum, the Garrel, and the Glassert, from the north \*. This river, running westwards, in a line nearly parallel to the great canal, through this county, for about eight\* miles, and approaching the canal by the distance of, from a few yards to a mile, enters into the county of Dunbarton, and falls into the Clyde, at the village of Partick in Lanarkshire, after passing under a magnificent aqueduct bridge, which receives the great canal in the neighbourhood of Glasgow.

All these rivers and lakes produce the different kinds of fish that are to be found in the lakes and rivers of Scotland. The lakes abound in trout, pike, perch, and eels. In the Forth, salmons are caught; but it is observed that they are not nearly so numerous in this river, ever since the operations of removing the Blair\* drummond moss have begun to be carried on upon such an extensive scale. By the masses of peat-earth which are floated down in such quantities the river is rendered turbid, and the fish are prevented from ascending. But it may be permitted to observe, that whatever the injury may be that is suffered by individuals in this *temporary* defalcation, the political calculator will have little difficulty in determining between  
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\* A short note may be admitted, to remark that almost all of these names are of Celtic origin; Kelvin, a. & CaoJ-avon, the narrow river; Kilsyth, *i.e.* Caol-suidb, the narrow recess or stripe; Garrel or Garvall, *i. e.* the Rough-burn; Glassart, or Clais-ard, the High-raviuc, &c

the permanent advantage of adding many thousand acres of rich soil to the agriculture of the country, and the transient suspension of even a profitable fishery.

The Firth of Forth is annually visited, by shoals of herrings, which afford a seasonable and grateful relief to the poorer orders of society. The herrings do not arrive in the Forth so early as on the western coast of Scotland, on account of the greater length of their course by the German sea. The fishing, accordingly, does not commence till harvest; and the fish, too, are of an inferior quality.

Salmons are caught in considerable numbers in Lochlomond, particularly in the vicinity of the mouth of the Endive, and there is no doubt that they would be still more abundant in that lake if a free communication with the sea were afforded by the Leven. There, however, in consequence of the exclusive privilege of the proprietors of the fishing, most of the fish are intercepted. None can reach the lake, except a few that pass by accident; or those that get up during the short period that intervenes between Saturday night and Monday morning, when the river must, by law, be left free.

It seems to be a great hardship to the proprietors of the banks of that beautiful lake, extending about 30 miles to the northward, to be deprived by the monopoly of the Leven of the valuable fishings which they might enjoy on their respective shores. In former times, when these municipal regulations were established, the principles of political economy were little understood. Good sense, and a proper regard to the general interests of the district, would seem to dictate, that as the lake feeds the Leven with its waters, the



Leven should return to the lake the treasures which it derives from the sea; that the proprietors on the banks of the Leven should have a right to fish upon their own properties in the ordinary and occasional way of angling or drawing a net; but that, at no time, or on any occasion, except when actually engaged in fishing, they should have a right to interrupt the communication between the lake and the sea.

In the inferior rivers of this country, there is no restriction or exclusive privilege with regard to fishing. The Endrick and the Carron have been long celebrated as streams very favourable for angling.

The salmon fishery at Stirling brings to the town a revenue of between 150 and 1,400 pounds. The fish are sent chiefly to the London and Edinburgh markets.

CHAR

## CHAP II.

### STATE OF PROPERTY,



#### §BCT. I.—ESTATES AND THEIR MANAGEMENT.

STIRLINGSHIRE presents as great a diversity with regard to the state of property as any county in Scotland. We meet here with every rate of landed income, from L. 40 a-year to L. 10,000. It does not seem necessary, nor does it appear usual, in drawing up these Reports for the consideration of the Board of Agriculture, to give a particular enumeration of the different proprietors of land, and *Of* the annual returns of their estates. The *valued* and the *real* rent of the county will be afterwards stated, by parishes, in authentic tables.

Here are in this county noblemen and gentlemen, who possess property within its bounds which brings an-

nually from L. 8000 to L. 14,000 ; amongst those m: be mentioned his Grace the Duke of Montrose, Lord Lieutenant of the county, Lord Dundas, Sir Chark-Edmonstone of Duntreath, Bart. William Forbes Callender, Esq.

In the intermediate states of territorial property, there are many gentlemen possessed of estates which bring from L. 1000 to L. 4000 a-year. A great number also of respectable proprietors occur, from L. 200 to L. 1000 a-year.—And, with regard to this last class, it may be remarked that they contribute principally to the agricultural improvement, to the wealth, and to the embellishment of this, as well as of all the other districts of Scotland. The gentlemen of this class reside almost universally upon their estates. Their education has been liberal, and their views are enlightened. The necessities of their situation, increasing with the gradually increasing expences of polished life, have prompted them, by forcible motives, to improve their properties by every method in their power. Their knowledge enables them to adopt the means of improvement which are suggested by the advancement of science; and they are qualified, by their good taste, for adding proper embellishments to their estates.

It is a fortunate circumstance for any country when gentlemen of extensive property, and inspired with a just spirit of improvement, reside upon their estates, and not only direct the amelioration of their property, but actually engage in it themselves. This good fortune the county of Stirling possesses in many remarkable instances. Mr Forbes of Callender, possessing one

of

of the most valuable properties in the county, resides constantly upon his estate; and has furnished an example of rural economy which, it is hoped, will be generally universally followed. Upon his accession to the estate in 1783, he found it almost in a state of nature. Of above 7000 acres in this county, all arable he began by taking 4000 acres into his own immediate occupation. He first subdivided the grounds, throwing that in the neighbourhood of Falkirk into fields of three or four acres and that at a greater distance into fields of six or seven acres, and inclosing them with hedge and ditch in the common form. The ridges were levelled by five or six ploughings and the whole was limed at the rate of 100 bolls of Lord Elgin's measure\* per acre. He took one crop of oats, sowing clover and rye-grass seeds with the oats. The lands were then let in lease. The remaining part of the estate was let to tenants, to be improved by themselves, after the example, and with the aid of the proprietor.

Many other opulent and enlightened proprietors in this county reside upon their estates, and occupy themselves agreeably and usefully in gradually improving them. Amongst these may be mentioned Mr Kpeirs of Culcruich, Mr Kincaid of Kincaid, Mr Stirling of Garden, Dr Moir of Leckie, Mr Graham of Meiklewood, Mr Cgilvie of Gairdoch, &c. &c. These gentlemen are not only proprietors, but extensive occupiers of land:— and there is no doubt that the improvements which their capital and their intelligence enable them to introduce will at length open the minds of

their tenants, and prompt them, by every motive of interest, to imitate their example.

It has happened, from various circumstances, that very considerable portion of this county has been frittered down into very diminutive properties, which have been held for several generations by feuars or portioners, as they are called.—Previous to the Union of this country with England, land was, in this district, held of little value. It is in the memory of persons still alive, that proprietors had great difficulty in procuring tenants to occupy their lands on any terms whatever. In the western part of the county especially, middlemen were often employed, who took extensive tracts in lease, and let them out to small tenants.

It was not unusual, in those times, for great proprietors to parcel out extensive tracts of land amongst their own retainers and dependents,—and to their heirs for ever, on the mere condition of paying the rent of that time,—which is now only a trifling feu duty.

The guardians of the great Marquis of Montrose disposed of much of his land in this manner during his minority ; and the Marquis himself afterwards made many similar alienations, in order to enable him to support the royal cause. Alienations of the same kind were made in this county by the Earls of Mar, Menteith, and Glencairn. The Earl of Wigton, who strenuously opposed the Union in 1705, from a conviction that it would prove the ruin of his country, disposed his extensive estates in the parishes of Denny, Kirkintulloch, and Cumbemauld to his own tenants, on the condition of their paying **for ever** the rents **of that** time.

Hence

Hence tire<sup>3</sup> frequency of small properties, occupied by vassals, holding of a *subject superior* in this county, particularly in the parishes of St. Ninians, Denny, Campsie, Slamannan, and even in the Carse.

In a certain view of political economy, it must be allowed that these small proprietors constitute a very valuable class of men. Possessed of property transmissible to their posterity, they feel within them a spirit of independence, and have a powerful interest in the prosperity of their country.

But, in another point of view, it may be remarked that, from the narrowness of their circumstances, they are (Jeprived of that education which alone can inspire men with liberal ideas, or prompt them to acrive enterprize. The small proprietor, having no rent to pay, has no stimulus to the improvement of his property. He is perfectly contented to Kve as his forefathers had done. He leaves his property to his eldest son as he found it; and the rest of his children to provide for themselves in the best manner they can. The condition of the habitations and fields of this class of men exhibits perhaps the justest picture of the<sup>r</sup> rura<sup>r</sup> economy of Scotland, above 100 years ago, that now<sup>1</sup> exists; and in their mode of life and state of mind, we may trace the character of the Scots peasantry of the same period in it\*; greatest purity.

This class of m\$n, however, must, in the progress of society, gradually disappear:—and, if we regard the agricultural improvement of our country, this is « a consummation deyoutly to be wished." The rising generation, .amongst this order, will, in their intercourse

with their manufaciring and commercilneighboui remark the superior enjoyments which modern refine ment furnishes: the next step will be to wish to share in them. A spirit of enterprize will be excited ; and luxury will make its wdy amongst them. To support this, they mubt sell their petty possessions; and they will be naturally led to engage in active life.

With regard to the management of estates, the higher class of proprietors, almost in every instance, employ chamberlains or factors; though there are instances of gentlemen of very extensive properties doing the whole of their own business themselves. Mr Forbes of Cal-Jander manages the whole of his extensive estates in Stirlingshire, Ayrshire, and Dumfriesshire, without any assistance.

The chamberlains or factors of gentlemen of great properties are generally gentlemen who had been bred to the law; but who, from particular circumstances, had been led to pay attention to agriculture, and even, in many instances, to practise it. A mere Edinburgh man of busings, however skilled in accounts, and in LIQ ~~h~~M pf (he land, is a very inadequate judge of the de- ~~t~~ul of agricultural affairs \ and where such only are em\* ptyyed, neither the interest of the proprietor or of the tenant can be duly consulted. But when, to a thorough knowledge of agriculture, and of country busi- nebs, there is joined an acquaintance with the law of the land, the advantage is great, in facilitating the transactions of the estate, and in preventing unneces- ~~ary~~ Juigation.

## SECT. H.—TLNUKBS.

IN Scotland, all the land is, according to the feudal system, considered as the property of the King, or Prince of Wales. These lands the King is considered as having parcelled out to the proprietors by charter and investment. All the land thus holds immediately of the King or Prince of Wales, who is accordingly styled the *Superior*\*. The person to whom the land is conveyed is styled the *Vassal* ; and the latter, in the feudal times, owed military service to the former. Those only who hold immediately of the Crown have a right to vote at the election of 4 Member of Parliament ; and they must possess either 400 pounds Scots of valued rent, or 40 shillings on land of *old extent*^ as it is called.

In Stirlingshire a great proportion of the valued rent is possessed by peers, who are excluded from all interference with the election of the members of the lower house.

A vassal, holding of the Crown, may convey his property to another man, who is then said to *hold of a subject superior*^ *or* by a *base holding*. Of these, there are great numbers in the county of Stirling. Though they are not entitled to vote for a member of parliament, they have<sup>3</sup> a right to sit and vote in the court of commissioners of supply<sup>4</sup>, which regulates the inter-



nal economy of the county, with respectyto highw  
bridges, and ferries.

A very considerable part of the land of this count j  
is *entailed*. A great part of it is not. Amongst the  
*entailed* may be noticed the estates of Lord Dundas,  
Sir 1 harles Edmonstone of i 'untreath, the estates of  
Gartmore, Polmaise, Culcruich, &c. The estate of his  
Grace the Duke of Montrose is *unentailed*^

## CHAP III.

### BUILDINGS.

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#### SECT. I.—HOUSES OF PROPRIETORS.

OMITTING the particular description of the buildings which adorn the numerous thriving towns and villages of this county, as in a great measure foreign to an agricultural report, it may be asserted that the houses of proprietors in Stirlingshire may vie, in point of elegance and commodiousness, with those of any county in Scotland. But, even of these, the particular enumeration would seem necessary, and, in some degree, improper. Suffice it to say that, besides the elegant mansions of many great and even of moderate proprietors, the environs of Stirling and of Falkirk are ornamented with numerous and handsome villas, to which gentlemen, who have been successful in their professional pursuits, have retired, in order to enjoy the sweets of rural life.

To

To this limitation of description, however, the magnificence and the embellishments of Buchanan, the seat of his Grace the Duke of Montrose, together with the antique grandeur of Callander House, the seat of Mr Forbes; the one situated near the western, the other near the eastern extremity of the county, may justly claim an exception.

Buchanan house, situated upon the Endnc, and in the vicinity of Lochlomond, is surrounded by a lawn and pleasure ground of more than 1600 acres, bearing a nearer resemblance in its extent, and in the disposition of its embellishments, to an English park than any thing that is to be met with in Scotland. Lofty hills, now covered, in a great part, with thriving plantations, form the back ground to the north. The finest lake in Britain, skirted by the towering mountains of Dunbartonshire, closes the prospect to the west. A lawn, sprinkled with oaks and beeches of more than two centuries old, forms the nearer scenery.

Callander house was built by the ancient Earls of Callander and Linlithgow many centuries ago; and it has been partly modernized and rendered uniform by the present proprietor. It is a very magnificent structure; its length in front is 300 feet. The lawn is adorned with aged trees of great size, which, there is reason to believe, were planted by the Earl of Callander immediately after the restoration of Charles II., whom that nobleman had accompanied in his exile.

SECT.

## SECT. II.—FARM HOUSES AND OFFICES,

IN no country where the comfort and accommodation of the farmer are neglected is it possible that his exertions can be spirited or successful. Personal and domestic enjoyment is the grand object which all, from the peer to the peasant, have constantly in view. In this, as in every other respect, the interests of the proprietor, and of the tenant, go hand in hand. If a comfortable dwelling and commodious offices are given to the tenant, not only will the value of the lease be enhanced in the eyes of candidates at the ensuing letting; but even, during the current one, the occupant will engage with more cheerfulness in every operation, and will the less grudge the fatigues of the day, or the annual expence of his improvements, when he considers the snug apartment which awaits him in the evening, and the comfortable accommodations which are provided for the fruits of his toil. By furnishing these accommodations to the tenant the proprietor increases the value of his estate in a ratio far beyond his expence. The tenements which he builds on the farm may be considered as, in some degree, indestructible; as they ought, in equity, to be maintained by the tenant in the condition in which they were delivered to him, until the end of the lease; and, at that period, we see every day that

that nothing proves a greater inducement to a tenant, having a family, and possessed of some capital, to exceed somewhat the real value of the farm, than the prospect of entering into a lodging of comfort, and even of some elegance'; whilst his mind recoils at the idea of a farm perhaps intrinsically superior, but in which he must live for a long term of years in a mean and smoky hovel.

It is by no means intended that the proprietor should, in thus accommodating his tenants, sacrifice his purse to a mere act of philanthropy. Besides that, it appears that he would find an ample compensation in the competition that would be excited at the end of the lease, there seems to be nothing unreasonable in his requiring 5 per cent, for the money that he had laid out in furnishing these accommodations. In all the conditions of society, a family pays a certain pecuniary rate for the mere article of lodging. Why the farmer should form an exception does not appear.

"Without pretending to any thing more than the knowledge of general principles upon this subject, it may be added, that instead of 7<sup>^</sup> per cent, as interest for the money that is sunk in farm buildings (which is the ordinary rate) 5 per cent, has been here suggested; leaving the additional 2; per cent, as a compensation for the indispensable obligation imposed upon the tenant, to preserve his tenements in due repair, and to leave them in that state at the end of the lease.

By such an arrangement, it would seem that the interest of the proprietor, and of the tenant, would be consulted in as equal a manner as possible.

Till

Till within a period of very recent date, the proprietors of this county took little concern in the domestic accommodations of their tenants; but left every one to provide a house and offices for himself according to his inclination and ability. Accordingly, in those days, the houses of the peasantry were wretched huts, thatched with fern or straw; having two apartments only, the one a kitchen, where master and mistress, and children and servants sat and eat together; the other a sort of room, denominated a *spence*, and this only in the better sort of houses, where strangers were occasionally received, and where the heads of the family generally slept. The byre and stable were generally under the same roof, and separated from the kitchen by a partition of osiers, wrought upon slender wooden posts, and plastered with clay. A glass window and a chimney were esteemed a luxury, and were seldom to be met with.

- Some edifices on this plan still occur in Stirlingshire; and though they have, in a great measure, disappeared, it must be remarked, that in the richest district of this county, or perhaps of cot land, the corses on the Forth, the accommodations of the tenantry are, in many instances, of a very inferior kind. This, it may be observed, is chiefly owing to the smallness of the carse farms in general (a subject which will afterwards come under consideration) Where the farm seldom exceeds 30 acres, which is, for the most part, the case, the proprietor cannot afford to erect costly buildings; nor does the condition of the tenant seem to furnish any claim to much elegance of domestic accommodation. The houses, accordingly, are mostly low, small, and uncomfortable;

able; few are thatched with slate; and still fewer are of more than one story high.

Besides the smallness of the farms in this district, there is another circumstance which checks the desire of the farmer to obtain a comfortable dwelling. The general practice here is, that the proprietor should *lay out* the money necessary for erecting the buildings, or for making repairs, and that the tenant himself should *carry* all the necessary materials. In performing these carriages much precious time is lost; and that, frequently at the most critical period of the season. The loss thus occasioned by the interruption of the operations of the farm is deeply felt, and perhaps extends even to the ensuing year. The real interest of the proprietor dictates that the tenant should not be called off at any time from the necessary cares of the farm.

The subject of the accommodation required by tenants, to enable them to live comfortably, and to carry on the operations of husbandry with ease and spirit, begins now to be better understood, and more attended to than in former times. A number of great proprietors have given their tenants houses and farm offices, with other accommodations, at an expence proportioned to their rents, which seems to be a just enough criterion. On the Duke of Montrose's estates in this county, there are many such comfortable, and even elegant farm houses and offices. Sir Charles Edmonstone of Duntreath is distinguished in this respect; and, on his Kilsyth estate, neat farm houses have been built on almost every farm; and, in almost every instance, they are covered with slate; *some* of these farm houses have two storeys; and

and all of them are properly suited to the extent of the farms. The house and farm offices of Captain Robert Davidson of Kilsyth farm furnish a model of agricultural accommodation, as his farm does of the first style of agricultural improvement.

Perhaps the most important of the modern accommodations of the farmer may be accounted the now general introduction of the farm yard; which is a square, formed by the different farm offices, paved within with small stones, and gently sloping from every side towards the centre. On the south exposure is the gate : the other three sides are furnished, with sheds, or covered recesses, to shelter the cattle in severe weather. In these farm-yards, the cattle that are to be fattened for the butcher are fed through summer on fresh-cut clover and, towards the end of the season, on turnips, potatoes, &c. In winter, the cattle that do not yield milk, are fed on straw and hay. Abundance of litter is always given them. The quantity of manure thus produced far exceeds that which can be otherwise obtained; besides that, the cattle, especially in winter, are better accommodated than by any other method. On Sir Charles Edmonstone's Kilsyth estate, there is a farm or raw-yard upon every farm of L.70 rent and upwards.

#### REPAIRS.

ON the subject of repairs; the reporter has met with no general regulation in this county. Perhaps what



what has been advanced under the former section may be sufficient to convey some idea of the common practice in this respect.

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SICUT. iv.— PRICES OF BUILDING MATERIALS, AND ARTISAN'S LABOUR.

NEITHER can any very important information on the subject in this section be furnished. The materials of building, as far as respects stone, lime, brick, and tiles, are abundant, and may be abundantly obtained in *Stirlingshire*. But, with regard to wood, from the interruption of *out* intercourse with the Northern States, in consequence of the war, no calculation can be offered of its daily increasing price. Proprietors of forests of Scots fir have taken advantage of this circumstance, and some have sold their wood at the high price of half-a-crown per cubic foot. The price of labour too is increasing so rapidly, that no precise estimate can be offered.

The great expence that attends the building of farm offices arises from the extent of ground room, and the consequent extent of roof required. Of all kinds of roof a slated one claims the preference; but a slated roof is, of all others, the most expensive. Tiles are much used; but their durability is far inferior; and their expence is not much less.

There is another species of roofing which seems to merit particular notice. It was originally introduced into Scotland, indeed, in an adjacent county, and may  
be

be found described in other publications ; but as it has lately been adopted in Stirlingshire upon a considerable scale, it may not be deemed improper to describe it shortly on this occasion.

The basis of this new species of roof is common *sheathing paper*, so called from its being employed *in thecathinn* ships. It is first dipped in tar, and heated to the boiling point, that it may penetrate the paper more readily. After being exposed to dry for two days, the tar is found to be completely imbibed. The sheets are, a second time, dipped in tar at a lower temperature, and then nailed on the roof in the same manner as slates, over-lapping one another, so as to be triple at the joinings, and double in every other part. Above the whole is laid a coat of tar boiled to the consistency of pitch, on which smithy ashes are passed through a sieve, to diminish the combustibility, and to prevent the liquefaction of the tar.

The roof on which these sheets are laid is much flattened, no greater elevation being required than what is barely necessary to carry off water. The common proportion of the elevation is one foot in twelve. From the lightness of the paper covering, the couples are very slender ; no more than 3 inches in breadth, and 1\ in thickness : they are dressed with a **plane** at the edges, that there may be no intervals at the **joining**.

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From

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\* The above account of paper-roofs is abridged from the intelligent paper on that subject, by the Rev. Mr. Graham of Glasgow, inserted in the Farmers Magazine, No. 33.

From this account it is evident that a paper roof must be much cheaper than a slated one ; if has been estimated at half the expence; but it has been suggested to the reporter that the expence, even of a paper roof, is *now* much, increased by the high duty which has been lately laid on paper of all kinds.

This kind of roof was introduced into Stirlingshire in 1807 In the parish of Campsie, a lircg pile of buildings, in which an allum manufacture is carried on, together with a village containing 50 families, is roofed entirely in this manner. Mr Npeirs of Culcruich, an enterprising agriculturist of this county, has lately set the *first* example of covering a house purely rural with paper.

Yvith regard to the durability of this species of roof, it may suffice to observe, that it was first introduced into Scotland for covering a public store-house in Greenockj twenty years ago during that period, it has received no repairs ; and, at the present day, continues in perfect preservation.

#### SECF. V.—COTTAGES.

Qs the subject of cottage? for .manufacturers and labourers, the reporter does not preiend to such a knowledge of architecture, as to be able to suggest any thing that is not detailed in many other agricultural reports. In the eastern parts of Surlingihire, the cortages, especially in the vicinity of Faikirk, appear to be very comfortable:

fortable : they are almost all of one floor, which is generally earthen. It were to be wished, for the sake of health and cleanliness, that they were floored with flat bricks, which, in that district, could be easily procured. They are covered sometimes with straw; but more generally with tiles. The paper roofs which have been described would seem to be a great improvement, with respect to cottages, both in point of warmth and expence. In cottages of one floor, the utmost attention should be paid to cleanliness, to which frequent white washing would greatly contribute. It is of great importance to the health of manufacturers, that a small garden should be attached to their cottages. This, in Stirlingshire, is generally the case: many also possess a cow's grass, and a small piece of ground. It is obvious that the quantity of ground occupied by a manufacturer or labourer should not be so large as to divert his attention and time from his proper employment.



## SECT. VI.—BRIDGES.

ON this subject, it may suffice to remark that no county in Scotland is better accommodated than Stirlingshire, in the convenience of bridges, on our numerous rivers and streams. On the Forth, from Stirling towards its source, there are four bridges within the limits of this county, besides two in the county of Perth, the smallest of them of two arches. The Endric, the Blane, the Kelvin, and Carron, are similarly accommodated. .,

## CHAP. IV.

### OCCUPATION.

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**T**HIS county presenting, as has been remarked, almost every variety of soil and climate that occurs in Scotland, is accordingly as variously occupied. The mountainous districts, which include the greater part of the parishes of Buchanan and Drymen, together with the range of hills which runs through the parishes of Killearn, Strathblane, Campsie, Kilsyth, Fintry, St Ninian's, and Denny, are principally occupied in the pasture of sheep throughout the latter range of hills, however, on account of the richness of the pasture, the upper part of the hills is mostly fed by sheep, while the lower part is generally occupied in feeding black cattle, and in fattening them for the butcher.

TbT

The lower districts of this county are almost exclusively occupied in agriculture; and especially the carses of Airth, St Ninians, Bothkennar, Falkirk, and Colmont, are kept under a constant rotation of crops of every kind of grain that is cultivated in Scotland.

The pernicious system of distinguishing the lands into *infield* and *outfield*\* the former receiving all the manure of the farm, whilst the latter was cropped from time to time, without any other amelioration than it might receive from resting, or from the urine of cattle pastured on it, is now very nearly abolished in Stirlingshire \ though the marks of ridges, extending nearly to one fourth of the height of the mountain\*, of Campsie, Kilsyth, and Gargunnoch, shew how far this practice prevailed in former times.



#### SECT. 1.—SIZE OF FARMS,

THE proper arrangement of farms, with regard to size, is one of the most delicate subjects that occur in the management of an extensive estate; and there are few subjects that have divided the opinions of political economists more. Some, considering that the strength of any country consists in its population, as it no doubt does, have argued that land should be portioned out in such divisions as will support the greatest possible number of inhabitants; and that, consequently, to enlarge the size of farms, by throwing several together, to be

occupied by one person, with his family, is a great political evil.

The experience of what has taken place, and is now actually taking place in the county of Stirling, tends to throw light on this subject, and to invalidate the above-mentioned reasoning. The period is yet very recent, when, in the western, or Highland part of this county, the population was much higher than it now is. In 1756, the population of Drymen was 2,789; in 1792, it was only 1,607. " One family now occupies what was formerly in the hands of seven or eight \*." The same thing has taken place with regard to many other country parishes of this district. But is it thence to be inferred, that the general population of Scotland, or even of this county, has suffered a proportional diminution ? The Statistical Account of Scotland, and the account since taken by order of government, undeniably prove that the population of the country has increased, and is increasing.

The solution of all this is easy. In consequence of the general introduction of manufactures of various kinds, our cities and villages have increased in size and population in a ratio which it would be difficult to calculate. Many new trading and manufacturing villages have also started up. This county presents many examples, as Grangemouth, and the villages connected with the Carron-works ; Balfron, Fintry, New Campsie, &c. To these villages, the ejected cottagers and smaller tenants have retired; and whilst they have left to the new occupant of their former possessions a more  
ample



ample field for the employment of his agricultural stock, and skill and industry \ it is certain that, however they might at first regret their removal from their native cottages\* their present condition is much more comfortable than their former. They are better lodged ; their earnings are more regular ; they are better fed, and better clothed \ and they have better opportunities, of educating their children, and of bringing them up to an useful profession.

It is true, that there ought to be limits to the accumulation of farms in the hands of a single individual 9 but it is presumed that the thing itself will prescribe its own proper limits Few persons possessed of wealth sufficient to occupy a large tract of country in agricultural enterprise, will chuse to employ their fortunes in that way. They will either employ their money in purchasing estates for themselves, or in the more promising and less laborious pursuits of commerce. It appears unnecessary, then, to prescribe limits to the quantity of land which individuals should occupy \ no prudent man will take more in lease than his stock and personal attention are adequate to; and both of these have their limits.

In the occupation of a grazing farm, there is little personal labour, and few servants are required. Accordingly, in the western district of the county, on the estates of the Duke of Montrose, and of General Graham Stirling *of Ditchray*^ the rents vary from L. 100 to /< 00 a-year; as to the extent of these farms, it must be estimated by miles, and not by acres.

In the lower districts of Stirlingshire, the arable farms vary in size, from 30 to 400 acre\*. On Sir Charles Lemonstone of *Untreath's* estate, the farms are enlarg-



in a very judicious style: similar arrangements have been made on the estate of Callander: and under this management, the country has assumed a very different aspect from what it formerly bore. In the parish of Falkirk, in the lower district, there is a farm of more than 300 acres: in the higher, or muirland district, there are farms of 600 acres!

It is to be regretted that the system of enlarging the farms to an adequate size, has not yet been generally extended to the most valuable district of this county, the Carse on the Forth. Here the farms are, for the most part, so small as to afford no scope for enterprise or improvement. Accordingly, the state of agriculture is here found, except in a few eminent instances, to be very inferior. It appears indeed singular, that in one of the richest districts of Scotland, and which has been, for so long a period, under cultivation, the first principles of agricultural economy should be so little understood, that the general size of farms is from 30 to 50 acres. Here, the loss to the occupant is great; as it is understood that, in the Carse, two horses are sufficient to labour at least 35 acres; and four horses, consequently, are sufficient for 70 acres. Mr Walker of Falkirk, whose example in agriculture, it is hoped, will soon be extensively imitated in this district, is the only person with whom the Reporter has met, who farms upon a large scale: he occupies near 300 acres in the Carse of Bothkennar. That gentleman, in one of his communications, justly remarks, « That the smaller the « farms are, the worse they are farmed."

Nor.

Nor is this to be wondered at. On a small farm, the horses and servants necessarily consume too great a proportion of the produce, to leave an adequate profit to the farmer: and, where there is no prospect of adequate profits, there is no spur to enterprize. It may be safely affirmed, that, in the Carses, no farm should be under 80 or even 100 acres.

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SECT. IT.—FARMERS.

THIS useful and respectable order of men has only begun lately to emerge, in this county, from a state of poverty and insignificance. About thirty or forty years ago, it was a rare occurrence that any man should rise to independence by the mere produce of the ground. The processes by which the soil may be made to yield the greatest returns of which it is capable, as well as those by which the operations of agriculture may be facilitated and abridged, were equally unknown. If the farmer was enabled to drag out existence, and to bring up his family as his fathers had done, upon his native spot, he considered himself as having attained the utmost felicity of which his condition could admit.

Graziers, and cultivators in cattle, were the first class of farmers in this district, who were able to accumulate  
some



some wealth. In consequence *at* the increase of trade, and the enlargement of towns and villages, animal food *tarn*\* into more general use\*. The speculators in cattle, either by breeding themselves\*, or by purchasing cheap in the more remote parts of Argyleshire and Inverness\* shire, where few purchasers then resorted, were ready to meet this demand ; and their profits were considerable. This occupation, too, requiring little personal toil, was more agreeable to them than the more laborious and unremitting cares of agriculture.

At length, however, the cultivators of the soil have begun, and that only lately, to assume the station which belongs to them in society: and enlightened proprietors have seen the wisdom of encouraging persons of some property, and of liberal views, to settle upon their estates. The agricultural improvements which have been recently introduced, with regard to the application of manures, the rotation of crops, and the instruments of husbandry, have had the happy effect of giving dignity to the profession of a fanner, and of rendering it not unworthy of being exercised by a gentleman<sup>^</sup>

There is, indeed, something in the occupation of a farmer, which is naturally attractive to the human mind; and which happily overbalances the many disappointments and chagrins and toils which necessarily attend it. To mark the progress of vegetable nature, and to direct and assist it, has inexpressible charms to an intelligent mind. The consciousness of being almost the actual proprietor of the fields which he cultivates, during the period of his lease, animates the farmer with the

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the idea of temporary independence: and, even under severe losses, the prospect of better seasons, and of more abundant crops, soothes his mind with hope.

It must be acknowledged, that, in order to support the farmer under his fatigues, under inclement seasons, and scanty crops, such a process of thinking as this is requisite. Numberless other professions offer more domestic comfort, greater bodily ease, and more abundant gains. But still, the profession of agriculture has charms which will attract candidates for every lease as it falls; and even induce him who has held it with little profit to renew his engagement.

It is to be hoped that the period will soon arrive when this useful and honourable department in society will be filled by persons of competent wealth, and of enlightened ideas. Then will that race of tenantry which pursue their occupation with little advantage to themselves, and to the great detriment of their country, pass away\* and betake themselves to other occupations, better suited to their abilities, and, at the same time, more profitable to the community.

To accelerate this progress in the amelioration of the condition and character of the farmer, ought to be a primary object with every enlightened proprietor: for, whilst he adds to the comfort and dignity of the farmer, he enhances the value of the acres which he lets to him.—How have the rents of lands, and the revenues of landed gentlemen, increased so rapidly within these few years? Has it been by the exertions of the miserable and illiterate occupants of small possessions,—oppressed and despised by their Lairds, and subjected

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to the most harassing and humiliating services ? No, surely: The striking increase that has taken place in the value of land has been brought about by the enterprize of farmers possessed of intelligence to comprehend the late discoveries and improvements in agriculture; and of sufficient stock to enable them to apply these successfully in practice.



### SECTION III.—RENT.

RENT is the yearly return-which the occupant makes to the proprietor for the use of his land. In Stirlingshire, as over almost the whole of Scotland, it is paid chiefly in money. Some great proprietors receive a small proportion of their rents in oatmeal; but only in such a quantity as is necessary to accommodate the numerous workmen who are employed about their domestic improvements. Formerly, it was the almost universal practice to stipulate for a certain number of fowls, called *kain* or *hain-hen* as a part of the rent: and it was equally universal to stipulate for a certain number of carriages, or of days work, at certain seasons of the year, to be performed by the tenant.

Though these stipulations are now, in a great measure, abolished, yet they are in many instances continued in this county. Their policy, however, appears  
more

more than doubtful. They are evidently a relic of the oppression of fensal times. To oblige a tenant, at any season of the year, to withdraw his attention from the operations of his farm, must prove injurious to him; and in his loss the proprietor must also suffer. The payment of kain fowls is particularly harassing. That the occupant of a grain farm, whose cultivated fields often approach within a few yards of his door, should be obliged to rear a certain number of poultry, must certainly be very ruinous to him. They cost the farmer three times the price at which he could purchase them in the market, and accordingly, it is not unusual for him to purchase, rather than to rear, the fowls which he pays in rent. It is an unfortunate circumstance that tenants do not attend to the import of these stipulations before the terms of their leases are finally settled. In their eagerness to obtain their farms, they consider only the money rent;—and accede easily and thoughtlessly to inferior demands, which they find, in the end, to be sufficiently distressing.

Many great proprietors in this county have, to their honour, abolished *these remains of barbarism*. Lord Dundas, one of the greatest landholders in the Carse, receives only money rent, having abolished all carriages and payment of kain. On the estate of air Charles Edmonstone of Duntreath, "All thirlages; mill services,<sup>44</sup> kain, carriages, and every species of servitude, are<sup>M</sup> totally abolished, as destructive to husbandry, derogatory<sup>41</sup> to the tenant, and repugnant to the feelings of « the generous and enlightened proprietor."

It has become a practice of late in Stirlingshire, and its influence seems to be extending itself, to stipulate for rents payable altogether in victual, according to the fors of the county. The equity, and even the policy of this practice, seems to be very doubtful. The proprietor, indeed, has *a chance* of receiving an increased rent from the increased price of victual. But what is the unfortunate condition of the tenant, when, in an unfavourable season, that has yielded him only half a crop, he is obliged to pay the same quantity of grain as if he had a full one? Had his rent been payable *in* money, he would have had a compensation in the advanced price of grain, which is the consequence of a year of scarcity; but the tenant who pays in grain in such a year, must be ruined; and, in his ruin, the proprietor must also suffer.

With regard to the amount of rents, it has increased, within these few years, in a threefold, and often in a fourfold ratio. In the grazing districts of this county, the rent of land is determined by the number of cattle that it will maintain. —In Buchanan and Drymen, the rent of a sheep's pasture is estimated at 4s.; but there, a sheep's grass often requires three acres; and sometimes twice that extent. In the fertile hills of Alva, 4s. 6d. is reckoned the rent of a sheep's grass; but there, an acre will maintain a sheep, and sometimes more. In the mountain pastures of Gargunnock, and probably all along the Lennox hills, an acre will maintain two ewes, with their lambs, in the Campsie fells, the summer's grass of a cow lets from L. S. to L. 4.

The rent of arable land varies extremely, according to its situation and quality. In the light dry fields of  
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the upper part of the county, it lets from 20s. to 40s. per acre. In the parish of Denny, the best land lets for 50s. and inferior land for 20s. per acre.

To furnish some idea of the rapid rise of rents in this county, the following sketch is given, *on the best authority* of the change of circumstances which has lately taken place on Sir Charles Edmonstone's Kilsyth estate.

« Previous to the expiration of the leases of 60 years  
 " which had been given under the forfeiture, the rent  
 « of the arable land, even in the lower grounds, which  
 " are a rich clay loam, was trifling : the pernicious dis-  
 " tinction of *infield* and *outfield* universally prevailed:  
 «\* there were few or no inclosures: the tenants were  
 " miserably accommodated with houses : the rental of  
 " the whole estate did not exceed L. 1000 a-year; no  
 " tenant paid, of mere rent, more than L. 35 : his sub-  
 <sup>stance</sup> was consumed, and he himself was impoverish-  
 " ed, by grassums. In '1804, the proprietor began a  
 « system of improvements, the beneficial consequences  
 " of which are already felt. The estate is inclosed and  
 <sub>subdivided</sub>. The distinction between *infield* and *ouU*  
 " *field* abolished \*, and the tenants have begun to adopt  
 " the most improved modes of agriculture that are  
 " known in this kingdom. Many of them pay ~~from~~  
 \*\* L. 200 to L. 800 a-year of rent. Some cottagers ~~are~~  
 <sup>still</sup> continued, with the view of preventing the depo-  
 <sub>pulation</sub> of the country. The rental of this estate now  
 " exceeds L. 6700 a-year."—The fine loam lands here  
 let at L. 8 ppr acre. The rents, in general, in this  
 district, are from 2^s. to L. S.

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\* Communication by James Davidson, Esq. Culzeum.



The farms of Boquhan, in the parish of Gargunnock, have been lately let for sheep pasture at L. 3, 10s. per acre.

In the Carse of Stirlingshire, the rent of land has lately risen in a high proportion. In Gargunnock, carse land is now let at 5 guineas per acre, *besides other burdens*. In St Ninian's, Larbert, Airth, Bothkennar, Falkirk, and Polmont, land of this kind lets from 5 to 6 guineas per acre.

It is universally observed that, as the rents rise, the tenants become industrious and thriving: where they are low, the tenants are slovenly and poor.

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SECT. iv.—TITHE-

To those who are acquainted with the Ecclesiastics! State of Scotland, it is unnecessary to remark that *tithes*, in their original acceptation of a *tenthy* of the produce of the ground, set apart for the maintenance of the clergy, are totally unknown.—To those who are strangers to our ecclesiastical establishment, it may be proper to suggest, in so many words,—that, at the Reformation of religion, in Scotland, the property of the church, consisting of the *tithe* or *tiendy* as it is here called, passed, by a gift of the King, into the hands of laymen, with the exception of the *tiilu*; appropriated to the support of

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of universities, schools, and hospitals; together with the small pittance that was assigned to the reformed clergy\* These laymen were called *titulars of the tiends*.—The hardship of paying the tiends to these titulars, according to the form in which they were anciently paid to the church, was soon severely felt and complained of by the proprietors of land. The whole matter was referred by both parties to the sole arbitration of King Charles I. who, in 1629, decreed, " That the heritors « could demand a valuation of their tiends; and that « they might further oblige the titular to sell their " tiends to them at the stated price of nine years purchase : instead of the tithes which were formerly levied *xi* kind, a *fifth* of the land-rent was declared to « be the tiend."

Thus it is in the power of every proprietor of land to have his tiends valued ; and, in most instances, to purchase them from the titular at nine years value.

The small augmentations which the stipends of the clergy receive from time to time, from the *Court of Trends* (to which the administration of the laws on this subject is committed) arise from the unexhausted tiends which may be in the hands of the titular; or, when these are exhausted, from those which have been bought up by the proprietor.

It may be permitted, on this occasion, briefly to state, that, in no country of Europe, is the Ecclesiastical Establishment supported at so small an expence as in Scotland. An authentic account will be given, in separate tables, of the value of the livings of the clergymen of Stirlingshire.

It may be allowed to add, that the proprietors of land have no cause to complain of the additions which have been made to the livings of the clergy from the unappropriated tithes. By the law of the land, these tithes are burdened with the support of the established ministers, and it was undoubtedly intended by the legislature that this support should keep pace with the advancing circumstances of society, so as to maintain the clergy in the rank which they originally occupied, and which they must occupy, in order to be respectable and useful. With this burden, every proprietor of land has purchased, or succeeded to his estate, and, under this condition, of supporting the established clergy, every titular has obtained the gift of his tithes.

The truth seems to be (and it is hoped that the remark will be forgiven) that the danger which threatens the Ecclesiastical Establishment of this country has its source in its poverty. At the distance of twenty or thirty years ago, it is well known that young men of liberal minds, and of decent circumstances, were induced, by the cheapness of living and of education, to undergo the long and arduous course of study which is requisite in a candidate for our church. But, within that period, the circumstances of this country have undergone a very material change, in consequence of the increase of trade and manufactures, and of the depreciation of money. Every rank in society has profited by this change, the stipendiary alone excepted. How can it be expected that even the pious desire of guiding men in the paths of virtue and religion, will be effectual, upon an extensive scale, to induce young men of genius

and learning to devote\* themselves to a painful and expensive course of study, for the space of eight or ten years, double the period of the studies requisite for a lawyer or a physician \*, whilst the circumstances of the country open up a thousand more promising paths to independence? Recent events have taught us the wisdom of maintaining our ancient establishments both in church and state. Unless the provision assigned to the clergy in Scotland be made to keep pace, in some degree, with the rapidly advancing circumstances of so\*ciety, the period seems not to' be far distant, when the enlightened characters which now adorn our church, must give way to an illiterate and grovelling race, who are neither qualified to understand the venerable records of our religion, or to represent their important truths, in an engaging light, to the people. \*

With the provision made for the clergy of Scotland, that for parochial schoolmasters should go hand in hand. It is to this institution, and to the consequent cheapness of education, that our country has so long owed the proud distinction of generally diffused knowledge, which marks even the lowest ranks; and which 5\* to be found in no other country of Europe. This provision has been lately increased by a legislative act; but it seems to be still too low to encourage any yotm^man of talents and of spirit to engage in so laborious a profession. A Table of the income of schoolmasters in

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this

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• Since this Report went to press, an act of the Legislature has passed, assigning the annual sum of L. 10,000, to increase the small livings of the Scots/^Jtwgy to L. 150 each;—a measure worthy of a liberal and enlightened Government.

this county will be added, so far as it has been ascertained.

SECT. V.—POOR RATES, &C

*tn* Scotland, by an act of Privy Council, 1692, "The heritors of the parish are directed to meet with the « minister and kirk-session; to make up a list of the " parish poor; and to impose an *assessment* for their « support, the one half on the heritors, according to their '< valuation, and the other upon the tenants and house- " holders according to their ability."

In some populous towns and parishes of this county, where trade and manufactures have been carried to a considerable extent, assessments have taken place' in the terms of this act. In country parishes, however, the poor are chiefly maintained by the interest of money which has been accumulated by charitable donations; by the collections made in church on Sundays; by the price paid for the mortcloth, or pall, at funerals; by fines for acts of immorality; and by the money paid for the proclamation of banns.—A list will be given in a separate table of the poor of this county, with the funds for their maintenance, whether raised by assessment or otherwise.

## SECT. VI.—LEASES.

THE duration and conditions of leases vary very considerably in this county. In the Highland district, which is occupied almost entirely in sheep walks, and where few improvements are practicable, the leases are for nine years. In farms that are held in tillage, the leases are generally of 18, 19, or 21 years,—periods which furnish scope for the tenant to launch out a portion of his capital in improvements, with the reasonable prospect of reaping the fruits of his industry and expenses.

. In former times, when society was in a great measure stationary, and little of the spirit of agricultural improvement among tenants, the proprietor often found great difficulty in letting his lands: and he often found it necessary to entice occupiers by granting leases during their life-times, and sometimes for two lives. Leases for three 19 years were not uncommon. The valuable estate of Killearn in this county is still encumbered with many leases of this kind, some of which will not expire for at least 20 years. Such leases are injurious to the occupant, as well as to the proprietor;—the former, *O 3* having

having no spur to entepprize, becomes indolent and poor: the latter is deprived of the benefit to which he is intitled from the gradually improving circumstances of a nation rising to wealth by manufactures and trade.

The proprietors of the present day are sufficiently aware of their own interests in this respect, and duK attentive to them. In some instances, in this country, they have been tempted, by hopes of a frequently renewed rise of rent, to shorten the period of their leases to a degree that must prove highly prejudicial to the tenant. Even in theCarses of Stirlingshire, the productive-ness of which depends entirely upon an enlightened and spirited mode of cultivation, though the general length of leases is, as it pught to be, 19 years, some lands are let for only 10 ; and there are, even some occupants who are only tenants at will. When it is considered, that np man of sense will launch out his capital upon lancjs from which he cap have no prospect of drawing adequate returns ; and that the needy adventurer, who will risk such an undertaking, must necessarily rob the soil of as much of its virtues as he can, in order to indemnify himself for the precariousness of the tenure by which he holds it> it is to be hoped that the proprietors will, at length, perceive that what is the interest of the tenant is theirs also.

As to the restrictions under which tenants are generally laid, with regard to the cropping of their lands, these also vary considerably in this county. In some instances, there are no restrictions whatever: the te-  
apt is allowed to crop as he pleases, from the begin?  
ning

ing to the conclusion of his lease. Such a licence, however, is highly injudicious and hurtful to all parties. In estates managed in this way, the whole soil is, at the end of the lease, a mere *caput murtuum*; and, at the beginning of a new lease, requiring to be recruited by manure and rest, it cannot bring nearly its just rent. In some estates, the arable land is divided into *three* equal portions; one of these to be held in tillage for *three* years, and then let out in grass; and so on, with the other two *thirds*\* Were it possible for the tenant, on the last year that he occupies his *third*, to lay on as much manure as will be a proper dose for it, and to let it out under grass seeds, this scheme might be admissible. But, in almost no instance where the farm is of considerable extent, is it possible to procure so much manure as will be sufficient for a *third* part of it; and, where any part is let out without sufficient manure, even a rest of *six* years will not restore it from its exhausted condition. Where the leases are long, as of 19 or 21 years, it should seem that it were sufficient to restrict the tenant to the cultivation of *one third* of his farm, only during the *last four years* of his lease, a restriction which appears to be indispensable.

The principal argument that has been advanced against the unrestricted occupation of the farm during the earlier 'period of the lease is, that if the tenant finds himself in bad circumstances, he may, in the prospect of bankruptcy, exhaust the soil and leave it in that condition. This, no doubt, is a consideration to be attended to; but it may be observed, that the proprietor, paying always the *blæus personæ* at letting his

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farm,



farm, should' then attend to the circumstances of his tenant; a measure, *h* must be confessed, not always easily accomplished.

In the Carse of Stirlingshire, tenants in general are not bound down to any rotation of crops, till the last *three* years of their leases, when it is stipulated " that they shall not take *two* white crops successively."

It is a general clause in leases, that the tenant shall not sell his victual *upon the foot* ^ as it is called, or with the straw \ a very necessary regulation, by which the whole straw is preserved upon the farm, and restored to the land in the form of manure.

As over the most of Scotland, the tenant here enters to the occupation of the arable land at Martinmas\*, and to the grass lands and houses at the ensuing Whitsunday.



#### SECTION VII.—EXPENCES AND PROFIT.

THERE is perhaps no department of national industry in which it appears more impracticable to offer even an approximated estimate of expences and profit, than that of the agriculturist. In the occupation of *arable land*,—these depend in a great measure upon the favourableness or unfavourableness of the season ; upon the casual abundance or scantiness of the crop; upon the

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the state of servants wages, which is affected by that of adjacent manufactures, and various other circumstances: To these circumstances may be added, the increased expence of lying, taxes, the price of agricultural implements, and cattle employed in labouring.

In pasturing districts, which abound in this county, the expences and profits depend so much upon the fluctuating state of cattle-markets, that it is impossible to offer an estimate of any general application. For the *three* years preceding the present (1809,) the prices of cattle were low ; and there was some reason to apprehend that the graziers could not have stood to their present rents had things continued in that state; but from the commencement of the cattle markets, in last May, prices have been increasing every month. Many dealers in cattle in this district are reckoned to have made 20 or 25 per cent, on their sales. The fact seems to be, that the number of cattle at present in the country is considerably inadequate to the demand. The consequence will be the increase of the breeding system ; and then, as has been often remarked by observing persons, matters will, after a period of three or four years, return to a level in this respect \ and the price of cattle will fall.

It may be added\* that the difficulty of forming any calculation with regard to the profits and expences of farmers is increased by the circumstance that almost none of them keep regular accounts of their affairs, or can give any account of them. Of the few enlightened agriculturalists in Stirlingshire, who observe a methodical precision in their transactions, it might be considered as indelicate to request an account.

## CHAP. V.

### IMPLEMENTS OF HUSBANDRY.



BEFORE entering on the consideration of the various implements and operations, which will occupy this and some of the ensuing chapters, it may be proper to premise, that it is not conceived that such a detailed view of these should be given as might be expected in a regular treatise on agriculture. In the agricultural report of a particular county, it is presumed that the Reader is acquainted with the general principles of rural economy; and all that seems necessary is to notice their peculiar application in the county under consideration.

Having

Having made this remark, it may be observed, that the implements of husbandry used in Stirlingshire do not differ so much from those which are employed through the whole of the low country of Scotland, as to require a particular description. In the eastern and southern parts of the county, especially, all the improvements have been introduced in this respect that are known throughout the kingdom. In the highland district these are also gradually making their way.



SECT. U—PLOUGHS.

IN the Highland district, the ancient barbarous manner of ploughing with four horses abreast, and, besides the ploughman, a driver called a gadesman, walking backwards before the horses, holding a horizontal beam, to which they are all fastened, and beating them in front in order to make them advance, may be still sometimes met with, to gratify the curiosity of the inquirer into ancient modes of agricultural practice. But even in the highlands, and universally in the lower districts of this county, the two-horse plough, managed by the ploughman alone, is now introduced.

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The old Scots plough is still in considerable repute. It answers well for tearing up a coarse and stoney soil: it sets up the furrow with a bold shoulder, so as to furnish abundance of mould for the operations of the harrow. Its disadvantage is, that it generally requires more than the power of two horses.

Small's plough is at present almost in universal use in this county. Its excellencies are its lightness, and the form of the naoald board, which is of cast iron, and which, rising from the share by an easy curvature, diminishes the friction and requires a smaller power of draught. This plough is universally used on the farms under the improved regime upon the Kilsyth estate of Sir Charles Edmonstone. In the Carse of Stirlingshire, where agriculture is still in a great many instances in a very unimproved state, the Scots plough has not yet altogether given way to Small's. It is there alleged by some, that Small's plough, which by its construction is calculated to go deep, and which, if it does not go deep, lays the furrow over imperfectly, is apt to bring up the till which lies under the clay, and thus to produce a mischievous effect. When, however, the enlightened ideas and practice of some intelligent farmers in that district come to be better understood, it will be known that deep ploughing is the best; and that there is no risk in turning up the subjacent soil, which by intermixture with the superior strata, and alternate exposure to the light and *frost*, will soon become equally good with the rest.

Small's plough is also called the chain plough, because at its first introduction it was drawn by a chain, passing under the beam, fastened immediately below  
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the coulter, and connected by the *mantle* to the fore-end. This chain is still used in some places, but is more generally disused, as affording little additional strength to the beam.

On this subject, it were to be wished that ploughwrights were better versed than they generally are in the common principles of mechanics; and that they had a better notion of the most advantageous method of turning over the furrow: that undoubtedly is the most perfect, by which the furrow is laid over at an angle of 45 degrees, exposing the greatest possible surface to the air and to the harrow.

Levelling and drill ploughs are commonly used.



#### SECT. 11,—HARROWS.

IN the harrows Used in Stirlingshire, there is nothing very peculiar. They are sometimes of three beams or *bulls*, as they are here called, and sometimes of four. These are joined together with cross bars: in every beam there are five, and sometimes six teeth, here called *ty?scs*. The teeth are of iron, and have a bevil forward at an angle of about 70 degrees, in order the more effectually to tear up the stiff ground and to root out the weeds. Two harrows, drawn by two horses, are joined together *Si* such a manner as that the  
course

course of the teeth may coincide as little as possible, and so as to pass over the ground in the most equable way.

A heavy harrow, called a *hreake* is sometimes, and ought to be more generally used, for tearing out couch grass, and other obstinate weeds, in summer fallow, or for preparing the ground for barley. It is generally of two pieces and of a triangular form, the teeth very long and stout. The hinder part is furnished with two handles to raise or depress the teeth, as may be necessary. Great attention is required in the person who directs the handles to observe when the teeth of the breake are filled with roots and the horses must be stopped till they are removed. The same operation must be repeated at every turning of the harrow at the end of the ridges. The roots are afterwards collected and burned; but, it may be observed, that a more advantageous practice would be to throw them into a heap in some corner of the ground where the most noxious weeds will ferment, and, in the course of about two years, be converted into valuable manure. The process might be accelerated by the addition of a little lime in a caustic state. This process has actually fallen under the reporter's notice in Dunbartonshire.

*attr.*

## SECT. III.—ROLLERS.

THE roller is an indispensable instrument in husbandry and the heavier the roller, the more effectual it is. In no district is the use of the roller more necessary than in the Carses, or clay lands, of Stirlingshire; where, ill dry springs, notwithstanding all the efforts of the plough and harrow, in pulverizing the soil, the hard consolidated masses of Clay, which deform the stiel, can be reduced only by the roller. Before the introduction of the roller, it was common in the spring for all the men and women on the farm to be employed for several days in breaking the clods on clay soils, with wooden mallets, or *ntel* as they are called.

But perhaps the most important use of the roller, is the consolidation of the loose soil, which had either been naturally tight, or which had been rendered friable and porous by the frosts, which, in this climate, often succeed the seed time. In such soils the seed, which had begun to send forth its fibres in quest of nourishment, finds nothing but open pores destitute of sap and warmth. By the operation of the roller, these pores are filled up, the roots of the vegetables are fixed in the soil; and the moisture necessary to vegetation is prevented from evaporating.

There is another application of the roller which merits attention. The peed Sjne of 1808 was uncommon--



ly early. Oats were sown in a considerable quantity in this district in February, and the whole oat seed was over early in March. Drought, accompanied by very severe frosts, succeeded for several weeks. In light dry field soils, especially in the western parts of Stirlingshire, the ground swelled and became open and porous. Whether from something peculiar to the season, or from the porousness of the soil, the oat-fields became infested with myriads of slug worms, which devoured the tender roots of the grain; rendered whole acres unproductive; and threatened the ruin of the crop. It was remarked that this devastation was most fatal in grounds that were in the best condition! as in old leys which had been let out in grass. A field of about seven acres, occupied by the reporter in the immediate vicinity of the western district of Stirlingshire, was threatened with the total ruin of the crop so that, at one time, thoughts were entertained of ploughing it down, and sowing it a second time. By the use of the roller, this disagreeable operation was rendered unnecessary. The field was rolled twice; first, to obviate the effects of the frost in heaving up the soil; and then, after the young corn had got up, to destroy the slug-worm. This second rolling was given after sunset, and before sunrise, as it was understood that it is during the night that these insects come forth from their lurking places and commit their depredations. In this operation, it is to be presumed that many of them were crushed to death; and what is perhaps of more importance, the earth was consolidated, and the pores, by which they had issued forth, were compressed and shut

<sup>1</sup> shut up. It is sufficient to say, that the operation was completely effectual, and that the ensuing crop was abundant. "

Rollers of every kind are used in Stirlingshire. Some are of wood, but not the most approved; many are of stone; hollow rollers of cast iron are frequent. Rollers divided into two parts, and iiated rollers are not uncommon.

#### SECT. IV.—DRILLS.

DRILLING machines are generally used in sowing turnips and beans; and, by their means, the operation is no doubt performed with greater regularity and expedition, and the ground afterwards cleared of weeds with greater facility. Drill husbandry, however, has not been yet introduced into this county upon an extensive\* scale. As far as the reporter has found, it is only practised with regard to potatoes, turnips, and beans; and with respect to beans, he meets with a considerable difference of practice and opinion amongst the most intelligent agriculturalists. In the Carse of Gargunnoch, the drilling of beans is not found to answer, and is disused. Such, it appears, is the tenacity of the soil, that in horse-lieing, large Masses of compacted clay are torn

up, and the crop materially injured. In the Carse to the east of Stirlingshire, and in the rich loams of Kilsyth, beans are generally drilled. The difference between the practice in the Carse of Gargunnoch, and in the eastern parts of the county, arises probably from this that the latter having been longer under the operations of agriculture, the soil has been rendered more friable than that of the former, which has been more lately brought under a proper mode of cultivation.

As to a great number of the articles specified in the plan of the Board of Agriculture, under this chapter, it does not appear necessary to enter into a laboured detail. The most of these instruments are too familiar to require description. Many of them again are unknown in this district, as scarifiers, scufflers, draining-mills, &c.



#### SECT. V.—THRASHING-MILLS.

SUFFICE it to say, that thrashing-mills, with their appendages of shakers, and winnowing-machines or fanners, are now very generally introduced into this county. Few or none who farm to any extent in the eastern and southern districts, want this first implement of husbandry. They are almost • universally wrought  
wrought

wrought by horses, water being for the most part scarce\* The power of the mill is estimated by the number of horses that is necessary to work it; an indefinite estimate} it must be allowed, to persons unacquainted with the strength of the horses employed, but sufficiently intelligible in the district under consideration. We speak of a thrashing-mill of a three-horse power, a four-horse, and a six-horse power.

From the daily increasing price of wood, and of other materials of every kind, an ordinary thrashing-mill costs from L.60 to L.200. A thrashing-mill of a three horse power, in this county, cost, about four years ago, L.125\* At the present day it would cost 2.5 per cent. more. Ten men are employed whilst it is in use, in the various operations belonging to it; it thrashes at the rate often bolls of wheat every hour, or 100 bolls in a day often hours.

Without enlarging on the utility of this machine, this may suffice to demonstrate the saving which it occasions. It is unnecessary to offer an estimate of the time; and the number of hands that would be required to thrash 100 bolls of wheat by the flail: It is reckoned that one third of the expence of labour is saved by the use of the thrashing-mill.

## SECT. VI.—CARTS.

THE one-horse cart is almost universally employed throughout this county. It is understood that one horse can draw about 20 tons. Were 40, or even 30 tons put on, not only the roads would be cut up by the greatness of the weight, but the burden horse would be soon destroyed. It is remarked at the same time by intelligent men, « that in the two-horse cart, the foremost fails soonest, probably from the inequality of his pull."

The Falkirk carriers have been long celebrated for dexterity in their profession. " Before the opening of the great canal, the whole mercantile intercourse between the ports upon the Forth and the city of Glasgow was carried on by carters chiefly of this district; and it is certain that they have long given the preference to the one-horse cart. By long experience they have ascertained that one horse, with a cart properly-fitted to his size and strength, will carry two-thirds of the load that two horses drawing in a line, and of corresponding strength are capable of doing.

According to the most approved construction, the cartwheels are about four and a half feet diameter. The axle is sometimes of wood, but more generally of  
iron,

iron, which is surely preferable, as it occasions less friction.

In many parts of this county, especially in the western district, single-horse sledges are still used for carrying hay, or corn in the straw; they are very cheap; the husbandman generally constructs them for himself.



SECT. VII.—KILNS AND MILLS.

This seems to be the most proper place for shortly noticing that great improvements have lately taken place in those necessary appendages of rural oeconomy, the kilns and mills of this county. Formerly kilns for drying victual were miserable hovels covered with thatch; every farmer had his own kiln; the grain was placed upon rafters covered with straw, and innumerable accidents happened by fire. It must be acknowledged that kilns of this kind are still frequently to be met with, especially in the western district; but in general they are substantially built, covered with slate, furnished with a bottom or flooring of cast iron, and, in many instances, connected with the mill, and under the same roof.

The mills are generally furnished with the proper apparatus for grinding every kind of grain; for roiling malt, and for making pot parley of every degree of fineness.

fineness. In the parishes of Kippen and Gargunnock, there are several mills of the best construction, which have the easy advantage of copious mountain streams. The lands in this county being, for the most part free from thirlage, the millers charge for their labour some, one part in 33<sup>s</sup> and some, one part in 41, of the grain that is grinded, and for preparing a boll of barley for the pot 2s. 6d.

CHAP.

## CHAP. V L

## INCLOSING.



By certain acts of the Scottish parliament \*, it is ordained, that contiguous proprietors shall be at an equal expense in inclosing their lands which border upon each other. These statutes continue to be acted upon; and thus the important improvement of inclosing, without which ground losej a great part of its value, has been much promoted in Scotland.

The only other instance that now occurs, in which inclosing is enforced by statute, is that of fields cut up by turnpike roads under an act of parliament. In this

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case,

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\* A. D. 1661, en. 17.apd41,



case, the trustees of the roads are bound to indemnify the proprietor for the land occupied by the new line, and also to inclose his field with hedge and ditch.

It may be observed, however, that notwithstanding the statute of so early a date, little progress was made in inclosing till within these thirty or forty years. In the mountainous parts of Stirlingshire, we may still trace the remains of rude fences or dykes, which separated the lands under tillage from those which were held in pasture. These generally ran in a straight line along the mountain about one-fourth of the way from its base. They were probably sufficient to prevent the encroachments of black cattle; for in those days sheep, which require a loftier and more sufficient fence, were reared only in small numbers. The subdivision of fields, and the inclosing of them with walls or hedges, were in former times unknown.

Of the various sorts of fences now employed, the rudest and simplest in its construction is called the *Galloway dyke*, (probably from its having been first and most generally introduced in that country). It is formed of large ill-shaped stones strongly wedged together, for about two-thirds of its height: and then, of stones gradually decreasing in size, for 18 or 24 inches more. The interstices between the stones are wide, and the light being seen through them frightens the cattle, especially sheep, and deters them from attempting them. They are cheaply erected, and cheaply repaired. In the parishes of Fintry, Denny, St Ninians, and the muir lands in that neighbourhood many miles of such fences occur.

*Slont*

*Stone walls* of about four and a half feet high, with a coppice of sods of earth- orturf. sometimes laid on in two rows, are also very frequent. They have the *advantage* of forming a fence of great strength and duration all at once. They have the *disadvantage* of interrupting the current of the winds with such sudden violence us to occasion gusts or eddies upon the surface of the ground, which rush on with increasing impetuosity over the fields, and disturb the stratum of air which lies next to the surface of the earth, and is not conducive to vegetation \*. In this respect hedges, with  
 hedge

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\* It may be permitted to take notice of a well known principle in the natural history of our atmosphere, which a practical farmer will do well to attend to in his operations. It is this, \*\* that it is highly advantageous to the growth of vegetables, that the stratum, of air which lies in contact with the earth, should be its much as possible in a state of rest. Chemists teach us that the air which we breathe consists of various substances, which, in the modern nomenclature, are termed gases. Of these an opportunity will afterwards occur of shewing, that the *carbonic acid gas* holds the most important rank in promoting the growth of Vegetation. It is this gas, which is evolved in burning limestone, or in reducing any calcareous substance by acids or by fire. It is produced in the process of fermentation; and its existing quantity in the atmosphere is, no doubt, momentarily increased as it is consumed, by these and other well known processes. The quantity of this gas existing in the atmosphere is stated by chemists to vary from 0.005 to 0.01.

Dr

hedge rows, are much preferable. The wind filtrates, if the expression may be used, through the hedge ; its force

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Dr Thomson, (System of Chemistry, Vol. III. p. 284- 1st edit.) observes, " that we may conclude, with some degree of confidence, that it is not veiiy different from 0-01," a prodigious mass in the component elements of our air\* Caibo\* nic acid gas is heavier than common air,, and hence natural\* ly subsides to the surface of (he earth. It abounds consc\* quently in the lower stratum, of the atmosphere, Being considered by physiologists us constituting the principal food of plants, it is obvious that, like every other species of manure, it should be retained by every possible means, upon the spot where it is to produce its effect. But the difficulty of doing this is great\* The agitations to which the atmosphere is liable dissipate it, and any operation by which this loss can be lessened is important\* Hedges and hedge rows have this effect. It will afterwards be suggested that leguminous plants, by the broadness of their leaves, and the shelter which they afford to the lower stratum of the air, produce the same effect, and consequently ameliorate the soil\*

Here, then, the reporter finds himself under the necessity of differing in opinion from a reverend and intelligent friend, from whom he has received very \aluable information with regard to the Carse of Stirlingshire. He states, " That thorn hedges, instead of being a benefit, arc highly injurious to a tenant; that they occupy much ground which might be under the plough; that they harbour birds destructive to grain ; and that, what is worst of all, they nrevent that free circulation of air which is so essentially necessary in harvest in aflat low lying district/'

This

force is gently broken, and, after passing, it proceeds with an equable and moderated strength, till it crosses the field, where the same process recommences.

The operations of William Forbes of Callander, Esq. in various departments of agriculture, **have** been already spoken of: in that of inclosing he furnishes a distinguished example. The detail will be given from the account with which that gentleman himself had the goodness to favour the reporter.

" The inclosures are hedge and ditch in the common form ; but two different methods are occasionally employed;

" 1. In order to save the expence of a paling for **fencing** the hedges, and, especially, in order to avoid the vexatiousness of having the paling destroyed and **stolea**, in this populous district, where wood is scarce  
 « Mr Forbes first causes a ditch, to be cast, five feet  
 « wide,

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This ingenious method will forgive the reporter when he reminds him, that even in the Curses of liothkonnar, Airtb, and Fa Ik irk, he set many unequivocal marks, (of which notice has been taken in speaking of the climate of this county.) of the sweeping fury of the S. W. winds, in the inclination of the hills towards, the N. E. Some inconveni-  
**ent** *ace* tny indi tti ht- kit (n>m **ike want of circulation of**  
 air in harvest, but this may be obviated by removing  
 the hedges in the middle of the field. It may be any force in  
 the hedges has been suggested, the method of  
 hedges and ditches, will be ad-  
 milieu- »

« wide, and three feet deep. The mound is between  
 « four and five feet broad at the base, and of the same  
 " height. In this mound, with a margin of one foot  
 \*\* back from the ditch, the hedge is planted. Beyond  
 " the mound a *second* ditch is cut, three feet wide, and  
 " 2½ feet deep, or as deep as the bank can be made to  
 « stand. The whole fence, including the two ditches,  
 « occupies the space of about 14 feet. By the time  
 " that the hedge becomes a fence, the ditches are  
 " filled up completely by the earth of the mound, so  
 « that no ground is lost,"

« 2. Another method by which Mr Forbes sometimes  
 " encloses is, to face the mound in which the hedge is  
 « planted with turf on both sides, the height being 4½  
 « feet, which, in the course of a year, settles at four  
 " feet. This mound is soon covered over with a sward  
 « of grass; and, at the same time that it is the most ef-  
 " ficient, it forms the most beautiful fence. The width  
 \* of this mound, at bottom, is 5 feet; at top, it is from  
 « 12 to 14 inches. By the time that the hedge has be-  
 « come a fence, the mound forms an excellent top-dress-  
 « ing, the ditches are filled up, and no more ground  
 " is occupied than that which is taken up by the  
 « hedge."

These hedges are planted in single rows, at the dis-  
 tance of four inches from each other \ and, at every  
 three yards distance, a plant of oak, elm, beech, or other  
 valuable wood is inserted, for a hedge row. The thorns  
 are purchased when seedlings, and trained up in a nur-  
 sery upon the estate, for two or three years, before they  
 are transplanted into the fences, if by this process, they  
 are

ore gradually naturalized to the soil and the climate\* In constructing these fences on the Callandef estate, not less than ttx millions of thorns, have been planted ; and the line of these measures about four hundred miles in length: the trees of various kinds, planted in the hedge-rows, amount to above 200,000, forming alone a forest.—It is unnecessary to remark the beauty which hedges and hedge-rows give to any country : in the dead levels of the Stirlingshire courses, they contribute particularly to please the eye, and no where do they grow more luxuriantly.

The only species of fences which remains to be noticed, is that of *sunkfenceS*) as they are called. A few years ago, these were a favourite kind of fence in gentlemen's pleasure grounds; and they occur frequently in this county. On the one side, the earth is scooped out to the depth of five feet, or mere; it is made to slope gradually from the bank to the level of the ground; and the bank itself is faced with stones neatly built, and sometimes cast with lime. On the other side, the grounds are on a level with the top of the wall, which is not seen j and, from that point of view, the eye is presented with an uninterrupted plain. In this respect, it is beautiful; but it is not a sufficient fence against sheep, who can easily leap down from the side that is level with the ground, unless a hedge be added on the top. It thus becomes an expensive fence j and is not now so much practised as formerly.

With regard to the expense at which these fences are constructed, it is extremely difficult to speak with precision, *en* account of the incalculable difference which

which must take place in different situations, from the ease or difficulty of procuring the materials, and various other circumstances. Hedge and dike, with paling, cost, in the Tarses of Gargunnock and Kippen, about L. 1. 8s per rood of 36 lineal yards. Stone walls or dykes cost from L. 2. to L. 4. per rood. Stone walls, when well built, will last, with little repair, for forty years.

*Gates.*—With regard to gates, it is unnecessary to enlarge. In the more improved parts of the county, they are uniformly of one piece, moving upon hinges of iron, fixed in stone, or sometimes in wooden posts. They consist of four or five horizontal bars, supported by upright as well as diagonal bars. Those used at the Buke of Montrose's seat at Buchanan are elegant, and peculiarly convenient. They are so exactly balanced upon their hinges, that they are opened with the smallest effort, and they shut of themselves. One of these gates, with all its appendages, costs L.10. or L.12,

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### SECT. III.—NEW FARMS.

UNDER this head, nothing occurs, unless the throwing of several small farms into one, which, as has been noticed already, is frequently<sup>1</sup> practised in Stirlingshire,  
is

is to be considered as establishing a new farm. In this view, almost all the farms on the estates of Callander and Kilsyth, may be denominated *new*: for, from almost a state of nature, they have been newly arranged and subdivided: new farm offices have been built, and new tenants introduced: a measure which, though at first it excited some clamour amongst the ignorant and interested, has ultimately proved highly beneficial, and added, in more than a threefold proportion, to the productiveness of a rich district of country, which was formerly almost lost to the public.

CHAP.



## CHAPTER VII.

### ARABLE LAND.



#### SECT. I.—TILLAGE

MANY particulars relating to the subject of tillage have been necessarily anticipated in describing the instruments employed in-cultivating the ground, as the plough, the harrow, and the roller.

To plough deep is of great importance; and no plough seems to be better calculated for this than Small's. To plough deep is the practice of the most enlightened farmers, in the corses, it is necessary in order to open up the soil, to afford room for the water to filtrate, and to run off into the drains; and to permit the roots of plants to run out in search of food. In every sort of land, it is necessary in order to add to the staple of the soil, and to bring up the moist earth, that lies below and never saw the sun; by the action of solar light,  
and

and of frost, and by the absorption of the natural acid! which float in the atmosphere, even this earth is soon rendered fertile.

The operation of ploughing is advantageously commenced, especially in old leys, in the beginning of winter, when the weather is open. The mould is pulverized, and the roots of noxious plants destroyed, by the succeeding frosts.

In the ancient practice of this county, little attention was paid to the direction or construction of the ridges; they were generally winding in a semicircular form; too many specimens of which may be still observed, even in the lower and richest districts of this county. \* They were besides raised high in the middle, so that the most fertile parts of the soil were accumulated there, whilst the sides of the ridge were left bare and thin.

A few enlightened farmers in the Carse have, of late, set an example, which it is to be hoped will be followed, of levelling and straightening their ridges. These consider the height of nine or ten inches in the middle as sufficient to carry off the water into the furrow; and the breadth given to the ridge is from 15 to 18 feet.

In this district, where the storms blow most frequently and most violently from the *south-west*, it may be proper,  
 I when

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\* It is singular, that at a very remote period, as has been already noticed, the ridges, of which the vestiges still appear in the Gargunnoch, the Camisjip, and Kilsyth hills, were perfectly straight and equal.

When the situation of the field will permit, to give a similar direction to the ridges for it is obvious, that, when the side of the ridge is exposed to the rains and winds, the finer particles of soil are washed down into the furrow, and probably carried off altogether. When the ground is steep, the same consideration of preventing the finer particles of soil from being lost, should direct the arrangement of the ridges in a slanting form, When the ridges are thus properly constructed, and the furrows properly turned over, the seed in sowing, will naturally fall into the form of a drill.

The more general introduction of ploughing matches in this county would have a beneficial effect in stimulating the ploughman to execute his work in the neatest and most effectual manner. These institutions, however, are yet unknown, in the carse to the east of Stirling, where their introduction appears the most necessary. The Gargunnoch farmer club, of which an account will afterwards be given, has, for many years, granted premiums annually to those within the western district, who excel in these competitions and there, the skill and dexterity of the ploughman are rapidly increasing.

No crops are put into the ground without ploughing, as far as the Reporter can learn, except potatoe oats, which are sometimes sown in this manner, after potatoes or turnips.

Potatoes and turnips, and sometimes beans, are cultivated in drills; and, in freeing them from weeds, horseboeing and hand-hoeing are occasionally employed.

In the operations of the farm, that of WEEDING holds an important place. Of the noxious weeds which infest the arable lands of this county, some are *perennial*, others are *annual*. It may be proper to take notice of some of the most hurtful in each of these classes.

#### L PERENNIALS.

1. The *heracleum sphondylium*, or cow-parsnip, sometimes, and happily but rarely, occurs in arable lands. It strikes its roots downwards for 20 inches or more, and is extirpated with great difficulty.

2. Of the *tussilago farfara*, some mention has been already made. It is very difficult to get rid of it.

3- The *senecio jacobea*, or rag-weed, which is a biennial, is very troublesome in old leys, and abstracts much of the riches of the soil. It is most effectually destroyed by cutting it down with the scythe, immediately before it flowers; and then it will form a useful addition to the dunghill.

4. The *achillea ptarmica*, or sneezewort, is a very pernicious weed especially in tilly and loamy soils.—It would seem that it can be eradicated only by an improved mode of culture, and the application of proper manures;

5. The various kinds of *grasses* which infest the soil, can be exterminated by fallowing courses only,

6. The *ranunculus arvensis*, crowfoot, or *Sit-sicker*, as it is here called, is very common, very hurtful, and very difficult to extirpate. Frequent ploughing, and

the enriching of the soil by proper manure, seems to be the most certain method of getting rid of it.

7. In light dry soils, the most troublesome of all weeds is the *artemisia vulgaris*, here called *mugwort*: its large branchy roots adhere obstinately, and form a matt which must be torn up by the plough, and removed carefully from the ground. In fields which have been long left under grass, this plant dwindles away, so as to occasion little mischief: but, on their being again brought into tillage, it gradually recovers its former size and strength

8. In dry field stubble-grounds, the *geranium dissectum* occupies much space. It is an unprofitable weed. The mode of extirpation seems to be the amelioration of the soil by culture, and by manuring.

## II. ANNUAL WEEDS.

Of the annual weeds, the most frequent and the most noxious in this district are, the *serratula arvensis*, or cursed thistle; the *onopordum acanthium*, a large and very prickly kind of thistle; the *souchus arvensis*, or sow-thistle; the *chrysanthemums*; the *centaureas*; the *agrostemna githago*, &c. With regard to these, the most common practice is, during the summer, to pull them with the hand, and to lay them in heaps to rot upon the ground. But, besides that there is a risk of pulling some of the corn along with them, or at least of injuring the roots in some degree, it may be observed, that the most part of these plants are of so succulent a nature, that even though they are pulled some time before

fore they have ripened their seeds, these are afterwards ripened upon the spot where they had been thrown; and the seed^ being, in almost evëry instance, furnished with wings (*pappus*) are carried about by the winds, and infect the soil for years to come.

It is submitted to the judicious agriculturalist whether it would not be better to cut these annual plants over, near the root, just about the period when they are forming the flower:—the root cannot, for that year, renew its stem; or, at the most, it can send forth only a few slender fibres : the seed is not perfected; and the whole planfr^perishes with the winter. It is of importance to remark, that plants, especially of the annual kind, when cut over before the period of perfecting the flower, bleed off their juices and die.

The Reporter has to add, that, on his own little farm, he has practised this method with success for several years, with regard to the *serratula*, and that still more formidable enemy, the *onopordum*. Just before they perfect their flower, he employs his servant to cut the weed with a coarse sharp knife, as near the ground as possible, and it is calculated that he can cut *thr.e* this-tles in the time (hat he can pull *one\* besides that no injury is done to the roots of the cortj;—It is left to every one to act fli this matter as he judges best; the thing seems, at least, to merit a tri^l.

As to the smalle? weeds that infest^ arable soils, such as the *veronicas* (speedwell) the *alsine* (chickweed) the *lamium* (dead nettlej thlasp! (shepherd's purse) the *sina-pis feigra*, *brassica lupus*, *rhapanus raphanistrum* (wild mustards)-*asenaria*, *sagina*, &c. &c. it is unnecessary to

say much: their prevalence is often owing to ill culture! and the poverty of the soil, which may be corrected by various means\* The rumex acetosella, or sheep's sorrel, is effectually destroyed by the application of calcareous substances. In speaking on the subject of WEEDING, the true theory seems to be, to pulverize the soils, and to enrich it by proper manures.



#### SEC'I. II.^-FALLOWING,

THE operation of *Fallowing* is practised in Stirling^shire upon a very extensive scale. In the carse grounds, it comes in uniformly as a part of the rotation, as will appear from the section immediately following. In all strong and adhesive soils such as these, it becomes indispensably necessary, u\* order to pulverize the ground^ to kill noxious weeds; to relieve the land, by rest, from the -exhaustion of uninterrupted cropping; and to expose successive surfaces to the action of the air and of the light.

Having proceeded thus far, it occurs, that, in order to illustrate this, and some of the agricultural processes which follow, with proper effect, u may be of service to suggest *shortly* some chemical principles of obvious application, and with which even the practical farmer should be, in some measure, acquainted. It is well known, that, in every art of life, the deductions of science

science have shortened and facilitated the ordinary processes.—What is the experience of the farmer, on which he rests his operations, but the plain conclusions of common sense, from facts which he and his forefathers had observed? Philosophy proceeds precisely in the same way: it collects, and arranges, and applies facts, but by a much quicker and surer method than could be done by the random experience of generations.



### *Chemical Principles of Vegetation.*

When the seed is cast into the ground, it undergoes the process of *malting*, which is nothing else than the first appearance of the new plant springing up from the fermenting mass of the parent seed. As the plant advances, it is fed by similar processes;—by inhaling certain kinds of air, and by incorporating with itself certain earthy and saline substances.

By a wise arrangement of nature, the destruction of one race of vegetables is made subservient to the reproduction of another. By a chemical process, all vegetables may be reduced to a state, of putrefaction; and then they restore to the earth the matter of which, in their living state, they had robbed it.

The richest soil, by being subjected to a perpetual series of exhausting crops, may be so much robbed of



those particles which enter into the composition and nourishment of plants, as to become incapable of yielding profitable returns. The great object of the farmer is so to manage his land that it may yield the greatest increase of which it is capable.

There are various processes by which this may be most effectually done. Some of these depend on the ordinary *operations of nature*^ assisted by human industry : others again are altogether *artificial*^ such as the application of manures \—of this last, notice will be taken under chap. XII.

In speaking of the *ordinary operations of nature* in promoting vegetation,^ it may be observed, that the air which we breathe, and which is also necessary to the growth of plants, is composed of certain subtile substances called *gases* by chemists. It may be stated shortly, that oxygen gas, or vital air, constitutes nearly 25 parts in the 100 of the atmosphere; nearly 15 parts are composed of azote, which is unfriendly to animal life; but it enters copiously into the food of plants.

Besides these two great constituents of the atmosphere, there is, as has been, remarked on a former occasion\*, continually floating in it, a small portion of carbonic acid gas, which enters largely\* into the food of vegetables: Mr Kirwan has observed, that there are certain vegetables which exhaust this, gas, whether applied in the form of lime, or otherwise, more rapidly than others; and that these vegetables, when analysed^

yield

yield again the greatest quantity of carbon. He instances, in the order in which they exhaust carbon most copiously, 1. wheat; 2 barley; S.-clover grass.—When speaking of the culture of these plants! the application of this doctrine will be attempted.

The nitrous acid gas is found also to exist in the atmosphere in a small portion\*. It consists of oxygen, with azote for its base. It is productive of very important effects in the economy of nature. In Spain, for example, nitre, or salpêtre, is obtained by collecting the refuse of the streets into heaps. After this has been, for some time, exposed to the atmosphere, it is thrown into perforated vessels, with the addition of wood-ashes, as an alkaline base. Water is poured on, and filtered through; the crystals of nitre are formed by evaporation. The same matter, being again exposed to the atmosphere, is re-impregnated' with nitre; and thus the process may be continued without end.f

All this serves to prove that certain substances exist, already formed in our atmosphere, which contribute to 'Ae growth of vegetables:—these natural acids, by combining with an earthy or alkaline base, form saline substances, which are the proper food of plants. Hence it necessarily follows, that, by proper applications to the ?oil, it is in the power of the husbandman to increase the production of these substances; and to concentrate, as it were, upon thcs surface of the earth, the fertilizing influences

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\* Dr Home's Principles of Vegetation, p. 14C.

t The UCT. MrTownbheiff'ts Travels in Spain.

influences of the air. This subject will recur when treating of manures.

It iufly be added, from the observation of facts, that there appears to be some inherent quality in solar light, which has a powerful effect in promoting, and in perfecting vegetable life. Chemical science does not seem, as yet, to have advanced so far as to analyze this influence, or to account for it. Its effects, however, are remarked by the most unenlightened. Cultivate any plant, the potatoe for example, in the dark, it will vegetate ; but it will not possess either the colour or the flavour of its kind. .Solar light seems to be indispensably necessary to communicate their proper qualities to-vegetables. There seems even to be reason to conclude that the rays of solar light possess some property analogous to the aerial acids ; and that, combined with certain qualities of the soil, they contribute to form, saline substances, the food of plants.\*

Thus,,

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"\* This idea is taken from a hint **Bugstod**, and merely **Uggesti-d**, by M. BtrthoUet, in an Essay on Bleaching, published in the *Atmaks <lc CJiymk: Ile obs* erves, " that theft) " seems to be a striking analogy **between flic solar raysj had** " **tht\* oxygenated** murintic acid, now used in bleaching, ly th " in their nature and efects.\* The t>uth is, that **the effect** produced by the rays of **rile sun iijmn** the coloured **parts of bodies** is **altogether similar** to that **produqed bytheabove-** mentioned acid. The **former** imm> slowly, and the **latter** "more rapidly, destroys the colour oi" cloths, **and performs** the operation

Thus, then, it appears that bountiful nature has furnished, without the co-operation of man, very liberal stores for the improvement of the soil. It is true, that these are too scanty to supply the great exhaustion of vegetable particles which takes place in lands held in regular tillage. Here, applications furnished by human industry must come in to the aid of nature\* such as manuring, fallowing, &c.\*

IN

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operation of bleaching. Formerly this operation was performed slowly by the application of an alkaline ley, joined to long exposure to the sun. By the late discovery, it is performed quickly, by the oxygenated muriatic acid\* with the addition of an alkaline ley. In both cases, the principle seems to be the same: in both, an alkaline base is necessary; in both, the presence of an acid is necessary, to form a neutral salt. In the one case, this acid is furnished slowly, by the rays of the sun; in the other, it is applied at once, in its more concentrated form.

It is hoped that the practical farmer will forgive the introduction of these few simple principles of science. They were originally offered, with some idea of a similar tendency, which will afterward be brought forward, in an Essay presented to the Board of Agriculture in 1801, on the subject of "the best method of converting old grass lands into tillage\* and of returning the same into grass, in a improved state." This Essay obtained the approbation of the Board with the silver medal.

In considering the operation of FALLOWING, it may be observed, that chemists teach us, that when substances which are chiefly, or totally inflammable, are, for a long period, exposed to the atmosphere, the action of the oxygen gas gradually deprives them of their principle of inflammability, and reduces them to an inert state, in which they are unfit for nourishing vegetables. We have a familiar example of this in the surface and parings of peat-earth, which, by this process of oxygenation, becomes unfit either for fuel or vegetation\* Even dung itself, by being long exposed to the atmosphere, becomes inert, and is converted into a species of peat.

Lord Dundonald, in his ingenious treatise on *the application of Chemistry to Agriculture*^ seems to have been led into an error, in reasoning from these principles, however just. He *condemns Jaltoxying*, in almost every instance, from the notion that the soil becomes oxygenated by long and frequent exposure to the atmosphere, and is consequently rendered inert, His Lordship indeed professes, page 59, quarto edition, " that the most \*\* prominent feature of his work is the unfriendly effect « with regard to vegetation, which is produced by the « exposure of the soil to the air."

When his Lordship, again, attributes the exhausting effect of narrow-leaved crops, as oats, barley, and wheat, to their affording little cover to the soil from the air, and the meliorating effect of broad-leaved crops, as pease and turnips, to their preventing oxygenation, by covering the soil,—his argument appears to be partly, and only partly, just. Broad-leaved crops prevent the oxygenation of the particles of manure, and other inflammable

flammable substances contained in the soil \*, but it would seem that the great and leading difference between broad and narrow-leaved Crops, with regard to their effects on the soil, are, *firstly* that the former confine the carbonic acid gas, the food of plants, near the surface of the earth more than the latter; and, *secondly*, that broad-leaved plants derive a great portion of their nourishment from the atmosphere, and the narrow-leaved, principally from the earth.

It appears, further, in speaking on this subject, that Lord Dundonald has not sufficiently adverted to the circumstance,—that the soil, or mould of earth in which vegetables grow, consists, for the most part, of substances which are *uninflammable* (and, consequently, incapable of oxygenation) such as clay, calcareous earths, &c. These substances, by exposure to the atmosphere, are gradually impregnated with the natural acids of which mention has been made, and are thus rendered more fit than before for the purposes of vegetation. Hence the utility of *fallowings* by exposing the soil, during a proper period, to the influences of the air and of the light..

In the courses of Stirlingshire, summer fallows are ploughed with a, ^rong furrow, from four to six inches deep : they are ploughed from four to six times during the season ; and it \is reckoned by intelligent farmers, that the dftener they>are ploughed the better.

It is reckoned that the strong loamy land of Kilsyth, when continued under crop, will require a fallow every sixth or eighth year.,

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When lime is applied to fallow, as is very generally done in the corses, it is laid on immediately before the last ploughing, and the last furrow is taken jthin; so that the lime, which has a natural tendency to descend, may not be buried too deep

In light arenaceous soils, Lord Dundonakl's doctrine of the hurtful effects of oxygenation may be admitted to hold. ' i ere fallowing seems to be unnecessary and improper \*, and accordingly, in the Highland district of Stirlingshire, it is almost unknown. In-such soils it would seem that e\*s is gained than is' lost by the in-\* flue nee of ihe atmosphei e: these soils require chiefly copious additions of manure.



### SECT. III.—COURSE OF CR3P5.

THE proper rotation of crops is a cpsiderationi of the highest importance to the farmer. S^me kinds of grain, as has been noticed, soon exhaust the soil of its nutritive qualities j whilst others contribute to ameliorate it, or, at least, exhaust it in an inferior degree. In no situation ought this cificumstance to be more attended to than in the corses of Stirlingshire, which are held, almost constantly, under tMlage: 7et there, a proper course of cropping is too frequently neg'ected. The indispensable

indispensable operation of fallowing, especially, is too often omitted,—the farmer grudging the loss of a year's crop, though he knows that the produce of the ensuing year would yield him an ample compensation.

In detailing the ordinary rotation of crops practised in Stirlingshire, of which very full and accurate documents have been obtained, the most proper method seems to be, to give tables exhibiting the particular district of the county, the soil, and the rotation of crops usually observed. By comparing the practice of different adjacent districts, the occupants of each may learn what to reject, and what to adopt from each other.

#### TABLES of the Rotation of Crops in Stirlingshire.

I. In the Dryfield lands of the county, comprehending Buchanan, Drymen, Fintry, KiUearn, &c. the course, when it can be accomplished, is, or ought to be, as follows:

|                                     |  |
|-------------------------------------|--|
| After grass, 1st year               | Oats.                                      |
| 2 <sup>nd</sup>                     | A green crop.                              |
| 3 <sup>d</sup> Barley,              | with grass seeds, j<br>or sometimes wheat. |
| 4 <sup>th</sup> *                   | Hay.                                       |
| 5 <sup>th</sup> and 6 <sup>th</sup> | Pasture.                                   |

II. Turning to *ſae* northern aspect of the Lennox hills, the Reporter finds, that in the carse grounds lying to the west of Stirling, a course, or *shifty* as it is here called, of six years, is practised, as Follows:



1. A summer fallow.
- a. Wheat.
5. A green crop.
4. Barley, with grass seeds.
5. Hay.
6. Oats.

III. In the Carse of St Ninian's, the Rotation is,

1. Fallow.
2. Wheat.
3. Beans.
4. Barley, with grass seeds.
5. Hay.
- 6 Oats.

IV. In the Carse of Airth, Bothkennar, Falkirk, and Polmont, it is,

1. Fallow, with lime.
2. Wheat.
3. Pease and beans, sown broad cast,\*with dung.
4. barley, with grass seeds.
5. Hay.
6. Oats.

Sometimes a second crop of oats is taken on the seventh year; but this practice is not approved of.

V. Mr Walker of Falkirk, one of the most intelligent agriculturalists in the county, has adopted a course somewhat different from the above? it is,

1. Fallow

1. Fallow, with lime, provided that the ground has taot been limed within 20 y<sup>as</sup> before
2. Drilled beans with dung.
3. Wheat.
4. Potatoe-oats, with three or four ploughings, and grass-seeds.
5. Hay,
6. Oats,
7. Fallow.

Mr Walker's difference of practice is founded upon the opinion, that in the rotation marked No. IV. tfee 3d and 5th courses come too near each other, both, consisting of green crops, and requiring the same food from the earth and the air.

N. B .Sometimes after the .crop of hay is taken off, the ground is broken up; half a fallow is given to it; and a clop of wheat is taken with success.

This may perhaps be the most proper place for faking notice of a circumstance in agricultural economy which y not always sufficiently attended to even in the Carses of Stirlingshire, the utility of frequently *changing tie seed* which is sown. Whatever be the philosophy of

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• Why Mr W. adopts such an unfrcquent use of lime, the reporter cannot state. If there, be any foundation for Mr Kirwan's idea of the great exhaustion of calcareous matter by certain vegetables, one should think that a crop of wheat und of clover and of oats would exhaust the lime sufficiently in the course 3f deven years\*

f this matter. It is certain that every kind of seed degenerates, by being sown in the same place for a long succession of years. By being exchanged for seed procured, perhaps at no great distance, the quality as well as the quantity of the produce *is known* to be improved. It seems to be an unreasonable idea, (though maintained by some) that seed should be brought from a poor to a richer soil, in order to bring the greatest increase. **Animals** are improved in their quality) by being removed from a poor to a rich soil; and so, no doubt, grain will, in some measure, be. But the just theory concerning seed seems to be, **that** by sowing the most perfect in its kind, the most abundant returns may be expected. **The** reporter has, indeed, met with a theory of an opposite tendency advanced, particularly with regard to oat-seed, " that, though not fully ripened, or well filled, it makes good seed." Neither philosophy or experience confirm this doctrine. " Fortes freantur fortibus et boni\*\*."

#### SFCT. IV,—WHEA'

WHEAT has been cultivated for<sup>1</sup> time immemorial *m* the Carse of Stirlingshire -, -anti being found the most profitable

\* Horace, Utl. L. iv- 4-

profitable of all crops, from the smallness of the measure, and the high price which it brings compared with that of barley or of oats^the culture of this grain is now rapidly extending itself towards the very western extremity of the county. About 16 years ago, there was little or no wheat sown in the rich soils of Kilsyth •, there are now upwards of 100 acres cropped annually with this grain.

The preparation for wheat varies according to circumstances. In general it is sown after a summer fallow, with dung or lime, or with both together. From 40 to 50 carts of dung are given to an acre, and from four to eight chalders of lime ; the quantity varying according to the quality and condition of the soil. As it is seldom that the occupier of an extensive farm can, in the same year, procure lime and dung sufficient to manure all his wheat land, it is an ordinary practice to give lime to the one half and dung to the other.

Wheat is also frequently sown in the ground where potatoes or turnips had been raised that same season. These crops, by the various operations which they had undergone, are found to furnish a sufficient fallow. An additional dose of manure is generally given.

It is not uncommon, after taking a crop of hay off ground which has been laid down the preceding year in grass, to plough down the second crop of clover when it has become luxuriant, and to take a crop of wheat. The clover serves as a manure to the wheat, being, as has been found by chemists, richly impregnated with calcareous matter. A gentleman, however, who has practised this method, finds that wheat sown

after clover is frequently infested with snails upon its appearing above ground.

As to the season of sowing wheat, \* it is extended in this county, from the beginning of September to the middle of December, according as the weather and other circumstances admit. Spring wheat has been lately introduced, which is to be sown in February or in March ; but it has been hitherto cultivated in so few instances that the reporter does not consider himself qualified to speak of its merits.

Over all Stirlingshire, wheat is sown broadcast. In all the Carses, and in the loams of Kilsyth, wheat is *harrowed* into the ground ; in some of the light loamy soil: of Campsie, it is *ploughed* down with a very thin furrow.

Wheat used for seed is almost universally steeped immediately before sowing, as a preventative against mildew, smut, and other diseases. The steep is \*either water impregnated with salt to such a strength that an egg will swim in it, or chamber ley or urine j whilst it remains in this pickle, (which is for twii or three days,) the weaker grains which, upon stirring, rise to the surface, are carefully skimmed off; and when the seed is taken out of the pickle, it is dried by spreading it on a floor, and by sprinkling quicklime o'er it.

Whether the effect of preventin<sup>e</sup> disease in the future crop is occasioned by the sepa<sup>p</sup>ation of the weaker grains from the more perfect (which could, be done equally well by steeping in pure water,) or by the absorpiion of certain matters from the pickle, which destroy the tendencies to disease, it is impossible to determine,

time, in the present state of natural science. It is sufficient, however, to induce every prudent farmer to adopt the practice, that it has been found effectual for the purpose for which it is intended

It may be permitted, at the same time, to add that the intelligent agriculturist, Mr Walker of Falkirk, *never sleeps* his wheat seed, and that yet he is seldom or never troubled with the smut, or any other disease in his grain. His method is to sow the seed of the *preceding year* which he finds to answer best in many respects, and *particularly* in this, that it appears to prevent disease in the grain. Perhaps it may be, that the cold of the preceding winter has had the same effect with the pickle in destroying the tendency to disease, whether arising from *mucor*, or from *ammalatifit*'y lodged in the grain. It was fortunate for Mr Walker, that in the autumn of 1807, he sowed the seed of 1807, which was of a much fuller and stronger grain than that of 1808. In November 1808, when the reporter saw his farm in Bothkennar, his young wheat exhibited a much stronger fibre, and a brighter green than that on the adjacent fields, which had been sown with the feebler grain of the same season \*.

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\* It has of late taken notice of a tract tending to recommend a similar practice stated in a letter from Sir John Sinclair, **part** and inserted in the Farmer's Magazine No. 351, p. 16. "That Mr Robertson of Essers constitutly **DWS** old wheat, and, is not troubled with the smut." Mr Nitui'

Young

In detailing the minuter operations of the harvest, (which it will not be necessary to do at great length,) it is intended in this section to offer every thing that relates to wheat, oats, barley, and the other grains ordinarily cultivated in Stirlingshire.

*In fetqng*, the sickle is universally made use of. An evident improvement of the sickle is now very generally introduced. The old sickle, which is still most frequently used, is teathed somewhat like a saw; the teeth soon wear out, and, for the most part, the sickle is henceforth useless, unless the teeth be renewed on the anvil. The improved sickle is broader in the blade; it has no teeth, and is of a better metal \ on the principle of the scythe, it is sharpened from time to time by a stone. It cuts with more ease than the other, and lasts for a much longer time.

By the sickle the **grain** is, no doubt, cut down more regularly, and is more easily collected into sheaves than; by any other method, but the operation **is** slow, and it requires many hands. It would be perhaps the most important acquisition to agricultural operations that has been made for a long while, if **in** instalment were invented, by which corns could be cut down, and at the same time

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**Young** states, " that he never steeps his **wheat**\*<sup>1</sup> in the troulik; and **except of steeping and then drying** the **seed** with quicklime we taken into the account, it would **seem that Mr Walker's practice should be objected to the proof of more frequent** experiment. The philosophy of the subject is in its favour.

same time gathered into sheaves, as hay is cut down by the scythe. In grounds completely level and free from stones, like the Carse of Stirlingshire, an estimate might at least be made of the proportional expence, whether by *labour* or by *lost*, of reaping corns with the sickle or with the scythe.

The size of the sheaves is proportioned to the length of the straw. In wet seasons they are not made large. Twelve of these in oats and barley, and fourteen in wheat make a shock, or, as we call it, a stook. In placing the stook, attention is paid in this climate, as ought perhaps to be done in every other, throughout the kingdom, to the point of the compass from which the storm or weather most generally blows. If the side of the stook be placed towards this point, the greatest possible surface is exposed to the weather, and the corn suffers accordingly; the end of the stook therefore is presented to the weather. In this district, from the circumstances which have been already mentioned with regard to the climate, the stook is generally placed in a direction from S. W. to N. E. In narrow vallies, and where hills and woods interfere, there may arise a difference of the currents of air, and in such situations experience must guide.

On account of the succulent nature of beans, pease, and other leguminous plants, they are left loose upon the ground for sometime before they are bound up into sheaves, that they may lose in part their superabundant juices.

In very wet and unfavourable seasons, a method is practised in this county, which perhaps is not much



known elsewhere, and may be shortly stated. The sheaves, instead of being set up in stooks, are set up singly on the lower end, the band being split up near the top, and the middle opened and exposed loosely to the current of the air. This method is here called *waiting*. It is had recourse to only in extremity \ there is much loss sustained by the exposure of the ears of corn to the weather and to the birds; but if there be only a few hours of drought and sunshine, the victual will not be finally lost

When the sheaves are exhausted of the moisture which had remained in the stalks, or which they had imbibed from the weather, they are built up into large ricks or stacks, of a circular form, and with conical tops, the eaves, at the commencement of the top, projecting over the body of the stack to ward off the rain. The conical top is thatched with straw. These stacks contain from 30 to 90 or 100 thraves of victual, a *\*hrave* being two stooks. No great quantity of grain is put into the barn at once ; it is safer in the stack from the depredations of vermin.

To preserve the grain as much as possible from vermin, the stacks on every farm, conducted upon a proper system, are placed upon wooden frames^' fixed upon pillars of stone 18 or 20 inches high, and on each pillar there is a flag-stone projecting over it several inches. By this means vermin are effectually prevented from ascending into the body of the stack. In rainy seasons frames of wood are sometimes placed perpendicularly in the stack, to preserve them hollow, and to afford a free circulation of air throughout.

Though

Though thrashing mills are now Very generally introduced upon every considerable farm, much work is still performed by the flail. Wheat straw, being too coarse for the food of cattle, is almost exclusively used for thatching and for litter. The straw of barley is very generally used in the same way. The straw of oats and of pease is used as provender.

With regard to the *manufacture* of these different kinds of grain, it will not be necessary to enlarge, the practice being nearly the same as in other parts of Scotland. Every district of the county is amply furnished with mills, constructed in the proper form, and furnished with apparatus suited to every necessary operation.

Flour, or the meal of wheat, is most generally made into loaves fermented with yeast.

The meal of oats, which is more used as a food in Scotland than perhaps in any country of Europe, is not fermented when made into bread ; but, being mixed with a proper quantity of water, is kneaded into dough, and this is beat out into thin cakes, which, after being heated on a circuit plate of iron, are toasted by the fire till they turn brittle. In Scotland, oatmeal boiled, and stirred about in water, is formed into a kind of pudding called *porridge*, which, with milk or beer, is the ordinary breakfast of the common people. "When well boiled, this is a very wholesome and nutritive food.

Another preparation of oatmeal, much used, especially in the western parts of this county, is *soxén*. It is made by pouring hot water upon oatmeal, or upon a mixture of meal with the husks produced in grinding. It is left in the vessel for a few days until it become

comes acidulous: It is then poured offj and boiled to the consistence of jelly. It forms a light and wholesome food. Dr Beddoe observes, that \* by the use of soins, or sowens, one of **Captain** Cook's most intelligent friends, cured his scorv tic sick on board his ship \*•"

The grains of oats, freed from their husks, are frequently used in milking broth, instead of barley i this preparation of oats is called *grots*.

Of the *stubble* of grain, the reporter can learn no use *thai* is made m this county, except that of ploughing It down *j* and this is probably the best purpose to which it can be applied. In Carje grounds especially, the strong stubble ploughed down serves to keep the ground open, and when it at length rots, it adds to the manure. The burning of stubble has been suggested, and it is in some places practised *j* but when **it** is considered that the ashes furnish only a very minute addition to the soil (not more than one part out of 20 of the substance "burnt,) it is not probable that the practice will be generally adopted.

The greatest part of these details maj appear **raunt**< resting and unnecessary to an inhabitant *jf* Stirlingshire, to whom they are minutely known. \*iut, besides that such details are required by the Board, and that **it** is proper that every treatise should be ^o complete in itself as to supersede the necessity of, reference to other

sources

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\* Observations on the uat tie -anil gurc of Ciilculus, sva- <curvy, &o by Dr Betldoes, Loud\* 1793, page 00.

sources of information, it may happen that this may fall into the hands of persons who may be disposed to form comparisons between the different methods employed, in conducting these operations.



## SECT. V.—BYE.

OF this grain there is almost none cultivated in Stirlingshire.



## SECT. VI.—BARLEY.

MUCH of the detail of the operations which concern this grain, as well as those which follow, has been necessarily anticipated in Sect iv. A few remarks will here suffice.

Barley ground is ploughed at least three times : every potato? ground is ploughed [once at least & one of these should be cross ploughing\* it is manured as in  
*the*

the case of wheat. Barley is universally sown broadcast, and is, in almost every instance, accompanied with clover and rye-grass. The ground is rolled immediately after sowing, if the soil is dry, if it is wet, it is rolled after the blade has come up. By this last method, many grains are saved and permitted to spring up, which, had the land been rolled in its wet state, would have been pressed down and lost in the compacted soil.

Almost all barley is mixed with some portion of bear or big. In the higher parts of the county, bear alone, without any mixture of barley, is found to answer best, being a coarser and hardier grain. It does not bring a price equal to that of barley by a few shillings.

Barley is sown in the end of April or beginning of May. This grain is much cultivated in the dry-field lands of this county, but since the more general and more profitable introduction of wheat, it is not so much cultivated in the Carse, especially those to the east of Stirling, as in former times. Mr Walker considers his land as too good to be employed under a barley crop, which, as will be seen from the tallies of produce which shall be added, yields only about eight bolls per acre, whilst potatoe-oats yield twelve and sometimes fourteen.

There was much malt made formerly in this county, in which there were several extensive distilleries. In the parish of Kippen alone, there were, previous to the late prohibition of distilling from grain, twenty malt-barns. Their number is at present greatly reduced.

The price of barley varies here as in other counties. In general, it is a little lower than in the Haddington market.

## SECT. VII.—OATj.,.

FOR oats, which are most commonly sown in lands that had been in grass, only one ploughing is given, and that frequently in the beginning of winter, the succeeding frosts contributing to render the soil friable. In light soils potatoe-oats are frequently put iii without ploughing, in land where potatoes or turnips had been raised the preceding season. It is essential, however, that the ground should be turned up into furrows immediately after the potatoes or turnips are taken up.

When any manure is given to oats, it consists of a top-dressing of lime or dung. The latter is called *teathing* in this county. Of these methods mention will be made under the article of *manures*.

Oats are so yn in February, in March, or early in Aprils and always in broadcast. Different kinds of *seed* are used, as BWnslie, Coupargrange, and potatoe-oats. This latter sort his, of late, come into very general use\*. It is an early oat, a circumstance of great importance in so precarious a climate as this is. Like other kinds of early oats, its straw is less abundant than that of late oats, but it is more plentiful in grain. Potatoe-oats re^uire a soil *hi* rich conditio L There they yield a great return; 'the husk is thin, and the farinaceous part plump and heavy. It is remarked, that when other kinds *ot*

oats yield only 16 pecks of meal, potatoe-oats generally yield 18 pecks. The Flemish oat, possessing nearly the same qualities, has been lately introduced.

#### SECTIONS VIII. & IX.—PEASE 1ND BK4NS.

THESE two kinds of grain being generally sown together, at least in the Carres of Stirlingshire, it may be permitted to bring them under one head. When mixed, as they for the most part are, they are sown with dung in Lehman' or March. The pease are in the proportion of one-third or one-fourth; the advantage of **mowing** them mixed is, that the pease throw their tendrils around the strong stalk of the beaiij and are prevented, in this rainy climate, from falling to the **ground** and rot.

Pease are sometimes sown alone, in the dry fields, in the western **part** of the **county**; in a dry season they succeed, in a wet one they are often lost.

Beans also are **sometimes sown** alone; in this case they are sometimes drilled, as is the practice of Mr Walker of Fulkirk. In the Carres of Gargunock, Polmont, and Urberr, they are sown broadcast.

**f**rom the **pro**riousness of the connate, these succulent plains do not always succeed, and are but little cultivated

tivated in the higher parts of Stirlingshire. They are understood to improve the soil, by confining, as has been already suggested, the gases which promote vegetation, with their broad leaves ; and by their deriving, like other leguminous plants, a considerable portion of their food from the **atmosphere**, as well as from the earth.

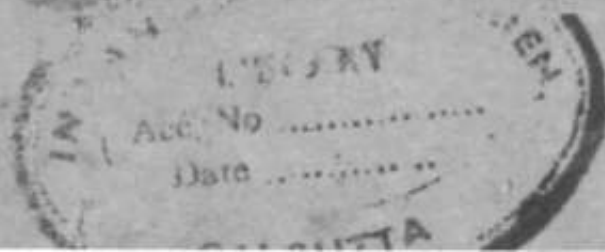
The common horse-bean is most generally sown. The late pea is sown in March ; the gray Hastings pea, an earlier kind, in April.

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**QUANTITY OF GRAIN SOWN\*\*, AND PRODUCE PER ACRE.**

HAVING offered these remarks with regard to the general practice of this county in the cultivation of wheat, barley, oats, pease, and beans, the grains almost exclusively cultivated in Stirlingshire, this seems to be the proper place for stating the quantity of each which is generally sown, as well as the returns generally yielded by the Scots acre. In a district of such various soil and climate it is impossible to give an estimate that will answer to every situation. It must suffice to offer an average reckoning, taken in different parts of the county.

• • u r x T





I. The quantity of seed sown per acre.

1. "Wheat, from 8 to 12 pecks, according to the soil.
- 2 Barley, from 8 to 10 pecks, sometimes 12 pecks.
3. Oats, one boll and sometimes five firlots.
4. Beans, one boll of 3 firlots, sometimes 4 firlots\*

II. Produce per acre\*

1. In the Carse west from Stirling, an acre yields :
  - Wheat, from 7 to 9 bolls.
  - Barley, from 5 to 7 ditto.
  - Oats, from 5 to 7 ditto.
  - Beans, from 4 to 7 ditto,—always an uncertain crop.
  
2. In the Carse of Falkirk, Airth, Bothkennar, and Polmont, an acre yields
  - Wheat, 12 bolls, and in well fallowed land sometimes 16,
  - Barley, 8 bolls.
  - Oats, 11 bolls.
  - Potatoe-oats 12, and sometimes 14 bolls.
  - Beans, 8 bolls.
  
- 8.<sup>1</sup> In the loams of Kilsyth, Campsie, Sec an acre yields;
  - Wheat, 12 bolls.
  - Barley 8 bolls.
  - Oats 6 bolls.

SECT\*

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## SECT. X.—TARES.

TARES are sown, to a very small extent, in the loamy soils of Kilsyth, Campsie, Buchanan, and some other places. It is to be regretted that they are not cultivated upon a much larger scale, as they enrich the soil, furnish a rich food for milch cows in the interval between the first and second clover crop, and, by assisting the summer feeding within doors, contribute to increase the dunghill. It was suggested to the reporter by a gentleman of this district who cultivates tares upon a small scale, « that they should not be used till the seed is nearly formed, as they furnish at that time the richest and most nutritious food." The seed of tares is never preserved here, as they are always used for stall feed-

ing.

## SECT. XI.—LENTILS.

\*HESK are unknown in the husbandry of Stirlingshire.

SECT..

## SECT. XII.—BUCK-WHEAT.

BUCK-WHEAT , the polygonum fagopyrum of Linnaeus, is lirrle cultivated in Stirlingshire. The reporter never observed it, except at Buchanan, the seat of his Grace the Duke of Montrose, where it is sown as a food for pheasants which have been introduced there. It is an excellent food for poultry, and even for swine. Its culture deserves attention. May it not be advantage-ous as a preparation for wheat, serving the same purpose, when ploughed down in its succulent state, that the second crop of clover does ?



## SECT. Xlii.—TURNIPS.

THE introduction of turnip husbandry, which is on-ly of recent daie, forms an important acra in the annals of Scottish agriculture. 'With regard to the merits of .this department of husbandry, they are unquestionable.

By

By the culture of turnips the soil is cleansed) and at the sametime ameliorated. Cattle are fed for the butcher, and for the dairy \*,»with succulent food, after the grass crop has failed j and the quantity of dung is increased by stall-feeding.

Some doubts were, it one period, excited in the reporter's mind by the accounts which he received from many intelligent agriculturists of this county with regard to the *exhausting* effects of a turnip crop\* In the fine loamy lands of Campsie, he learned < that ground, which had born a crop of turnips, does not, the ensuing year, produce nearly so good a crop of wheat as that which had been under potatoes; and that, consequently, turnips are now cultivated in that district on a reduced scale, whilst the quantity of ground laid down with potatoes is tripled." In the dryfields on the Endrick, a farmer reports, that a field laid down, the one half with potatoes, and thfe other with turnip, was sown the ensuing year with flax: that which grew on the potatoe ground was one fourth better than that on the tu>Rip grounOi-

On the other h^nd, a great number of the most intelligent gentleme^ with whom the reporter has had

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\* It is pretty generally known (and this knowledge should be more universally carried into piactic<0 that the disagreeable flavour occasioned to milk an i butter by rurnip feeding, w completely removed by the addition of a small quantity oi nitro. '

an opportunity of conversing, are decidedly of opinion that if an equal quantity of dung, and equal pulverization, be given to turnip ground as to potatoe ground, the ensuing crop will be equally good. Captain Davidson of Kilsyth farm, who occupies above three hundred acres of fine loam, generally lays down every year about 14 acres with turnips, which are succeeded by a good crop of potatoe-oats, with grass seeds. He observes no deterioration of the soil from turnips.

The question, in short, seems to reduce itself to this, that if the soil is, in any instance, impoverished by a turnip crop, this is occasioned, in the first place, by its receiving a smaller quantity of manure than is given to potatoes, (as is generally the case,) 2dly, by the inferior degree of pulverization given to turnip ground, in the last stages of the crop; and, lastly, by the poaching of the ground in taking up the turnips. Were all these circumstances equal, it would seem, on physiological principles, that potatoes are the more exhausting crop of the two; the turnip has the largest leaf; it confines more of the carbonic acid gas on the surface of the ground -, it imbibes more nourishment from the atmosphere and less from the soil; and it contains\* a much smaller quantity of farinaceous matter.

On the subject of this crop it is necessary to remark, that many soils in this county appear unfortunately to be ill adapted to its culture\* The proper soil for turnips is a dry and arenaceous soil, or a dry loam. The subsoil, too, must be attended to. Where the subsoil is an impervious till, or f<sup>u</sup> pck, the ground is poached in carrying off the crop, and, especially, injured by cattle,

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<sup>1</sup> if the turnips are fed off upon the ground. Water in this case lodges in the winter in the pits that are formed ; the soil is chilled, and rendered unproductive.

An intelligent gentleman<sup>#</sup> in the western district of Stirlingshire, deeply versed in the principles of chemistry, together with their application to agriculture, observes, " that little of the land in this county) ro the west of Falkirk., by Stirling, Kippen, Balfmn, and Killearn, is favourable for turnip husbandry, because the soil is, *in general*, heavy, wet, and spouty, and lying on a rock or till impervious to water ; that he persevered for many years in cultivating turnips, but was obliged to desist, on account of the obvious deterioration Qf the soil by poaching; nor has<sup>7</sup> it, even after an interval of many years, recovered its fertility; that turnips, therefore, cannot be cultivated in this district with advantage, except in a few favourable patches of land, which here and there occur."

One exception at least, of a soil favourable for turnip hus^an&y, the reporter met with in the estate of Dr'AVloir of L\*eckie, in the parish of Gargunnoch. Dr Moir cultivates turnips to a very considerable extent, and with complete sucSess; the account of which seems to be, that his dryfield land is free from a tilly subsoil, that it is in good qrder, and well pulverised.

In the Carse of Stirlingshire, turnips are cultivated on a very limited scale. It is obvious that the close  
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\* Archibald Stirling oi Garden, Esq.

compacted soil of these districts is not suited to the cultivation of this plant. There are few cattle fed in the Carse; and the land can be more profitably occupied in raising grain. "Turnips and flax," as a sensible agriculturist observes, "are not much used in the Carse, though most people have a small quantity of both; but the soil is not adapted to them."

To conclude this subject, it may be remarked, that a very great proportion of the higher parts of this county consists of dry field of an arenaceous or loamy soil, the best suited of all others to the cultivation of this important plant. These being properly occupied in turnip husbandry, may perhaps supersede the necessity of forcing this crop against nature in the Carse; and even should a turnip crop be required in the lands of an unfavourable subsoil which have been alluded to, the disadvantages of nature may possibly be overcome by industry. To prevent the poaching of the ground, the turnips may be carried off in dry weather at the end of autumn and stacked; and the ground should be immediately turned up in ridges to prevent the lodging of water, and to expose the surface to the ensuing frosts of winter.

With regard to the detail of turnip husbandry, it is too well known to be required here. The first step is the complete pulverization of the soil by repeated ploughings, with the addition of dung. The seed used is either the yellow, the white, or the red, and very commonly the three kinds mixed. It is sown from the 15th June to the 10th July. If sown sooner, the plant would shoot into seed before winter; if later, it would not

<sup>1</sup> not arrive at perfection. It is sown when there is some moisture in the soil, or when a shower is expected. Turnips are universally cultivated in this county by the drill husbandry ; they are sown, for the most part, by the drill plough, by which they are also rolled in the process of sowing j they are weeded both by hand and horse-hoeing.

Of the vegetables enumerated in the Plan of the Board, from Section 14th to Section 19th inclusive, namely, Cole-seed, or Rape, Cabbages, Rut a Baga, or Swedes, Turnip Cabbage, Kol-Rabie, Borecole, &c. some are not cultivated at all in this county, and others upon a very limited scale.

Some gentlemen cultivate cabbages in the field in a s<sup>^</sup>iir quantity.; some plant them in alternate drills with, common kale or colewort, or with Swedes transplanted from the seed bed. These last are not generally cultivated, however, and when they are, it is remarked, by an intelligent agriculturist, « that they are for the most part sown too late to come to perfection."

Colewort, or common kale, it is observed, furnishes a very grateful as well as a profitable food for milch cows. The offal obtained by picking off the exterior leaves, and leaving those nearest thr'centre/to expand into a new top, is said to bothe most productive of milk of a



good quality, of any food that can be given to cows. A gentleman of this county, who farms upon a liberal scale, states, " that the offal of an acre, of kale is nearly sufficient for the summer feeding of six cows in the house;" the value, as food for winter, cannot be easily calculated.



#### SECT\* XX.—CARROTS.

CARROTS, though only introduced lately into this, county as a field crop, are cultivated successfully by some enterprising agriculturists; and, where they succeed, they are considered as the most profitable crop, o\* all others. Mr Kincaid of Kincaid lays down an acre with carrots; and the general return is 20 tons per acre. In the year 1807, carrots sold in the Glasgow market at L.5 per ton; a prodigious return from one acre of ground!

Mr Johnston of Alva cultivates carrots to a greater extent than any gentleman in the neighbourhood; he sometimes sows three acres.

The habit of this plant indicates the soil which is proper for it. It pushes its root downwards perpendicularly.

cularly. It requires therefore a deep loamy soil \ \t will not thrive in an adhesive clay : a-porous subsoil is also requisite; a till^ bottom destroys it.

It follows also that the soil should be highly pulverized by frequent ploughings, Land which has been under a potatoe or turnip crop the preceding year, and richly dunged, is tve most proper. Bui it should not be dunged agajn for carrots \ for the consequence will be ihe breeding of maggots in the plant. The seed is sown by the hand, about the beginning of April, on the surface of drill ridges, formed about the distance of two feet, in a slight groove made for its reception ihe carrots, when taken up, are stored in heaps, like potatoes, or put under a roof. No plant is less injured in the ground by frost, on account of the depth to which it penetrates.

Besides furnishing a grareful and nutritious food for man, it affords also an excellent food for cattle, particularly for horses.

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PARSNIPS and BEETS, the subjects of sections XXI\* and XXII, } a^ oniy cultivated in the kitchen garden in this county.

## SECT. XXIII.—POTATOES.

THERE is, perhaps, no plant which, in point of importance, both as to its use and its culture, yields to the potatoe in the agricultural economy of modern times. When we consider the many millions of British subjects who now depend upon it principally for their daily food, we are disposed to wonder how our forefathers supported existence before its introduction; and we must allow, that no detail which regards its culture and improvement can be considered as superfluously minute.—It is hoped that these considerations will apologize for the details which follow with regard to this important vegetable.

The potatoe is the *solanum tuberosum* of Linnæus. The general character of the whole genus is more than suspicious. The *solanum dulcamara*, which is a native of the western parts of Stirlingshire, is a deadly poison: its flower exactly resembles that of the potatoe.—It is, at the same time, fortunately ascertained, by long experience, that the potatoe partakes in almost no respect of the deleterious qualities of the family to which it belongs: it forms, without question, i. most nutritious and wholesome food : it containj more farinaceous matter

ter than most of other vegetables used for food. Its introduction into the system of Scottish agriculture, at least, has given a new aspect to society, not only by furnishing a cheap food for the poor, but by opening up new modes of cultivating the ground, and of arranging the rotation of crops.

Still, however, before we quit the subject of the character and qualities of this vegetable it may be permitted to remark, that, under some forms, it exhibits certain slight traits of the solanum family —It is not out of the memory of persons still alive, that, on the first introduction of the potatoe into this country, which is yet a recent event, it was considered as an unwholesome food. This idea has proved to be unfounded, but it would seem that a certain attention in dressing it is necessary to divest it of every shade of its generic character. In oiling or roasting, it may be observed particularly, are required to render it a proper aliment for the human race. By these operations it would seem that the acrid qualities are thrown off which are inimical to health, and by the removal of which the vegetable is rendered completely wholesome.

An example may be given in a preparation of the potatoe, which is very common, at least in the western parts of Scotland: it consists in boiling the potatoes, stripped of their skins, in a proper quantity of water, together with a piece of beef or mutton • this dish is there called potatoe soup. This soup, prepared as above, the Reporter can say, from his own experience, and that of many on whose testimony he can rely, produces, in many stomachs, a nausea; and, though the degree

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is slight, still it is a *degree* of deleterious quality\* This effect is completely removed by previously boiling, or at least half boiling the root in water\*, which is to be poured off:—the potatoes are then to be thrown into the juice of the animal food, which had been boiled in a separate vessel, there to be boiled and macerated «new.

Brute animals do not appear to suffer perceptibly from the use of the unboiled potatoe, or of the water in which it had been boiled. Reasoning from analogy, however, one should be disposed to conclude that it is proper to steam, or scald, or give a half boiling to potatoes, for the food of horses, cows, and swine.

The potatoe was, as it is believed, first introduced into Europe from America. It appears to have been cultivated in Ireland a considerable time before it found its way into Scotland; and it appears that it was in the county of Stirling that it was first cultivated upon an extensive scale.

From a memoir presented to the Board of Agriculture by Dr William Wright, it appears that potatoes were first planted out in the open field in 1728, by Thomas Prentice, a day labourer in the parish of Kilsyth. But Robert Graham, Esq. of Tamrawer, in the same parish, was the first who, in 1739, cultivated this root successfully, in the open fields, to any considerable extent. Potatoes had formerly been planted only in gardens, and in a very small quantity. Mr Graham planted them in such quantities as to be able, in no small degree, to supply the demands of the neighbouring markets. To extend the advantage of his discovery\*

as it may be truly called, as widely as possible, he rented lands for the culture of potatoes, in the vicinity of Renfrew, Glasgow, Perth, Dundee, and Edinburgh.\* Such an instance of public spirit, and of successful enterprise, justly claims monumental record in the annals of agriculture.<sup>1</sup>

Potatoes are now planted in this county by every farmer, in such quantities as to supply his family ; and, in the neighbourhood of towns and villages, to supply the market. In the Carse, they are not, however, cultivated to any great extent: every farmer there, in general, plants in the tenderest part of his ground, or in land that had been summer fallowed, just what serves himself.—A loamy or arenaceous soil is the most favourable for potatoes. This soil abounds in the parishes of Kilsyth, Campsie, Strathblane, and in general in the western district of the county\$ and there potatoes are planted to a great extent.

Potatoes require to be richly manured with dung. In sandy^soils, a mixture of one half dung, and one half moss or peat earth, is found to answer well.

Potatoes are seldom planted in lazy beds, except where new ground is to be brought under culture, or in some outskirts of a field to which the plough cannot reach. Cottagers and small possessors plant very generally by *dibbling*: they grudge the space which is lost by planting in drills; and in this case, hand-hoeing is always practised. But, when potatoes are cultivated

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\* See Statistical Account of Kilsyth.

to any extent, they are always planted by the plough, in drills, at the distance of about 30 inches or three feet, and the sets at the distance of about nine inches in the drill. The dung is sometimes placed in the drill in which the sets are to be laid; but more generally spread upon the ground before the drills are formed. In the first case, the whole dung, no doubt, goes to the planr, and the crop is larger; but the potatoe is not esteemed so sweet or dry; and the benefit to be derived from the dung to the ensuing crop is lessened.

Potatoes are planted by sets, or cuttings, each having at least one eye or bud. About the year 1800, a small sharp instrument, of a spoon form, was introduced for scooping out the eye or bud only, and for saving the rest of the root, in those times of scarcity, for food. This instrument seems to have been soon abandoned; probably because the bud, accompanied only by a very small portion of the potatoe, was liable to be buried and lost in the operation of planting; and also, because it was found that a considerable portion of the substance of the root is necessary, at first, to nourish the young bud.

With regard to the different sorts of potatoes that are cultivated, they seem to vary beyond all possibility of calculation. Botanists will probably grant it to be the general character of plants whose fructification is, according to the Linnaean nomenclature, of the *liacca* kind; (I. e. having a number of small seeds inclosed in a succulent substance, covered with a skin)—that their seeds, when sown, produce an endless variety of the plant. This is the character of the *ribes*, or gooseberry kind.

kind. It is also that of the potatoe, which, by sowing the seeds obtained from the apple or bulb, may be produced in every variety of colour and form. The seed sown produces, for the first year, only a very minute root, scarcely bigger than a pea: this being planted, produces, by the second year, a root of the size of a pigeon's egg: by the third year, it is of the ordinary size; and is an *early* potatoe, till, by long continued culture, it ceases to retain that character.—It is the business of the cultivator of this valuable root, to ascertain this process, and to follow it out by proper experiments.

In about a month after the potatoes are planted in drills, or as soon as the weeds begin to gain ground, the whole field is harrowed down level. In a short time, the shoots of the potatoe make their appearance, and mark the drills distinctly. Hand-hoeing is then applied; and when the shoots are sufficiently advanced, they are horse-hoed, three times, at least, in the course of the season.

It is of great importance to plant this root early, that it may ripen fully before the autumnal frosts destroy the tops: for the potatoe, being a green crop, derives much of its food from the atmospheric gases; and it is well known from the experience of autumn 1807, and of another year some time back, when the tops of the potatoes were destroyed by the frost, early in September, that from that moment they gained nothing. Potatoes should be in the ground, in this climate, by the 20th of April.



In this view, it seems to be a pernicious practice to cut off the tops of the potatoe, while yet green,\* as is done by some poor people for feeding their cows — Of the point suggested in the last address of the President to the Board of Agriculture, of picking off the flower of the potatoe before it forms into an apple, the Reporter cannot speak with confidence, on account of the imperfection of the experiment made by him in Autumn 1808. He had the flowers completely picked off from a certain number of drills > but, during his absence for a considerable time, at that period, a new set of flowers succeeded, which were unfortunately allowed to remain. The drills which were treated in this way, however, appeared to be at least as productive, and even perhaps somewhat more so, than those which had been allowed to perfect the seed. It seems rational to conclude, that, if the vegetation of the plant is not injured by cutting off the flower, which does not seem to be the case, the root must receive the nourishment which would have gone to the apple, and be proportionally enlarged. The subject deserves attentive investigation.

It is singular that in many potatoe fields which fell under the Reporter's observation, in Autumn 1809, particularly one of his own of five roods, the flower fell off almost universally without forming a bulb or apple\* The crop was, at the same time, most abundant.

Potatoes are taken up, either by digging with an iron instrument, with three prongs, called a *grape*, or by ploughing down the drill, whilst a number of persons follow with grapes, to search for and gather the roots.

roots. The latter is the most expeditious; the former the most economical method.

They are stored, for the most part, in heaps, of a longitudinal form, and terminating in a sharp ridge. These are covered first with straw, and then with a coat of earth, to the depth of, at least, 18 inches. The heap is besides generally roofed with thin turf. To store in pits, dug in dry gravelly soil, with a course to carry off any water that may lodge, is not uncommon in this county. Potatoes are also sometimes stored in buildings; but, even in the closest buildings, it is proper that, in severe winters, they should be surrounded by a coat of straw.

The average quantity of potatoes planted on an acre is about three bolls \ the average produce is from sixty to eighty bolls.

The *price* varies without end. In the scarce years of 1799 and 1800, potatoes sold at 16s. per boll, corn measure. In a year of plenty, they are sold for six or seven shillings per boll.

With regard to the *application* of this root, it also varies without any other Jimit than that of the species of animals that feed on it. It affords, both in its *boiled* and *unboiled* state, a nutritious food for horses, cows, whether giving milk or to be fattened, swine, and sheep. In its boiled state, it is used as food for poultry.

The potatoe produces a beautiful starch, which, when boiling water is poured on it, forms a jelly: if a little sugar is added, % it furnishes a very palatable food. The quantity of starch, or farinaceous matter, produced by

equal weights of different kinds of potatoes, is undoubtedly the just criterion of their respective value.

With regard to the keeping of potatoes by dryings the Reporter<sup>4</sup> possesses no data from experience or information, to enable him to advance any thing. Considered *a priori*) drying expels a very large portion of the substance of the root; and it would seem that except in the case of preparing it for being conveyed by long voyages, for the use of navigators (and, in British economy, few uses to which it can be applied are more important) it may be easily and safely preserved from one end of the year to the other in heaps or in pits.

A potatoe crop is generally succeeded in this district \*with wheat, with barley, or with potatoe oats\* accompanied with grass seeds.



SECT. XXIV. AND XXVI.—CLOVER AND RAT-GRASS, OR  
RYE-GRASS.

As these two kinds of grass seeds are almost always sown together, it may be permitted to throw the account of them into one section.

Clover and rye-grass are sown with wheat, with barley, and sometimes, when the land is in good condition, with oats, particularly with potatoe oats\* The red

red and white clover seeds are generally sown together, in the proportion \* of two of "the former to one of the latter. For the most part eight lbs. of red and four lbs. of white clover are given to the acre. Sometimes a smaller quantity is given. In the Carse, where only one crop of grass is taken, white clover, whose great excellence is that it is a perennial plant, is seldom used: 12 lbs. of red\* are given to the acre.

With regard to the question, «Is the land tired of clover," the solution seems easy upon chemical principles. Mr Kirwan, in a small tract " concerning the « Principles of Vegetation," relates some experiments which he made in analyzing vegetables; and he found Calcareous matter, in the *greatest* quantity, in wheat; in the *second* degree, in barley; and in the *third*, in clover grass: and he rationally concludes that these vegetables exhaust the calcareous matter with which the\* soil is impregnated, in the same order and degree. The celebrated discoverer, Mr Davy, as quoted in a late Address to the Board, by the President, " found so much " gypsum in the ashes of clover, that he conjectures <sup>IC</sup> that the failure of that plant may be caused by the gypsum being too much exhausted." It would seem, then, that though clover is a broad-leaved plant, it does not derive sufficient nourishment from the carbonic acid gas of the atmosphere ; but requires also a supply of calcareous matter from the soil. The remedy is **obvious: apply lime or gypsum, and you will have clover.**

Rye-grass, being a narrow-leaved plant, and producing abundance of heavy seed, evidently exhausts the

soil. It is either annual or perennial. The annual is that which is now to be most commonly found in the shops, and cannot be distinguished by the eye from the other. On its first introduction, it was considered by agriculturists as an imposition but is now, from various circumstances, gaining ground. In the corses of Stirlingshire, the land is too precious to be left in grass for more than one year. There the annual rye-grass is pretty universally preferred.

In the view of its exhausting quality, it would seem that it ought to supersede the perennial, even in the dryfields of the county, where, if the land is to be left in pasture, an abundance of native grasses, equally valuable and less exhausting, spring up on the second year, particularly the *holcus mollis* and *lanatus*.

If perennial rye-grass be allowed to run into seed whilst it is pastured, the cattle decline to eat it, and the ground is, at the same time, impoverished. The reporter remarked a very extensive field in the western district of Stirlingshire, one part of which had been sown with perennial rye-grass \ but as a sufficient quantity of that kind could not be obtained, the remainder of the field was sown with the annual. This was the second year -, and the field was pastured by sheep. That part which had been sown with perennial grass had run into seed, and not a (single sheep was to be seen on it5 that which had been sown with the annual, was covered with a fine sward of native grasses, and upon this thp whole flock was collected.

There are, it must be allowed, some soils in this county, the gars? soils especially, which if they are to be left

in grass for a number of years, cannot cover themselves for a long period with native grasses. In these the perennial rye-grass is undoubtedly proper.

The hay is generally cut about the end of June or beginning of July. In the corses of Falkirk, Bothkenar, &c. 300 stones are reckoned an ordinary crop. In the western districts, 200 and even 180 stones are reckoned a good crop. In the upper grounds of Strathblane 100 stones are the ordinary crop ; in the lower grounds 300 stones are not uncommon. From that parish alone, 10,000 stones of hay are annually sold, mostly in the Glasgow market.

A few weeks after the hay is taken off the ground, a second crop of clover alone springs up with great luxuriance. It is cut down, for the most part, for soiling, and furnishes an excellent food for milch cows and for horses. Sometimes that which remains till the frost begins to set in (by which this tender plant is soon destroyed,) is mixed up into a stack with early threshed straw. It heats or ferments, in a certain degree, and gives succulence to the straw, forming a very nutritious food for cattle.

This second crop of clover is often, as has been noticed, ploughed down for a wheat crop; and, from the circumstances that have been mentioned, furnishes an enriching manure to the ground,

Saintfoin, lucerne, chichory, and the other plants enumerated from Sect, xxvii. to Sect, xxxii. inclusive, are not known, or scarcely known, in the agriculture of Stirlingshire, though it might seem that some of them, particularly lucerne, might be introduced with great advantage in feeding cattle within doors. The soil, it is presumed, would, in general, answer.

There is a plant not enumerated in the plan of the Board, which is frequently sown with advantage in grounds laid down with grass. It is the *plantago lanceolata* of Linnaeus, or rib-grass. It is a native of the country, and the seed may be easily collected ; it is sold in the shops. A small quantity is sufficient, perhaps one pound, for the acre. It affords a very succulent food for cattle. Its principal advantage is with respect to pasture. It continues long in the ground.



#### SECT. XXXVI.—FLAX.

FLAX is not much cultivated in this county, though almost every farmer in the loamy and dryfield soils raises a little for the use of his own family. The seed is the highest priced of all that are used in husbandry ; it is therefore of importance that the soil which is to receive it should be pared in the most complete style that is possible; a loamy, friable, and well pulverised soil

soil is, of all others, the most proper for this plant. It is of advantage to sow early 5 it is sown in March or the beginning of April. It is commonly weeded when about five or six inches high by women, who sit upon the ground, and advance as they weed, in this posture. This serves as a rolling to the plant, and fixes its roots in the soil. This evidently suggests the actual use of the roller.

In steeping it, the soft water of ponds or lakes is found to macerate the husk most quickly. The time of steeping varies a little with the temperature of the weather, as well as with the quality of the water. In warm weather, and in soft water, it is the common practice to give nine days and nine nights.

In the parish of Denny, seven pecks of flax seed are given to the acre, and the ordinary return is 20 stones. In the loams of Kilsyth, an acre produces from 15 to 20 stones of flax. In St Ninians, "12 pecks of lint-  
" seed sown on an acre, after potatoes, return 36 stones  
" of lint from the mill \*."

Flax is considered as a very exhausting crop, and is seldom or never repeated on the same spot without an interval of succeeding crops, f It is generally accompanied with grass seeds.

The plants enumerated in the succeeding sections of Chapter 7th are not cultivated in this county, except occasionally in gardens.

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# Stat. Acct. vol. 18. p. 390.

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**CHAP. VIII,****GRASS LANDS**

BY this title it is understood that land held under regular culture, and occasionally laid down with the artificial grasses already spoken of, are excluded, and that an account is now to be given of those lands only which produce grass naturally, whether occupied as meadows or as pasture. Of both these kinds of land; there occur large tracks in Stirlingshire.

**SECT.**

## SECT. I.—MEADOWS.

THERE are many meadows in this county of very considerable extent, some lying low on rivers, and others upon the higher grounds.

1. *Lying Um on rivers.* The Carron bog, which is more than four square miles in extent, contains at least 3000 acres. In the parishes of Buchanan, Drymen, Fintry, &c. many hundred acres of meadow ground occur, on the banks of rivers, formed chiefly of alluvial earth. These meadows are often overflowed in winter\* by the swelling of the mountain streams. The greater part of the Carron bog is flooded during that season by the river, which traverses its whole length, and which is there industriously carried over the plain. At that time, it presents the appearance of a Urge and beautiful lake. These land floods, by the deposition of earthy particles carried down from the hills, add greatly to the fertility of the soil; and are, at 'all times, beneficial, except when they occur near the period Of cutting the hay: when they take place within a few weeks of  
of

of that time, they pollute the grass, and too frequently render the crop altogether unfit for cattle.

These meadows are saved (or *hained* as it is called) from the middle of April, or beginning of May, till the period of cutting, which is from the 20th of July till the 15th of August, when the grass is supposed to have arrived at its full growth. It may be observed, at the same time, that in meadows liable to be flooded, and indeed in all situations, in this precarious climate, it is proper to take off\* the hay as early as possible ; at the farthest, by the first of August. In favour of this practice, it may be further observed, that the grasses of which the hay of these meadows consist, when they are allowed to ripen fully, drop their seeds, which are so nutritious to cattle; and they become so hard and rancid, as to afford a much less succulent food than when cut whilst in full sap, and with the seed not quite ripe\*

It may be proper here to attempt giving some idea of the various kinds of grasses which these bogs or natural meadows produce; and this, it is presumed, may be most successfully done, by an enumeration of the proportion which each occupies, at an average, in one hundred parts of such meadows. In such an estimate, perfect precision cannot be expected; all that can be done is to approximate.

Proportion of Grasses in 100 parts.

|                  |    |
|------------------|----|
| Carex—van Spec.  | 35 |
| Ranunculus acris | 10 |

—

Carry over 45

|  |   |    |   |    |
|--|---|----|---|----|
| Carried over   | • | -  | 4 | 5  |
| <i>Plantago lanceolata</i>   | - | -  | 1 | 0  |
| <i>Aira coespitosa</i>   | - | -  |   | 5  |
| <i>Holcus mollis et lanatus</i>  |   | -  |   | 5  |
| <i>Anthoxanthum odoratum</i>   |   | *- |   | 3  |
| <i>Caltha palustris</i>  | - | -  |   | 3  |
| <i>Juncus</i> —var spec.   | - | -  |   | 5  |
| <i>Scabiosa uuccisa</i>  | - | -  |   | 5  |
| <i>Menyanthe trifoliata</i>  |   | -  |   | 2  |
| <i>Eriophorum vaginatum</i>  | - | -  |   | 3  |
| <i>Tormentilla</i>   | - | -  |   | 3  |
| <i>Viola palustris</i>   | - | -  |   | 2  |
| <i>Hypochaeris radicata</i>  | « | -  |   | 4? |
| <i>Pedicularis palustris &amp; sylvatica</i>   |   | -  |   | 3  |
| <i>Lychnis flos cuculi, angelica, valeriana,</i><br><i>Spirea ulmaria, Euphrasia, &amp;c</i> « |   | -  |   | 2  |

→

100

→

The cryptogamous plants, or mosses, the polytri-\*  
chum, hypnum, &c» which abound in these meadows,  
are omitted in the above estimate, as contributing co\*  
thing, but rather doing injury, to the hay crops.

No manure is, at any time, given to these meadows.  
Their produce varies, according to different situations  
and circumstances, from 100 to 180 stones per acre;  
as does also the price of the hay, from four pence to  
nine pence per stone. It sells on the foot from 25 to  
30 shillings per acre. The foggage, or pasture of these  
meadows, before the period of baving the grass, and  
after that of cutting, may be valued at 5s. per acre.

In making this hay there is more risk incurred, and more attention required, than in making hay of artificial grasses. In the latter, the fibre is large and strong; it easily admits the current of air, and long resists the effects of a rainy atmosphere. Meadow hay is soft in its fibre, and retains its succulence long; and can be dried for stacking only by a long and frequent exposure to the sun and wind. In rainy weather, which is so frequent in this climate, at that season, meadow hay frequently loses both its colour and its sap, so as to become unpalatable to cattle. Perhaps the most proper process in such weather would be, to put it up, from the very first, in very small coils, or cocks; and to embrace every favourable moment for turning these upside down; throwing, as circumstances will admit, two or three into one, and forming them with precision, so as to ward off the rain. By this method, the coils are ventilated, so as to prevent their heating; and the sap and colour of the hay is preserved.

2. *Upland meadows.* These may be distinguished into dryfield lands left in ley, after having produced crops of corn; and mountainous grounds, producing coarse grasses, which are sometimes cut for feeding outlying cattle in winter,

### 1. Leys.

These grounds, when preserved for hay, produce a vast variety of native grasses, which furnish a winter's food for cattle, little inferior to that of the most highly valued artificial grasses. As many of these native vegetables which occur in Stirlingshire, from their valuable qualities, deserve to be known and cultivated; and, as  
it

it is hoped, will, one day, become serious objects of attention to Scottish agriculturists, it is presumed that a short detail of their character and qualities will not be deemed improper in this place.

1. The *lathyrus pratensis* abounds in the dry pastures and leys of the western parts of this county. It is a succulent herb, and very agreeable to cattle, either for field pasture, or when made into hay. It might be advantageously propagated by preserving its seed.

2. Several kinds of vetches grow naturally in these districts. The *vicia cracca* grows in dry leys, in such profusion as sometimes to constitute two-thirds of the herbage. It grows to a great height, from 20 to 36 inches in the field, and in hedges much higher. The Reporter, last summer, observed a ley field, in the upper part of Buchanan, almost entirely covered with this beautiful and succulent plant. It forms an excellent hay. It may be easily propagated from the seed; and might be sown advantageously, in a proper proportion, with lighter grasses.

The *vicia sepium* also grows abundantly in the same district and seems to merit cultivation.

3 The *polygala vulgaris*, both white and blue, abounds in all these fields; it is very grateful to cattle.

4. The *ononis arvensis*, though upon the whole a noxious weed, is, whilst its leaves are young and tender, very agreeable to cattle.

5. White clover grows naturally, both in the low grounds, and in the hill pastures. It is a perennial; but the quantity of its growth should be increased, by sowing

sowing a certain proportion of it in every field that is to be left out in grass.

6. The *lotus corniculatus* grows, in considerable quantities, in dry pastures; and is highly grateful to cattle.

7 The *bellis perennis*, or common daisy, grows abundantly, and is greedily devoured by cattle.

8. The *tormentilla erecta* constitutes a great proportion of the herbage of dry pastures; and is greedily eaten by cattle. Its high degree of astringency is probably salutary in correcting the effects of other parts of their food.

9\* The native grasses, the various species of the *aira*, the *poa*, the *festuca*, &c form a large proportion of the herbage of these leys.—But of all the grasses which grow naturally in this district, the two species of the *ZiolcuSy* the *lanatus* and *mollis*, will probably be allowed, on a fair estimate, to be the most valuable. In favourable situations, this plant has a broad and succulent leaf. The flower, or seed spike, is large and nutritious. The whole plant spreads, and forms a horizontal stool of sometimes 18 or 20 inches in diameter. It is peculiarly grateful to cattle. From the abundance of its seeds, and its disposition to multiply and spread by shoots, it seems to be peculiarly fitted for covering the ground expeditiously, after having been broken up by tillage. In the arenaceous and loamy soils of the western district of this county, it forms the great bulk of the grass crop which appears the second year, after a crop of annual rye grass had been taken off 5 and this second crop is often as heavy as the former\* It propagates itself, though slowly, on carse grounds, newly recovered from moss, as the Reporter observed on the  
farm

farm of Mr George Galbraith, below the village of Kippen. Indeed) in carse grounds, it does not grow Spontaneously in much plenty: to cover the ground, if that object L had in view, its seeds should be sown: In marshy soils, the poa aquatica, a strong plant, with heavy farinaceous seeds, and of which horses are particularly fond, may be propagated advantageously It grows spontaneously in ditches which have not been cleansed for some time.

## II. Mountainous grounds, producing coarse grasses, which are sometimes made into hay.

In the Campsie and Fintry fells, the juncus artiquatus, or spret, forms a great proportion of the herbage. On the very summit of the mountain, along the road from Campsie to Fintry, many hundred acres of this grass occur, without almost any mixture of other vegetables. It abounds also in some parts of Drymen parish. It grows to a great length. Cattle do not touch it in summer, if any other pasture is to be had. It is cut down in great quantities, in the end of harvest, dried, and stacked. *It* forms a hearty food through the winter for outlying cattle.

One great error that seems to be committed in preserving this grass is the lateness of the season when it is cut. By the month of September, when it is generally mowed, it has become coarse and hard; much of its seed has fallen off, and it must have become much less nutritious. Were it cut about the end of July, it would be much more tender and juicy, and a second growth would succeed, which, by the end of the year, would form



form a grateful pasture. A still more pernicious, but not uncommon error is, to leave this plant uncut altogether. It falls down to the ground, under the frosts of winter, and forms a thick matt, which is not only useless in itself, but obstructs vegetation for the ensuing season.



#### SfcCT. II.—PASTURES.

i. *Rich feeding land.* Under this character fall to be noticed the lower division of the mountains of Killeafn, Strathblane, Campsie, Kilsyth, St Ninian's, Fintry, Gargunnoch; and Alva, furnishing an extensive tract of feeding land, of a quality not surpassed by any in Scotland. These mountains are from 1000 to 1530 feet in height. The upper regions are occupied in sheep walks; they are separated from the lower, by a stone wall, loosely built, in the form of a Galloway dyke: and the lower part is besides subdivided into convenient fields, by fences of the same kind.

The native vegetables which are most abundant in these pastures are,

White clover.

Flantago lanceolata, or ribgrass,

Senecio jacobea.

Gnaphalium dioicum

Centaurea scabiosa%

Scabiosa

Scabiosa succisa.

Cerastium—sparingly.

Junci, of various species abundant.

Ranunculi, do. do.

Alchemilla vulgaris.

Galium montanum et verum.

Aira caespitosa.

Alopecurus, pratensis et agrestis.

Festuca ovina.

Holcus, lanatus et mollis.

Pteris aquilina, &c.

These pastures are principally occupied in fattening black cattle for the butcher, and in rearing young stock, for which they are eminently adapted. In the Camjpsie hills alone, about 300 head of cattle are annually fattened, yielding from four to five stones, tron weight, of tallow. In Kilsyth about the same number are fattened : about the same number also in Strathblane. These cattle are, for the most part, from the west highlands, and of a small breed. They are fattened to the weight of from 18 to 24 stones tron.

2. *Dairy grounds.* In the rich corses of Stirlingshire, the dairy is little attended to : the richness of the soil renders it far more profitable to raise grain. In this district, every farmer keeps a few cows, merely for the supply of his own family. It is a singular thing, that the town of Stirling is principally supplied with butter by the moss lairds, as they are called, or cottagers of the adjacent moss of Blair-Drummond; each of whom produces somewhat more than supplies his own family; and the surplus is sent to the Stirling market; Stir-

ling is also supplied with eggs, chiefly from the same quarter.

In Gargunnoch, Kippen, Fintry, Strathbane, Campsie, and Kilsyth, and in the upper pan of St. Ninians, the dairy is more attended to, but not to any considerable extent, as it has been found more profitable to rear cattle than to produce butter and cheese. In Strathblane, for example, where about 260 milch cows are kept, 130 calves are generally reared. The produce of the dairy must be, consequently, small.

According to the best information that the Reporter has been able to obtain, the annual value or produce of a milch cow, in Gargunnoch, including the price of her calf, varies from 41. to 71. The cheese which is made here is of inferior quality. In Kilsyth, the produce of a milch cow is estimated from 61. to 101. From this estimate made,—the former, on the northern side of this range of mountains, and the latter on the southern, some idea may be formed of the produce of the dairy in Stirlingshire.

At the same time, it seems proper to cite some remarks on the dairies of Stirlingshire, made near 14 years ago, by Mr Belsches of Greenyards, in his Report of 1796\$ premising only, that it appears that the dairy was much more attended to in this county, at that period, than it now is.

" Few calves," says he, <sup>f</sup> are reared, being mostly « sold to the butcher. The milk is manufactured into " butter and cheese. Much improvement is wanted in " the making of cheese. The curd is not sufficiently « prepared: too little salt is mixed with it; and proper " presses are not in general use. Butter, in great quantities,

" titles, is also made in the dairy, during the summer,  
 " and beginning of autumn. It is generally sold fresh,  
 «' to Glasgow, Stirling, and Falkirk markets. In au-  
 " tumn, the butter is generally salted up in wooden or  
 " earthen vessels, and sent to Edinburgh, Glasgow,  
 « and other markets. Both the plunge and barrel  
 " churns are used', but in general the plunge churn is  
 €€ preferred. The whole operation of churning is per-  
 " formed by manual labour; and, almost universally,  
 " the cream alone is employed in making butter. What  
 " of the butter milk is not consumed in the family of  
 < the farmer, is either sold to labourers and manufac-  
 " turers in the neighbourhood, or sent in small barrels  
 « to market. A few gentlemen give the butter milk  
 « and whey to the hogs.—In the management of the  
 " dairy, the cows are milked three times a day, in the  
 " height of the season. At present, the cleanliest dairy  
 " women are bringing earthen vessels into use; and in  
 " some places, wooden vessels, lined with lead, are em\*  
 < c employed for holding milk.—Cows are commonly al-  
 " lowed to pasture in the mornings and evenings, and  
 < c through the whole night. They are kept in the  
 " house, and fed in the middle of the day, in the hot  
 " season of the year, which preserves them from being  
 € tormented by insects." Mr B. adds, that «the annual  
 ic produce of a good cow is supposed M796) to rise  
 " from 51. to 121.: that the larger kinds are universally  
 %i disused on account of the superior quantity and qua-  
 " lity of the food which they require, and of the wet-  
 < c ness of the climate, which occasions the land to be  
 " much poached by the tread of such heavy cattle: the

•< summer food of a cow," says he, "is often bargained for at a price from 30s. to three guineas."

The summer's grass of a cow let§, at present, in these pastures from 21. to 31.;—another proof that dairy fanning is not carried on upon an increased scale in this district. The walk of a cow in winter, without fodder, 11.

3. *Sheep pastures.*—A great proportion of the superficial extent of this county is occupied in pasturing sheep; the mountains of Buchanan and Drymen almost exclusively; together with the upper region of that whole range of mountains which stretches from Killearn, through the parishes of Strathblane, Campsie, Kilsyth, Fintry, St Ninian's and Gargunnoch, and the hills of Alva.—In these latter, the herbage is fine, and consists nearly of the same plants that occupy the lower part of the mountain. In the mountains of Buchanan and Drymen there is much heath, which, however, is rapidly disappearing, in consequence of spring burning, and the bite of sheep: for it is remarked, over all the highlands, that, wherever sheep have been long introduced, the heath gradually dies away, and is succeeded by rich herbage, to which, no doubt, the droppings of these animals contribute in no small degree.

Benlomond is esteemed the richest sheep pasture in the western district of the county. There occurs no heath on this noble mountain after you have ascended about one fourth of its height; and, even in the lower region, it occurs partially and scantily. The whole mountain is covered with verdure; and furnishes to the botanist one of the finest fields of study to be found in the highlands of Scotland, The Alpine plants of the rarest

rarest kind abound: the *rubus chamaemorus*; the various kinds of saxifrages; *alchemilla alpina*, *cerastium alpinum*, *silene acaulis*, *azalea procumbens*, *rhodiola rosea* and *triantalis europea*, adorn its sides; and the *sibbaldia procumbens* gives perpetual verdure to its very summit.

In the portions of these mountainous pastures which are not occupied by heath, various grasses very grateful to sheep abound, as the *carex*, of different species, *junci*, *festuca ovina*, &c. Where a mossy soil occurs, it is, for the most part, infested with the *anthericum ossifragum*, and the *drosera rotundifolia*, both accounted hurtful to cattle, and apparently with justice. Indeed they are seldom touched by them.

Of the rent of sheep pastures, in different parts of the county, some idea has been offered in chap. IV.

4. *Laying land to grass.* This article is understood to refer to lands which had been occupied in tillage\* and which, after being exhausted by cropping, are to be restored to fertility, by being laid down to grass, and rested;

In the rich corses of Stirlingshire, the ground is too valuable to be allowed to remain long under grass; nor does this process there seem necessary. It will be seen by the table of the rotation of crops which has been given, that lands are generally laid down to grass with a barley crop, with wheat, with pot a toe-oats, and with flax. The grass seeds generally used have been mentioned. They are sown, in the end of April, or beginning of May. In the corses, one crop of hay is taken, the second growth is used for soiling. In the dryfieldsj one crop is, in like manner, taken; and the land is pastured for two years.

It is of importance to observe, that either dung or lime, or a portion of each, is, or ought always to be added to lands laid down in grass. Without this addition, the soil will be little benefited by *resting* in grass. These manures are necessary to furnish an alkaline base, by which the natural acids that float in the atmosphere may be attracted, and those neutral salts<sup>4</sup> formed, which are so conducive to vegetation.

5. *Breaking up grass land.*—With respect to *paring* and *burning*, it may be observed, that they are operations of a very costly nature, and to be employed with much caution. In this process, it is calculated that no less than 19 parts out of 20 of matter fit for promoting vegetation are dissipated and lost, whilst the saline substances procured by the operation are so inconsiderable in their quantity as to be no object to the cultivator.

It is not the practice in this county to let grass land, for a short period, with *permission* to break up; though it has in a few instances occurred. The rent, in such instances, varies from 4l. to 6l. There are said to have been instances in Dunbartonshire, on the western confines of this county, about the year 1800, of lands having been let for breaking up at 14l. and even at 16l. per acre.

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\*Scep. 136, & seq.

## CHAPTER IX;

### GARDENS AND ORCHARDS.

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#### SECT. I.—GARDENS.

IN Stirlingshire, the gardens of gentlemen of fortune are made to produce every vegetable luxury that is to be met with in the southern parts of the kingdom. The climate, as has been already noticed, is, from the narrowness of this part of the island, extremely mild;—and, in this view alone, of indicating the climate, does it now seem necessary to say, that peaches and apricots ripen, not unfrequently, upon the open wall. Apples, pears, cherries, plumbs, and all sorts of small fruit, thrive well. In the very western extremity of the county, grapes, peaches, nectarines, and pine apples are produced under glass, in the greatest abundance and perfection.



Still, however, the peasantry, especially those of the inferior order, are deplorably inattentive to the comforts of garden produce. They cannot be made to comprehend the assistance that may be derived from a kitchen garden to the subsistence of a family\* The cultivation of carrots, turnips, pease and beans, onions and leeks, is very rare amongst them j or at least it is attended to upon a very limited scale, except in the neighbourhood of towns, where a ready sale furnishes a spur to industry.



#### SECT. II.—ORCHARDS.

ORCHARDS are still less attended to in this county than kitchen gardens, though there is perhaps no county in Scotland better adapted to the production of fruit. *hi* Clydesdale, probably from accidental circumstances at first, and, at present, from the ready market for fruit afforded by the great city of Glasgow\* orchards hold a distinguished place in agriculture.

In Stirlingshire, it would seem that the very contrary process has obtained.—It is well ascertained that, in ancient times, orchards were cultivated, on an extensive scale\* in the corses of Bothkennar and Airth. The greatest part of this fertile territory belonged to the abbey of Cambuskenneth, by the gift of David I.—The monks\*

monks, slight as were their scientific acquirements, when compared with those of modern times, possessed all the knowledge of the 'Age; and, in their choice of situation for their religious establishments, with respect to shelter, fertility of soil, and even picturesque beauty, we must still admire their judgment and taste. The Abbey of Cambuskenneth, situated upon one of the beautiful links (curves) of the Forth, N. E. of Stirling, and still within the bounds of that parish, furnishes an example.

The dignitaries of the abbacy had country seats on their estates in the adjacent territory on the southern side of the river. There, horticulture appears particularly to have engaged their attention, at a period when we have no reason to believe that the most powerful of the nobles of Scotland possessed the luxury of a kitchen garden. Whilst the monks of Cambuskenneth had orchards in the rich plains of Bothkennar, which produced the pears and rennets of France, Sir John the Graham, the friend and coadjutor of Wallace, inhabited a castle situated on the skirts of a bleak moor, in the western extremity of St Ninian's, where probably there was not a gooseberry or cabbage ever raised.

These luxurious clergymen passed the winter in the Abbey, whilst they spent the summer in Airth and Bothkennar, where the reliques of these orchards may still be traced. The soil, as has been said already, is a clay of very great depth. To prevent the roots from shooting down perpendicularly into the cold soil, to which the influence of the solar heat never reaches\* and to direct the roots to seek their food in a horizontal direction, they placed large flags under every  
fruit

fruit tree. These flags are still found in all their orchards.

Indeed, no soil seems to be more favourable for fruit trees than the Carse of Stirlingshire, in the parish of Bothkennar there are *twelve* orchards; and in that of Airth, *nine*, many of which were planted by the monks. The pear tree particularly thrives in this soil. *The golden knap*, or *gouden ndp* as it is here called, seems peculiar to this part of Scotland. This tree bears astonishing crops. The produce of many single trees of this kind has been known to sell for ten guineas. It is equal in beauty to any fruit tree whatever: it is never known to canker.

Orchards in the Carse may be estimated to bring from 50l. to 100l. per acre. Upon the estate of Westertown, in Bothkennar, a small orchard, of about an acre, -about twelve years ago, produced almost nothing, the trees being very old, and much decayed. The present tenant thought of recruiting them, in which he succeeded, by laying over the surface a rich covering of dung in the beginning of winter, so as to give an opportunity to the juices to penetrate to the roots of the trees. The next year he laid on a covering of quicklime, hot from the kiln. The trees became immediately healthy. Though large, and very old, they took on a new growth; and have ever since produced large quantities of fruit. One year, he sold the produce of this orchard for 100l. In less favourable years, he has sold it for 63l. and for 43l. In the year 1809, though unfavourable for fruit, it brought £01. Since the first dressing, he occasionally gives dung to this orchard; which, without taking the fruit into account, is amply repaid

repaid by the large quantities of early grass that it produces.

Were the trees planted in rows in these orchards, abundant crops of potatoes, turnips, or flax, might, without any injury to them, be raised in the interstices.

It is to be regretted that orchards are not more generally cultivated in this district. The cause of this neglect is not far to seek. An orchard makes no return for ten or twelve years after it is planted, which, in almost every instance, exhausts two-thirds of the period of the lease; and most people prefer a lesser present advantage to a greater one at a distance. From the same cause, orchards are much neglected by tenants. When a tree is blown down, they do not think of planting another. To keep the orchard in a good condition, and especially to improve it, would, at the renewal of the lease, be to raise the rent on their own heads. Some scheme of remedying this evil would be of great advantage in the Carsés.

When orchards are to be planted in these soils, the ground should previously receive a complete summer fallow. A trench or ditch should be drawn round it, of eight feet wide at top, and five or six feet deep; and all the earth which is taken from it spread upon the space that is to be planted. In the Carsés, this ditch is absolutely necessary to carry off the superfluous moisture; as the roots of the trees, when soaked in water, soon decay. If the trees are planted in autumn, the roots should be covered with straw, to defend them from the frost. The practice of the monks of Cambuskenneth, too, should be followed, of placing a flag stone of a  
foot

foot or 15 inches in breadth, under every tree, to give the tap root a horizontal directionj ^which, when it has once taken, it will always preserve; finding the nourishment to be obtained near the surface more genial, as well as more accessible, than that which it would receive by pushing downwards. Double the number of trees should be planted at first of what is intended to remain, in order to give shelter, and, %in due time, to have a proper selection. The ground in the interstices should be kept in culture for the first 15 or 16 years, in order to kill noxious weeds. An orchard, in this climate, should be sheltered by a belt of trees, on the north, and east, and west, leaving the south open to the influence of the sun. The one half of these trees should be evergreens, to afford shelter before the deciduous *trees* come into full foliage.

By such attention, favoured with such a climate and soil, the Causes of Stirlingshire might become the fruit granary of Scotland; the grateful beverages of perry and cyder might be produced at home; and the consumpt of foreign wines in a great measure superseded.

In this view, and speaking of fruit trees, gooseberries and currants deserve attention. They thrive admirably in this climate. Besides the preserves that may be made from them, the wines which may be manufactured from them form a cheap and delightful beverage; which, it may be hoped, will, one day or other, save to the nation many thousands which now go to the wealth of France and Portugal.

Before we quit this branch of the subject, it may be proper to notice, that in the old orchard at Duchray Castle,  
in

in the parish of Drymen, there are some aged filbert trees, a variety of the *corylus avellana* of Linnaeus, which produce a nut of larger size and higher flavour than the common nut of the woods. These were brought originally from the monastery of Inchmahoina, in the isle of Menteith, where the filbert is still cultivated to a considerable extent.—It is the *avellana rubra* of fiau-hin (pin. 418.), and thus described by him: « var. y<sup>w</sup> *cvrylus saliva fructu oblongo rube?ite.*”

The filbert is generally propagated by layers, as being greatly preferable to budding or engrafting; though it takes very well by engrafting on the common hazle; but it is too apt to throw out suckers or shoots under the graft, to make a good stock.

Aiton, in his *Hortus Kewensis*, and Professor Martyn, in his late edition of Millar's Dictionary, agree in the opinion that all the filberts are only seminal varieties of the *corylus avellana*, or common nut.

## CHAPTER X.

### WOODS AND PLANTATIONS,

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THE woods and plantations of Stirlingshire constitute *i* very important part of its wealth: and the possibility and probability of rendering these far more productive than they have hitherto been, give a high interest to this part of the subject of our Report.

Many appearances still exist which render it unquestionable that a great proportion of this county, as well as of all the western parts of Scotland, was formerly clothed with wood. The mosses of Kippen, Gargunock, and Airth, in the lower district of the county, and the still more extensive mosses of Polmont, Muirp/onside, Slainannan, Fintry, St Ninians, Drymen, Buchanan,

chanan, &c. of higher elevation, bear evident marks of ligneous origin.

That the whole of that elevated range of country, extending in a semicircular sweep from Stirling to the neighbourhood of Polmont, was, at one period, covered with wood, appears more than probable, even from its present aspect. The Torwood and Callander wood, in the neighbourhood of Falkirk, are the evident remains of this very extensive forest. " The royal forest of Dundaff must have covered the highlands, which are still called the lands of Dundaff. The royal forest of Stirling must have covered the rising grounds to the south of that town. An extensive moss renders it probable, that even the low lands of the parish of St Ninians, especially to the north-east, were once covered with trees." \* Even to the westward of Stirling, the reliques of this same range of forest may be traced. Dr Robertson records,† that "in many places of the muir of Gargunnock, there are roots of trees discovered, of a large size, from which it appears to have been once a forest; but that now not a tree can be discerned."

To root put, and to remove these woods, so as to fit the ground for pasture, or for the plough, seems to have been, as it now is in America and in South Wales, the polity of our forefathers. The Scottish forests, as we have reason to believe from history, as well as from tradition, were then infested with bears, and wild boars, and wolves:

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\* Statistical Account of Scotland, Vol. XVIII p. 38?.

† Ibid. p. p4.



wolves:—they were useless for the purposes of agriculture. Besides the demolition of the<sup>N</sup>Caledonian forest, of which Xiphilinus speaks, and which certainly was situated in this district, there is reason to believe that the natives, from economical views, joined, in after ages, in stripping the country of its wood.

The circumstance of the introduction and multiplication of cattle, which, at an early period, became favourite objects in the north of Scotland, will go far to account for the extermination of our forests. When wood remains unprotected from the bite of cattle, it will soon disappear. The aged trees which are beyond their reach, decay with the lapse of years. The young shoots which arise from the seeds which they had disseminated, or which had sprung from their roots, are nipt in the bud, and never become trees. In the bite of cattle, there is a peculiar malignancy to the growth of wood: the irregularity of the incision poisons the plant, to the growth of which the smooth cut of the knife would have only given an obliquity of direction.

Scarcely half a century has elapsed since the value of wood, and particularly of oak coppice, has begun to be justly appreciated in this district of Scotland. From that period, however, the policy of our ancestors, in this respect, has been happily reversed. To protect natural woods from every kind of depredation ; to extend their limits by obvious processes ; and to plant trees of every kind that is useful or ornamental, is the present practice of every enlightened landholder.

The woods of Stirlingshire may be conveniently distinguished into those which grow *naturally*, and those which have been *planted* by the hand of man.

### I. *Natural Woods.*

These are generally termed coppice and consist of the various species of timber which grow naturally in Scotland. It will not, it is trusted, be deemed improper to enumerate the native constituents of these woods, according to their scientific denominations. They are these:

- Quercus robur - the oak.  
 Fraxinus excelsior - the ash.  
 Salices variae - willows of different species.  
 Acer pseudoplatanus the greater sycamore, or maple, probably not a native.  
 Populus tremula - the quaking ash, frequent.  
 Corylus avellana - the hazle tree, frequent.  
 See p. 177.  
 Betula alba - the common birch, abundant.  
 Betula alnus - the alder tree, abundant.  
 Ilex aquifolium - the holly, not infrequent.

The pinus sylvestris, or scots fir, is a native of other parts of Scotland, but not of Stirlingshire. The carpinus betuhis, or hornbeam, with the fagus syl/atrica, or beech, are stated by Ijghtfoot to be natives of Scotland; the latter is particularly stated by some writers to be native of the Torwood in this county; but there

is reason to believe that they are both exotics. Beeches of a flrge size are to be met with <sup>iv</sup> Stirlingshire, particularly in the lawn about Callander house; but it is certain that these have been planted.

The *taxus baccata*, or yew tree, is unquestionably a native of Scotland, and formerly abounded in Stirlingshire, as the names of many places, such as *Skia u'iuir* (the ridge of yew trees), and *Fa'isc-iulr* (the conflagration of yew trees), still attest. It has now disappeared in this, as well as in many other places of Scotland, having been extirpated probably on account of its deleterious effects when eaten by cattle.

The *sorbus aucuparia*, or mountain-ash, vulgarly called the rowan; a beautiful tree in respect of foliage, flowers, and fruit, and capable of being applied usefully, both with regard to its wood and bark, 'grows in great abundance.

The *crataegus oxyacantha*, or hawthorn, grows to a large size in our glens and rocks; and, with its hemispherical top, forms a beautiful addition to the shrubbery.

The *pyrus malus*, or crab-apple, abounds in the woods in the highland district; it makes a fine figure when in full flower.

The *prunus padus*, or birds' cherry, sometimes grows in these woods to be a specious tree. Its fruit, when ripe, is black, resembling the gean. It is deleterious in a considerable degree.

*Oak Woods of Stirlingshire.*

The oak woods of this county constitute such a considerable part of its wealth as to merit, on this occasion, a particular detail, in regard to their extent, value, and management.

1. According to the most accurate information that has been obtained, the extent of the natural oak growing in Stirlingshire is as follows;

|   | Acres. |                                       |
|---|--------|---------------------------------------|
| Buchanan woods  | 18     | The property of the Duke of Montrose. |
| Mugdockwood   | 163    | Grace the Duke of Montrose.           |
| Ledlewan  | 70     | of Montrose.                          |
| Finnich. Drummond   | 30     |                                       |
| Duchray woods   | 100    | Of Gen. Graham, Stirling.             |
| Patches of oak in Killearn, Strathblane, Campsie, and Kilsyth | 200    |                                       |
| Woods in Kippen parish  | 50     |                                       |
| Boquhan, in Gargunnock parish                                 | 43     |                                       |
| Torwood   | 63     |                                       |
| Touch woods   | 80     |                                       |
| Natural wood on the Calander estate                           | 300    | William Forbes, Esq.                  |
| Small patches in the east end of Drymen parish                | 30     |                                       |

Total acres 2929

Thus it appears that there are in this county near 3000 acres of oak coppice wood, exclusive of many

hundred acres of ash, birch, alder, &c. constituting a very valuable species of property; growing, for the most part, on a soil which would not, for any other agricultural purpose, bring half a crown an acre; and requiring\* at all times, very inconsiderable trouble and expence in management.

2 The value of these woods may be calculated *nearly* from the following data. An acre of ground, in the Buchanan woods, by an average reckoning over their whole extent, produces one ton\* and a half of bark\*. In some favourable soils and situations an acre will produce twice that quantity\*, but the above may be considered as the medium. A ton of bark sold in 1809 at 181. Sterling.

The small timber of these woods is, for the most part, sold for the purposes of rural economy; and the price is generally supposed to remunerate the wood merchant for the expences of *cutting* and *peeling*; though, from the advantage of water-carriage by Lochlomond and the Leven, it is presumed that the Buchanan woods must do a good deal more. Of this timber are also made hoops, trends and spokes for carts, and rafters for palings to a considerable extent. The refuse is *sold* by roup for firewood.

Oak wood is seldom or never used in making charcoal. Birch, which abounds in the western district of the county, is principally used for this purpose, being of little value for any other. Alder too, and hazle, and willow,

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\* Ten tones Dutch weight of oak bark make three bull: Twelve bolts and six, or 12 tones, or 12 tones, nittiu one hundred.

willow, which also abound, maybe converted into charcoal.

As to *grubbing* up coppice wood, it may be observed that, in the western part of the county, wood, especially oak, is too valuable, and the soil on which it grows of too little value for any other purpose, to be grubbed up: a few instances may be eitcepted, where only alder and willows grow. The only instance of any importance that fell under the Reporter's notice occurred in the Lower Torwood, where this operation costs from 151. to 201. per acre; but when the land is fhus cleared, it is as valuable as any in Stirlingshire.

### 3. *Management of Oak Woods.*

As His Grace the Duke of Montrose is by far the greatest wood-holder in this county, and (possessing a nearly equal extent of oak wood in Perthshire) probably the greatest proprietor of oak in Scotland; so the management of these woods over all his estates, for these last twenty two years, under the intelligent direction of George Menzies, Esq. his Grace's chamberlain,, furnishes the most complete model in this respect that is any where to be met with. To that gentleman the Reporter is principally indebted for the following, and for many of the preceding particulars.

The whole extent of the Buchanan woods is divided into 24 portions, called *hags* •, one of which is annually sold by public auction, and cut down. In this manner, the vrhole is cut down in the course of 24 yfears •, and when the last *hag* at one extremity is taken down, the &st, at the other, is ready to be cut the ensuing year,

These *hags* vary considerably in their extent and value, from local and accidental circumstances of situation and soil. These circumstances are attended to in their arrangement. In general, they extend from 70 to 100 acres. Within these few years, the price of one of these hags has varied from 1200l. to 2400l.

The purchasers of these woods begin the operation of cutting *as soon as the bark is off*, that is, as soon as the vegetable juices ascend the bark, so as to render it easy to disengage it from the wood. They are bound by their contract to finish their cutting by the 10th day of July, under the penalty of forfeiting all that is left standing. This stipulation is necessary, in order that the young shoots may have time to make some progress before the rigors of winter set in. They oblige themselves, besides, to cut the stems as close to the ground as possible, the ensuing growth having a much firmer hold, and finding more abundant nourishment, the more closely its roots adhere to the ground. They are further bound to leave as much of the small wood as will enclose the whole *hag* with a paling of strong stakes, wrought close with *peeled* crops; here called *rice*, sufficient to last for full six years.

The occupier of the farm on which the wood that is to be cut is situated, is bound by his lease to erect this paling at a certain rate, by the rod of 36 linear yards. This is done immediately after the wood is cut; and he is *then* bound to maintain it, during the lapse of the six years (if his lease endures so long) in a condition to prevent the encroachments of all kinds of cattle, under a suitable penalty for every instance of transgression.

Till

Till within these twenty years, the Duke of Mon-trose's woods were weeded, or thinned, only once, and that at the age of 12 years. There is nothing more obvious than that the abstraction of nourishment from the stems that are to remain, as well as the want of a free circulation of air, from the closeness of the stems, during so long a period, must prove highly injurious to the growth of the wood. For these twenty years, however, the Duke's woods have, been regularly weeded, or thinned, for *the first* time, at the age of six years. And Mr. Menzies obligingly informs the Reporter, that, as a still further improvement of this system, " he has begun this year (1810) to thin the woods at the age of *four* years; and that he intends to thin them even " at that of *three*." There can be no doubt that the operation will be crowned with success. The stems that are left will be beyond the reach of cattle in less than six years\*, when, it must be evident that, notwithstanding the utmost attention of the tenant, the paling must have become very frail.

For many years past, under this judicious management, there is also a *third* weeding given with the best effect: it takes place at the age of twelve or fourteen years. In this weeding, five or six stems, as circumstances admit, are left to every stool of oak. The *two* first weedings are given in winter, when cottagers, who, at that season, have nothing else to do, are glad to obtain employment. The *third* takes place in summer, when the bark rises freely. The stems that are left are, at the same time, pruned into proper form, no evil consequence arising, as the oak never bleeds. The bark produced by this *third* weeding pays considerably



more than its own expence, and that of the two former weedings: and the rapid growth which ensues from the encreased nourishment, and from the free circulation of air, is highly striking.

In every hag, previously to the sale, between three and four hundred trees .of the most specious form are marked and reserved for timber\* Some of these have stood for two cuttings, some for three, • and some for four; and are, consequently, forty-eight, seventy-two, or ninety-six years old. In the wood of Salachy, in Buchanan, there are some trees eight, and some ten feet in circumference, at one foot from the ground, and from five to seven feet in circumference at ten feet from the ground: they are from thirty to forty feet in the stem.

In former times, the reserves were chosen chiefly from seedlings, or trees standing single, and supposed to be produced from an acorn that had been dropped. This attention, however, is not, at present, found to be necessary. Reserves that may, in the space of fifty or sixty years, become timber fit for the navy, are procured, with still more certain effect, by selecting one of the straightest steins that occur in a stool of oak, and by razing the inferior stems by the ground. The reserve soon gains the ascendancy, and its droppings effectually prevent the growth of the rest. It is even observed that such reserves prove to be straighter and more beautiful trees than those which spring from the acorn, which are often crooked and straggling, and seldom acquire a proper form tHl they aje cut over with the knife.

By this simple method, it is obvious that oak timber of very considerable size, and fit for every domestic and national use, may, in the course of half a century, be obtained from our own woods, in a\* degree of abundance which exceeds calculation. It may be permitted to remark that, in the present situation of our country with regard to foreign nations, this seems to be an object of imperative attention; and that there can scarcely be a louder call on patriotism than to employ this easy method of increasing the number of reserves in every coppice wood in Britain. The final pecuniary return, it is presumed, would be even greatly increased.

Along the lower skirts of the mountains of Buchanan, and on the borders of Lochlomond, as well as on the Duke of Montrose's estate in Perthshire, there is a strong natural tendency to the extension of the growth of oak. On almost every little heathy knoll, you meet with stunted stools of oak, which require only to be razed over by the surface of the ground, and preserved from the bite of cattle, to become coppice wood. To this extension of the woods, accordingly, every attention is paid. When a hag is cut, the paling is made, to surround every bit of ground where it is likely that oak will grow; and in the leases liberty to do so is always reserved. In this manner, oak is rapidly extending over Craigrostan, the western shoulder of Benlomond, and in many other places of the estate, where, within these few years, heath only grew.—When the value of this soil, which is frequently bare rock, and, in almost every instance, at least in the western parts of the county, unfit for bearing a corn crop, is considered, it would seem that no economy can be more advantageous

vantageous than the' enlargement of these coppices by extended enclosure.—A mode of enlarging oak coppice upon an unlimited scale, which has been practised for many years upon the Duke's estate, will be detailed under the section of *Plantations*.

It appears to be a fact established by experience, that oak coppice wood will not renew itself if it remains uncut beyond the period of 35 or 40 years. The general period of cutting is 24 years. An instance of the total and perpetual loss of an extensive and valuable wood on the Duke of Montrose's estate is in point, and seems to merit the attention of wood-holders. It is in the memory of persons still alive, that about sixty years ago, the thriving wood of Glaschoil, stretching along the southern banks of Loch Katrine in Perthshire, was sold to the York-building company, which, however, became bankrupt before the wood was cut. During the unsettled state of the company's affairs, the wood was left standing, his Grace's commissbioners not considering themselves entitled to interfere with a property which had been sold; nor could the creditors of the company interfere, their claims not being yet legally established. At length the wood was cut down at the age of about forty years. It has never renewed itself, and now scarce a trace of it remains.

SECT,

## SECT. Hi—PLANTATIONS.

IT is only within these forty years that the extension of woods by planting has been attended to in this county on a considerable scale. There occur, indeed, some insulated instances of planting trees in the neighbourhood of the houses of great proprietors some centuries back, and these are consequently arrived now to a large size. They will come properly to be noticed under the following section, of timber.

For some years past the landed proprietors of Stirlingshire- have become duly sensible' of the advantages of plantations, in respect of embellishment, of shelter, and of profit.—Many hundreds of acres have been clothed, within these few years, with waving forests, which before presented only barren heaths, or unproductive pastures. On the estate of Boquhan, in Gargunnock parish\* near 400 acres have been planted. On the estate of Sauchie, an extensive plantation of oak, ash, beech, and the various species of the pine, furnish a fostering shelter from the sweeping violence of the southwest wind. The example of Sir Charles Edmonstone of Duntreath, Bart, is, in this, as well as in many other instances of rural economy, highly conspicuous. Mr Archibald Edmonstone of Stratjiblanc parish, amongst many other valuable communications, writes 'hat « in the years 1807, 1808, and 1869, Sir Charles  
"has

«has planted on the Duntreath estate upwards of  
 « 200,000 trees of various kinds, but chiefly *hard*  
 « 'wood,\*<sup>9</sup> that is, oak and ash.

The most extensive and persevering example, however, of modern plantation in this county, is furnished by his Grace the Duke of Montrose, who, for these twenty years, has planted, at an average, sixty acres annually, and is rapidly covering the skirts of the mountains of Buchanan, formerly a bleak heath, with a thriving wood. As the manner in which these plantations are conducted seems to furnish a model in this respect, the detail, it is presumed, will be acceptable.

The species of trees that are planted are, oak, ash, sycamore, (*acer pseudo-platanus*) beech, larch, and Scots firs.

The oaks only are reared in the nursery at Buchanan; the acorns are procured from England, and sown in rows in the month of March. They are generally allowed to remain in the seed bed for two years, when they are removed, into the nursery, where they remain for four years. Being then about five feet high, they are planted out; if they are too high, so as to be liable to injury from the winds, they are cut over at top.

The other species of trees are procured principally from Glasgow.

The leading feature, however, in the conduct of the Buchanan plantations is, that they are chiefly directed to the extension of oak coppice-wood or ash, over those parts of the estate which are not included within the pleasure grounds. In these last\* every species of tree is introduced which contributes to ornament} whilst,  
 in

in the more distant, plantations, the grand object is to clothe the country with oak or ash.

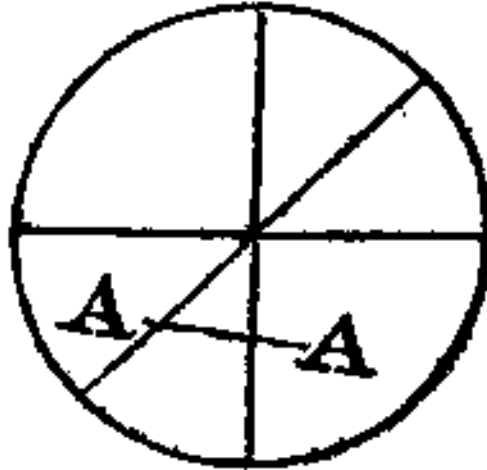
With' this view, Scots fir and larch are employed only as nurses, when this purpose is served, they are cut down, and oak chiefly remains. The eye can judge when the oaks have arrived at sufficient growth and strength to resist the blasts, and to support themselves. This is generality the case about the fifteenth or sixteenth year after they have been planted. After that period, they are treated, with regard to thinning and pruning, precisely as oak coppice wood is. When they are of a proper growth, they are, in the same manner, cut down, and will, in the same manner, renew themselves for ever.—The Scots firs and larches, which had served as nurses, are applicable to many purposes of rural economy.

In this process, 1000 oaks or ashes are planted in an acre, and about 1200 Scots firs, with about 400 larches, as nurses.

The plants are not put into the ground by *pitting* as is the general practice elsewhere. Besides that the operation of pitting is tedious, and consequently expensive, it is found, that in wet weather the pits fill with water; and that, in dry weather, the moisture is apt to be exhausted ; in each of which cases, the tender roots of the plant suffer injury.

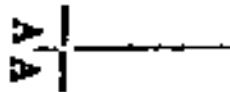
The method here practised is as follows : the operator, with his spade, forms a circle of about twelve or fifteen inches diameter, and cutting a few inches deep. He then makes three cuts with his spade within the circle, crossing each other, as diameters, through the centre; the whole having the annexed form:

He



He next inserts his spade in the direction of the line *A A*, at the distance of a few inches from the centre; and bending the handle of the spade towards himself, and almost to the ground, he gently elevates the contents of the circle, the earth opening in fissures, in the direction of the cuts which had been made through the centre. At the same instant, he inserts his plant at the line *A A*, pushing it forward to the centre, and assisting its roots to ramble in the various fissures; he lets down the earth by removing his spade, and having pressed it into a compact state with his foot, the operation is finished by adding a thin covering of earth, with the grassy side down, by way of a top-dressing.

This is the method employed in planting oaks. That used in planting Scots firs and larches is still more simple; a single cut of sufficient depth is made with the spade, and then the earth is elevated, as before, by a cross cut *A A*, into which the plant is inserted, and gently pushed forward, till its roots obtain full admission into the soil.



By this method, an experienced man will plant 300 oaks in a day, or between 6 and 700 larches and Scots firs. Such a man will plant a whole acre, with the proportions which have been mentioned of the various species of trees, in five days; and it is estimated that such an expert person will do as much in fifteen days as twenty ordinary men will do in one day. The expence of labour in planting an acre, exclusive of enclosing and draining, may be calculated by stating that the usual wages of such a person are half a crown a day.

When it is necessary to drain the ground before it is planted, the earth taken from the drains is used in giving the top-dressing which has been mentioned. The operation costs from 10 to 30s. per acre. In dry moorish soils, where plants would not otherwise thrive, the ground is thrown up into lazy beds, and the stuff taken from the intervals is spread on the surface.

There is one other method of extending plantations\* practised on the Duke of Montrose's estate, which merits the attention of all proprietors of coppice wood. In all such woods, there occur many vacant spaces, of greater or less extent. Into these vacant spaces larches are dropped during the first season after the wood is cut and enclosed. In the course of the six years that the enclosure must be preserved, these get above the reach of cattle, and will, one day, add much valuable timber to the general stock.

Within these twenty years, about 1200 acres have thus been planted on His Grace's estate in Buchanan \ which, reckoning according to the proportions mentioned above, amounts to one million two hundred thousand oaks and



and ashes, with nearly two millions of Scots firs and larches.

It is only necessary to add a few words with regard to the method of pruning these plantations which is practised.

In the summer pruning of the old oak timber at Buchanan, the wound is covered with pitch, or with a composition into which pitch enters. This attention is not paid to oak coppice-wood.

The best season for pruning the pine tribe is the month of April, when the juices begin to flow: at that time as much resin will flow from the wound as will form an enamel over it.

It is altogether unnecessary to enlarge on the character and uses of the various species of trees that are principally cultivated in modern plantations. The maple (*acer pseudoplatanus*) is much used in various kinds of machinery. The beauty, the rapid growth, the hardness and incombustibility of the larch have given it a decided preference to the Scots fir. It is known, however, to be liable to one disadvantage; it is liable to *cast*) as we call it, or to warp, after having been sawn into deals, which renders it less proper for flooring, as well as many other purposes. Whether this may be remedied by delaying to use it for a considerable time after it is sawn, and by placing it in a certain form, with the application of forces sufficient to counteract this tendency to warping, remains to be ascertained.

Birch, when sheltered from the bite of cattle, grows naturally, even to the summits of our mountains, at least, those of the second order, as may be seen in the inaccessible glens and ravines of upper Buchanan and Drymen.

Drymen. Could the expence of enclosing be encountered by proprietors, what an incalculable benefit would arise from sheltering these weather-beaten stations with belts of this hardy tree !

Before closing this subject, it may be proper to take notice of one species of plantation which has been lately introduced into Stirlingshire, and which promises to prove of great advantage.

The cultivation of a specie\* of willow, called here the *red saugh* has been long practised in the corses of this county. It is of rapid growth, and very useful for many domestic and rural purposes. A young man, who has planted this tree, may live to see it ready for cutting before he is very old.

But the willow plantation which is now held in view is that lately established on the estate of Mr Foyer of Bogside, in the parish of Baldernock. A piece of low lying reddish clay ground, consisting of about ten acres, is held in lease, and a willow plantation formed on it, by Mr William Atwell, basket maker, King-street, Glasgow. He plants about 45,000 willow stocks to the acre; preferring that thickness, contrary to the general practice of planting thinner, because, during the first two or three years, they are more productive of twigs for baskets; and because, when the stocks have attained sufficient strength to bear hoops for hogsheads, these, being confined to a narrow space, shoot up straighter, and fitter for the cooper, than if allowed to straggle. As this plantation is yet in its infancy, it would be premature to attempt a calculation of its advantages. Mr Atwell has another plantation of willows, of three or four acres, in the neighbourhood of

Glasgow, which, in point of luxuriance, and the selection of the most approved varieties of the willow tribe, is esteemed a curiosity. This, indeed, as well as the other, is too young to produce hoops, which, in Mr Atweil's opinion, ought not to be allowed to grow

**K**ill the stocks have acquired a considerable degree of vigor. The varieties of which he most approves are the yellow, the Huntingdon, the Spaniard, and a *tie*<sup>1</sup>® *kind*,\* which has not yet obtained a specific name.

### *Form of Plantations.*

Having spoken so largely of the mode of conducting plantations in this county, it may be proper to add a few words with respect to their *form*\* They are constructed, especially when designed for shelter, in the form of belts, or lengthened slips, of various depth.

In a district like this, where the south-west wind sweeps over a narrow isthmus for about 137 days in the year, the construction and direction of these belts is of peculiar importance. When they are designed for shelter, they ought always, when circumstances will permit, to be directed from N.W. to S.E. so as to break the violence of those winds which principally annoy this climate.

The

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\* For the above particulars with regard to willow plantations, the Reporter is indebted to his ingenious friend, the Rev. Mr Stirling of Port, who has himself lately formed a willow plantation, with a fair prospect of success.

The necessity *qf* this attention is obvious to every eye in the bleak districts of Slamannan, and the western part of Muiravdsinside. There the soil is light and meagre; and some grounds held in cultivation are elevated, as has been noticed, \* 620 feet above the level of the sea. Shelter is here the great desideratum. In Slamannan little has been done in this way; and the few belts that occur are by far too narrow and scanty. In the eastern district of Muiravonside, the subject seems to be better understood, and the practice applied with happy effect. The belts of planting are directed so as to ward off the most pernicious blasts, and they are of considerable depth. Though they are of recent origin in this quarter, their beneficial effects are already evident. The soil appears to be ameliorated, and the produce improved, precisely in the measure that shelter is given, by the judicious direction and progressive advancement of these belts of planting. Indeed, there can be no doubt that the climate, and consequently the soil of any country, may be improved in an incalculable degree by increasing the shelter given by plantations.

Hedge-row trees have the same effect, so far as their influence extends, and they are frequent in the lower parts of this county. They not only add to the beauty of any country, but, in process of time, they become timber. And, if in this district they have not succeeded so well as the trees in plantations, the obvious causes are, the violence of the blasts, and the want of shelter, which may, by attention, be removed.

## SECT. IV.—TIMBER,

STIRLINGSHIRE may be justly denominated a well-timbered county, throughout the greatest part of its extent. The reserves in the coppice woods alone, which have been already noticed as having arrived, many of them, at a large size, amount to many thousands. There is much fine timber, oak, beech, ash, &c. in the lawn at Buchanan. At Killearn, the estate of Sir James Montgomery, Baronet, there are larches, planted about sixty years ago, which are more than 100 feet high, and above nine feet in circumference. There is a great quantity of full grown wood, consisting of oak\* ash, beech, elm, and maple, on the estates of Boquhan, Gargunnoch, Touch, Sauchie, Bannockburn, Polmaise, fculcruich, &c. &c. The timber in the lawn at Callander house is remarkable for its age and quantity and size, and the era of its having been planted approaches to a certainty. The Earl of Callander had accompanied Charles II. in his exile, during the commonwealth. Upon his return, at the restoration, he employed himself in embellishing his estate, in the style that he had observed on the continent, and particularly in planting various kinds of forest trees. These trees are now, of consequence, a century and a half old.

There

There are instances in this county of oak coppice Wood having been allowed to become timber, by thinning the trees, suppressing the underwood, and withholding the axe. There is a beautiful wood of this kind to the east of Buchanan house. Callander wood, of near 300 acres, undoubtedly a coppice originally, has been treated in this manner, and has now become timber,

*Remarkable Trees\**

Some oaks in the lawn of Buchanan are probably near three hundred years old. They have grown to a great size. Their beautiful forms, and picturesque appearance, are very striking.

At Ularchois, in the parish of Strathblane, there are two remarkable oaks, under the largest of which the road passes. « It is 15 feet in circumference; and its branches form the radii of a circle 30 yards in diameter. The other grows near it, and though not quite so large, is a more beautiful tree, having a taller trunk, and being more closely covered with foliage." \* Indeed, the larger tree, it may be remarked, is fast verging to decay.

There is in the parish of Crymen an alder tree (*betula alnus*) which, in 1795, measured 19; feet round the trunk. Its arms were then decayed, and dropping off but new shoots were, at the same time, springing

out from the top of the stem, which have since become respectable branches

There is an ash tree in the church yard of Drymeft which is said to be 150 years old: at one foot above the ground, it measures 15 feet in circumference, and at the middle of the trunk, 13 feet 8 inches.

In the middle of Torwood, in the parish of Dunipace, stood the celebrated tree called WALLACE'S OAK, in the hollow trunk of which that hero is said to have secreted himself after his defeat in the north. It is said, when entire, to have measured 12 feet in diameter, or about 36 feet in circumference.\* Of this tree only a few decayed fragments now remain, and these will also soon disappear, from the eagerness of the virtuosi to obtain even the smallest portion of them as a memorial of that patriot warrior.

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•SuuAcc. Vol. IH. p.336,

CHAP,

## CHAPTER XI.

### W A S T E S .

IF by WASTES are to be understood *commons*, or lands which no individual possesses the exclusive property, but of which a number of adjacent proprietors claim the common use, it may be observed that there is very little land of this description in Stirlingshire.

There is one tract of moorish ground, of about 360 acres, in the parish of Polmont, of this description. It is of little value. Perhaps a few other instances of the same kind may occur.

In the immediate vicinity of Falkirk, a tract of about 150 acres, the property of Mr Forbes of Callander, much of which is of excellent quality, and all capable of improvement, was usurped, for time immemorial, by the feuars of the village, as a common, for feal and



divot (for covering their houses) ant<sup>1</sup> for pasturage. It was consequently in a state of nature, and mostly covered with furze. The houses in Falkirk being now generally slated, the servitude became of little use\* and the villagers have resigned it to Air Forbes for a valuable consideration: He is now improving it in a proper stile; so that this tract of land, formerly of no value, will soon add to the beauty as well<sup>1</sup> as to the riches of this district.

If again, by wastes we are to understand ground that has not been yet applied, or that is incapable of being applied to the production of grain, we must conclude, that of the 328,000 Scots acres which the county is reckoned to contain, 220,000 acres must be denominated *waste*. \*

This, however, would be a very erroneous estimate. In Stirlingshire there are certainly 8000 acres occupied by coppice woods, plantations, and timber; 2000 acres are a sufficiently low estimate for lakes, ponds, rivers, roads, towns, and villages. There will remain 210,000 acres, of which we may account 195,000 as pasture; and of this, at least two-thirds, including the whole range of the Lennox hills, together with Benlomond, may be considered as constituting pasture ground inferior to none in Scotland. The heaths of Buchanan and Drymen, though they are not of so good quality, are still valuable sheep-pastures > and what affords valuable pasture for sheep cannot be denominated a waste.

There

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\* See p. 39.

There will remain, then, to be considered as wastes, only the mosses of various depth and quality, which occur, of greater or less extent, in almost every district of this county; and the whole of these may be estimated as amounting to 16 or 17,000 acres.

Of these many, it must be acknowledged, appear to be impracticable.\* The moss of Alva, the great moss that stretches eastward from Cumbernauld through Siartiaanan, Muiravonside, and Polmont, with some of the deep mosses in the upper parts of Buchanan and Drymen, seem to come under this character.

But whatever the scientific discoveries and practice of future ages may be able to effect with regard to these, there is every reason to expect, that not only the light and shallow moorish grounds which abound in this county may be improved, but even that the patches of deep moss which disfigure the fertile plains of Airth, St. Ninians, and Kippon, will soon disappear, and give way to the rich clay soil on which they are incumbent.

x. With respect to the shallow mosses and moorish lands which extend widely through the parishes of Buchanan, Drymen, Balfron, St. Ninians, &c. perhaps the most beneficial purpose to which they can be applied, or to which nature admits of their application, is the pasture of cattle. And, in this view, all perhaps that is in the power of human industry to do, is to improve the soil and herbage by sheltering it from the impetuous winds, by draining off the superfluous moisture,

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\* See p. 39.

ture, and *sometimes* by paring and<sup>†</sup> burning the surface.

Of all these methods of amelioration, however, it is presumed that none will prove more effectual than that of sheltering the soil by plantations, which, if formed of the hardy natives of these regions, birch, alder, and mountain ash, to which might be added the Scots fir, would, in process of time, give warmth to the climate, and nourishment to the herbage, even on very high elevations. It is certain that the most beneficial effects might be produced in this way, in the bleaker districts of Slamannan, Muiravonside, Denny, St. Ninians, Balfron, and Drymen. The practice of burning the heath upon the mountains in early spring has been mentioned, and contributes greatly to the improvement of the herbage.

On the outskirts of the heaths of Balfron, where the mossy stratum does not exceed a few inches in depth, many acres have been restored to a state of productiveness by tearing up the ground with the heavy Scots plough, giving it a years' fallow, and adding a copious dose of lime. Where the depth of the mossy stratum is inconsiderable, this method will, in almost every instance, be accompanied with success.

## II. With

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\* When paring and burning are employed, it will be necessary to restore and improve the herbage, by sowing the native grasses, such as the *festuca ovina*, the *alopecurus*, the poas, *anthoxanthum odoratum*, *bolcus mollis et lanatui*, white clover, &c,

† P. 26.

IL With regard to the deep mosses of Kippen, St. Ninians, and Airth, though their extent is now inconsiderable, and their present value almost equal to nothing, they hold a place of high importance in the eye of the agriculturist, with regard to their history, the mode of their improvement, and their certain future value.

The history of the low lying mosses on the Forth has been already sketched; \* it now remains to speak of the method which is employed to reduce them, and to recover the subjacent soil.

It appears that Mr James Ure of Skirgarton, in the parish of Kippen, was the first who, about the year 1730, conceived the idea of floating off the moss soil into the Forth, by a stream of water; an idea which has been so happily adopted and pursued there, and in the adjacent extensive moss of jUairdrummond, and which has already added to the productive soil of this district, many thousand acres of the richest quality. Mr Ure first tried to carry off a small stripe of his moss by means of a rivulet that runs into the Forth; and, finding that the scheme was easily practicable, he entered into a contract with his neighbour, Mr Edrnonstone of Broich, (without whose concurrence he could not act, on account of the levels, and the interference of their lands) to carry in a stream of water upon their joint property in the moss. They began by clearing away the upper stratum, which, as has been stated in  
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giving the history of this moss, consists of a soft spongy substance of no value: they next digged the subjacent stratum down to the clay for fuel; and thus, every year, a small portion of rich carse soil was gained.

The same method, nearly, is still employed, in reducing these mosses. They consist, as has been stated,\* of two strata; the superior one of a soft, white, spongy substance, to the depth of five or six feet; the inferior, of a black, compact peat, to the depth of four or five feet, and the whole mass incumbent on a rich clay.

In order to remove this body of moss, or peat earth, the first step is to draw a ditch round the whole area, of a depth somewhat greater than the upper, or spongy stratum; then every person who has occasion to procure fuel from this moss employs himself for some days during the winter and spring, in throwing the upper stratum into the ditch, into which the stream is now admitted, and the stuff is carried off\* into the 'Forth.

In this manner, a stripe of ground, from ten to fifteen feet in breadth, is annually cleared of the upper stratum around the whole area of the mossy soil. The lower stratum of black, compact peat earth, remains; and in this the people of the neighbourhood dig their fuel, and on its surface they *spread* out their peats to dry; whence this space, which had been cleared of the spongy upper stratum, is here called *spreadfield*.

But as the quantity of fuel that is annually digged exhausts only a small proportion of the space that had  
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\* P. 40.

been annually cleared of the upper stratum, the method practised is this: when, in process of time, the *spreadfield* has acquired an extent of about thirty or forty yards, a ditch or canal is drawn around it, at its upper extremity, where it joins the unreclaimed moss. There is, at the same time, a deep ditch formed around the extreme verge of the whole area: this ditch extends to the depth of a foot or eighteen inches in the subjacent clay. The two ditches or canals form concentric circles, including the *spreadfield* in the intermediate space.

This *spreadfieldy* or intermediate space, is now divided into small longitudinal portions, resembling the lazy beds in which potatoes are sometimes planted, by canals or ditches, forming segments of the diameter of the concentric circles which surround the mossy area. The stream is now let into the innermost canal, and the small canals are, at the same time, filled. Men are stationed on each side of them, who toss in the peat earth with their spades; it is carried by the stream into the deep ditch which surrounds the area, and floated into the river.

In this process, a thin stratum of nine or twelve inches is left, above the clay, consisting partly of black peat earth, and partly of the remains of wood. This, in the dry season (generally in the month of August), is burnt, and contributes to the fertilization of the newly-acquired soil. The roots of the oaks, which still stick fast in the clay, are gradually dug out, or burnt, which is often a tedious, and always a laborious operation. The soil thus recovered is henceforth a rich arable carse.

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To make an acre of *spreadfield* Arable, by the above process, Mr Galbraith of Blackhouse, who has himself, in the course of forty years, cleared more than twenty-four acres, states the expence to be from 12l. to 16l. The land, thus cleared, will yield four, and sometimes five good crops of oats, without manure; and this he finds to be the surest crop, after such a soil has been newly recovered. Some of his neighbours, after having taken this course of crops^ leave the ground in this exhausted condition \ and it is remarkable that the soil is in a short time co\ered, as the Reporter observed, with the phleum prateuse, and the holcus lanatus •, and the ditches luxuriantly filled with the poa aquatica, all of which grasses cattle are extremely fond of. Mr GaUbraith, however, disapproves of this exhausting process. His own method is, after having taken three crops of oats, to summer-fallow the ground, and to give it a copious dose of lime: and he finds that, after it is well wrought up, and the manure incorporated with the soil, it will produce abundant crops of wheat, beans, barley, &c. for several years;

This process of recovering soils covered by a deep stratum of moss, it must be acknowledged, is slow •, but, to remove the whole mass from top to bottom at once, would require more than double the expence which has been stated as necessary to the rendering an acre of *spreadfield* arable. It must be kept in view, besides, that, in the Kippen mosses, regard is had to the future supply of fuel to the adjacent district.

In reducing the great moss of Blairdrummonp!\* which, lying in the county of Perth, falls not to be described minutely in this work, the process is somewhat

what different in its detail, though founded entirely upon the same principle. There, the moss is let out, in small lots, to families, which have, at length, become so numerous as to form populous villages. Their leases contain clauses by which they are obliged to clear a certain space in a certain time, and, having no other occupation, it is their interest to clear their lots as expeditiously as possible. Besides a considerable rivulet which traverses the moss at Kincardine, water is supplied from the river Teath, which is raised by means of a Persian wheel, and conveyed by a wooden pipe, of eighteen inches in diameter, into a reservoir centrally situated in the moss. From this reservoir the water is distributed to the occupants of the different lots according to certain fixed regulations: and every occupant, at the proper season, and when he enjoys the command of water, tumbiea-the moss from top to bottOOi, into small canals previously formed, and floats it off into the river; still leaving, as in the instance of the Kippen mosses, some inches of peat earth, to be burnt, or incorporated with the soil.

It is proper to state, that a gentleman of this district\* made an attempt, some years ago, to improve a considerable piece of his moss after the Ayrshire method, by draining the surface, by digging it, and laying on lime; but the experiment did not succeed. Mr Galbraith also tried to improve two acres of moss after the same method, the one on the high moss, the other on the *spreadfield*. He states that he had a tolerable crop of potatoes; but tha^ a crop of oats and grass did not succeed.

Indeed,



Indeed, when the constitution of these extensive mosses, as it has been already described, is considered, it will not appear surprising that attempts at surface-improvement should always fail. In mosses like these, of a depth from nine to eleven feet, the upper stratum of which consists of a wet spongy substance, it cannot be expected that any manure will convert much of it into a soil favourable for vegetation: and even though, by accumulating manure upon the surface, an adventitious stratum of good soil may be created, still the inert cold mass that lies below must have the effect of chilling the surface, and of destroying vegetation. The Ayrshire method may do, and has actually proved effectual in reducing mosses of small depth, and of a favourable declivity \ but as to the deep and level mosses of Airth, St^Ninians, Kippen, and Kincardine, to remove the whole mass, and to expose the subjacent clay, appears to be the only certain mode of improvement.

As to forests, there are now none properly so called in Stirlingshire. The forests of Callander and Torwood, of which some traces still remain, were royal forests; as was also that of Dundaff, which has, long ago, totally disappeared.



UPON the whole, with regard to the WASHES of Stirlingshire, it may be observed\* that, though there is only a very small portion of the county which falls to be considered as totally inapplicable to the purposes  
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either of pasture or of agriculture, still, it must be acknowledged that there are many extensive tracts of ground, which might be made, by industry, to yield returns incalculably larger than they produce at present. In a national point of view, especially at the present period, there cannot be an object of greater importance than that of rendering the British empire independent of imports of grain from foreign countries; and of even making the culture and productiveness of our own soil keep pace with the demands of an increasing population.

We know what some ancient nations have done, whose population exceeded the ordinary productiveness of the soil. In the mountains of ancient Palestine, every particle of the soil was occupied in producing food for man. Barren rocks were rendered fertile, by carrying earth to them from a distance. The narrowest slips of soil, on the faces of the SDs, were propped up with walls, and carefully cultivated. In Japan, a climate naturally bleak and unfertile, we are informed\* that the mountains are cultivated to the very summit. Not a particle of any substance fit for fertilizing the soil is lost; but even on the public roads, and in the streets of the towns, receptacles are provided for preserving substances so useful in supplying the wants of an industrious and populous nation.

How must one be filled with regret to observe the little attention that is paid, in many districts of our own  
Q country,

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\* See Timnberg's Travels in Japan.

country, to objects of such high importance. Whilst our ingenuity and industry have carried the arts to a degree of perfection which no nation ancient or modern has ever reached, agriculture *is*, in many instances, only beginning to emerge into notice. How many precious tracts of ground well fitted for producing food for man, meet the eye in every quarter, lying in a state of nature? In the higher districts of Stirlingshire, where, in former times, the population was greater, but is now diminished by emigrations to the manufacturing towns and villages, marks of a cultivation, prompted by necessity, may be traced pretty far up on the skirts of the mountains. These lands, once under the operation of the spade or of the plough, might be again easily brought into cultivation, with all the ameliorations which they have acquired from nature, in a course of successive years.

## CHAPTER XII.

### I M P R O V E M E N T S .

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#### SECT. 1.—~~DRAINING.~~

**A**S a certain degree of moisture is necessary to vegetation, so a superabundance of it, lodged in the soil, is destructive of the growth of useful vegetables, and prohibits that of aquatic plants of little value.

In Stirlingshire, the methods which have been invented for removing superabundant moisture are only of recent introduction, and are employed only on a very circumscribed scale.

Elkington's manner of draining has been brought into use by some enterprising agriculturists, and is, without question, the most effectual of all others, in porous Soils, which abound in springs.—It would seem to be preposterous to enter, on this occasion, into a detailed

description of this method, which is now so well known, and an account of which may be found in every treatise on agriculture.

The grand principle upon which! this method is founded is, the detection of the subterraneous source or reservoir, in which the superabundant moisture originates ; and the next step is, to carry it off by cuts of sufficient depth to reach this reservoir, or by boring and tapping, according to circumstances.

All that seems necessary to be suggested further is, that the aquatic plants which grow on such soils will always prove sure guides in detecting the sources of the springs. Wherever the various species of *junci* or rushes cover the soil, a certain indication is afforded of subterraneous water. Water cresses, *ranunculus hederaceus*, *veronica becabunga*, and particularly that minute plant, the *mintfontana*, furnish the most decisive indications of <sup>the</sup> presence of springs. A little attention to observations of this kind, directed by an ordinary degree of common sense, will enable any man to practise the Elkingtonian mode of draining, without further instruction.

The proper draining of the carse soil of Stirlingshire, when its great value is considered, must appear to be an object of peculiar interest. There are, indeed, few springs in the corses, and there is accordingly little occasion for under <sup>draining</sup>. But *surface-draining* is here more necessary than in any other soil whatever. The subsoil of carse land is compact, and not easily pervious to water; and, in the course of agricultural operations, during a long series of years, this compactness is continually increased by the tread of horses.

horses, and by the weight of the implements that are employed.

In these carse grounds, it was the custom, of old, to cut open drains of ten feet wide, and of a very considerable depth. The object that was principally had in view was to procure clay from these dittoes for manuring the adjacent fields. The clay was allowed to lie a year upon the ground; it was then mixed with dung, and spread out upon barley ground. But, since summer-fallowing and the culture of wheat have been so generally introduced, this practice has gone into disuse: the wide drains are filled up, and their place supplied by small open drains, to carry off the superfluous water into a large common drain, which conveys it into the river. By this method, much ground is saved, and held under crop, which was formerly useless.

With regard to these open ~~drains~~, which are indispensably necessary to carry off the water that falls from the sky, and lodges upon the surface, it is much to be regretted that, in too many instances, little attention is paid to giving them a proper depth, or clearing them when they are choaked up. These lands, as has been stated, are only a few feet above the level of the Forth; and it is obvious that when the drains are not of a sufficient depth, the surface of the water which they contain will be nearly on a level with the adjacent fields, and that, instead of draining off, they will send back the water upon them. This situation of things is too frequent in the carses.

An instance in point, of the beneficial effects even of deep ploughing, in draining carse lands, was obligingly communicated to the Reporter by the intelligent proprietor

prietor of the estate of Leckie,\* Situated upon the Forth, a few miles to the west, of Stirling.—When he succeeded, about Seventeen years ago, to this estate, which contains near 1000 acres of carse, he found the soil a *caput mortuum*, and altogether unproductive. It had been under cultivation for a long series of years. The practice had been to plough only to the depth of two inches, or two inches and a half. That small portion of the soil had, accordingly, by continued cultivation, become much pulverized; whilst the subjacent stratum had, on the other hand, become hardened and compacted by the same process, so as to become totally impervious to water. The water consequently stagnated between the soil that was held in cultivation, and that which lay immediately beneath it, as if the latter had been till or rock.

This gentleman, intending to travel over a similar soil in the neighbourhood, remarked an acre of carse ground which the occupier had *trenched*, or dug up to a considerable depth, with the spade; whilst an adjacent field, of the same quality, continued to be cultivated according to the old practice\* He observed that, in harvest, the acre that had been dug with the spade produced a luxuriant crop, whilst the neighbouring field was unproductive.

The hint suggested by these observations was immediately adopted. The gentleman caused his carse lands to be ploughed to twice the depth that they had formerly

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\* Dr. Moir.

merly been; and drains were, at the same time, constructed to carry off the superfluous moisture. By this process, a vast addition was made to the permanent staple of the sod. By the continued influence of the atmosphere, loaded as it is with the natural acids which are so conducive to vegetation, the ground is soon rendered and long continues fertile.

By this simple *improvement* of ploughing deep, the water, which was formerly lodged 2 \ inches below the surface, now finds room to diffuse itself; and what is superfluous is carried off by proper drains. The subjacent soil, being subjected to less pressure, has become, in a certain degree, porous. In short, these corses have become dry.

It is worth while to remark, that a most material consequence with regard to the healthiness of this vicinity has followed this improv<sup>^</sup>fiiDt. The gentleman, who had the goodness to conffm<sup>i</sup>cate the above account, had formerly practised, with great reputation, as a physician in Stirling. During the period of hi? practice, he states that intermittent fevers were annually epidemic in the corses of Gargunnock and Kip\*pen, occasioned evidently by the infectious miasmata arising from the wet soil, impregnated with the animal and vegetable substances which had been employed a\*manure, together with the exuviae of plants which had been left to rot upon the,ground. Since the soil has been rendered dry, however, by the *new mode* of cultivation which has been described, intermittent fever\* have disappeared, and are now altogether unknown in that neighbourhood.



It may, perhaps, be asked whether the vapours which arise from the vast tracts of moss that are situated in this neighbourhood, may not be expected to produce the same diseases, and to continue their prevalence as formerly. The fact is, that they are not found to do this. The vapours that arise from moss, or peat-earth, are not miasmatic, and are not found to produce ill effects upon health. Peat-earth consists of a collection of vegetable substances held in an insoluble state by an antiseptic acid. The inhabitants of the moss villages at Blairdrummond are as healthy as any in the neighbourhood.

With regard to the form of the close or covered drains which are employed to carry off\* collections of subterraneous waters, a few words will suffice.

The most perfect, as well as the most expensive, is that in which the ditch is first covered with flags; (if the bottom be a mill-rill, this expence may be saved) a wall of some inches in height is built upon each side, and flags laid over at top. The earth is then levelled over the whole. In the extensive lawn of Buchanan, much draining has been executed in this manner, with the happiest effect.

A less expensive form of covered drains is to place the flags on edge, in the bottom, inclining towards each other in the form of an angle, or pavilion, at top. Small stones are then thrown in, which consolidate the flags in that position, and the whole is covered over with earth.

Another method is, after the ditch has been dug to \* proper depth, to fill it up to the height of 18 inches with loose stones, the largest at the bottom, and the smaller

smaller ones at the top. It is usual to cover these with b/oom, furze, juniper, or other brush-wood; and the whole is covered with earth, the green side of the first turf being generally turned down. These are, in this county, called *rumbling syvers*, or drains.

To all these kinds of covered drains the mole is a noted enemy, by perforating the banks, and throwing in the earth, by which the course of the waters is often choaked.



#### SECT. II.—PARING AND BURNING.

OF these operations some not<sup>h</sup> has been taken already, \* as being generally attended with more loss than profit. They were formerly much practised on the shallow outskirts of the mosses of Buchlyvie, Kippen, and Gargunnoch; but have now fallen greatly into disuse! Paring and burning, however, may be beneficial, and even necessary, in soils that are covered with a thin stratum of cold unproductive peat-earth. By destroying this inert stratum by fire, we get at the rich soil with which it is covered, and the ashes which are produced furnish a very suitable manure.

SECT.



## SECT, III.—MANURING

MANURING is the act of preserving the soil in a condition fit for producing the greatest returns of which it is capable, by the addition of extraneous substances, which have been found, by experience, to effect that purpose. There is no subject connected **with** agriculture in which the application of chemical principles appears to be more necessary than in that of *manures*.

Vegetables have been found to exhaust the soil of certain elements, which, again, are actually found, upon analysing these vegetables, to have passed into them, and to constitute a portion of their substance. Thus wheat has been found to contain about 37 parts in 100 of calcareous matter, and red clover 33 parts in the same quantity. Hence, it necessarily follows, that, in order to render any soil capable of producing these valuable plants in abundance, it must be copiously impregnated with calcareous matter.

It appears that nature has produced no soil which, without occasional additions, is capable of producing successive and abundant crops; whilst, at the same time, there are few which may not, by the aid of human industry, be rendered productive. To mix up the soil in the proper proportions of, the various ingredients which constitute vegetable mould must therefore be considered as the most essential branch of the agri-

culturist's art.

**culturis**

The principal elements which constitute the soil are, silex, or sandy particles ; argil, or clay \*, and calcareous substances, or lime, under its different modifications.

Where silex bears too great a proportion in the soil, it is not sufficiently retentive of moisture to favour vegetation ; but the skilful agriculturist corrects this by a proper mixture of argillaceous earth. Where, again, the proportion of argil is excessive, the soil is not sufficiently porous: the water accumulates on its surface, and destroys vegetation. This error of the soil may be corrected by adding a proper proportion of silex and of lime.

In estimating the fertility of soils, attention should be paid to the quantity of rain that falls annually. In a dry climate, argil should preponderate, to retain the moisture: in a wet climate, silex should abound, to filtrate it off.

Mr Kirwan esteems that a climate, where the quantity of rain that falls annually does not exceed 27 inches: when the rain that falls exceeds that quantity, Nature considers it as *wet*. Nature, for the most part, has generously suited the soil to the climate. Mr Kirwan observes, that at Turin 40 inches of rain fall annually, and that the soil contains from 77 to 80 per cent, of silex: that at Upsal, it rains 24 inches, and that the soil is 56, the calcareous matter 30, (and the argil probably makes up the remainder of the 100.) At Paris, the quantity of rain is still less, and the proportion of silex is from 46 to 51 in the 100.\*

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\* See Mr Kirwan's pamphlet on "the Principles of Vegetation."

In a climate like Stirlingshire! where the quantity of rain that falls is about 99 inches, taking the medium of the county, and where some rain falls during 206 days in the year,\* it is evident that that condition of the soil is the best, in which silex and calcareous matter greatly exceed the proportion of the argil. Perhaps 60 parts of silex, 25 of lime, and 15 parts of argil may, in this district of Scotland, be considered as the most advantageous proportion.

Having taken the liberty to premise these few simple, but seemingly necessary remarks, on a subject so interesting to the agriculturist, let us now proceed to consider the particular additions which are generally given to the soil, in this county, under the name of manures.

Manures may be conveniently distinguished, both with respect to their chemical properties, and their use, into calcareous and putrefactive.

### I. *Of Calcareous Manures.*

1. Marl. This is a compound of clay, silex, and calcareous matter; and from this last ingredient it will probably be allowed that it derives its principal efficacy in promoting vegetation. Marl is denominated argillaceous, silicious, or calcareous, according as any one of these substances predominates. The last is sometimes called shell marl. A marl of a very bad consistence (hence called stone-marl) has been found in the  
copper

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\* See p. 9.

copper mines at Aithrey, and applied to the soil with some success. All marls effervesce with acids.

There has not been much marl found in Stirlingshire, nor has it been diligently searched for, on account of the abundance and superior quality of the lime, which is so easily to be obtained in the eastern and southern districts of the county.

In a marshy bog, upon the estate of Lord Dundas, within a mile of Falkirk, a bed of clay marl has been lately discovered, of about six feet in thickness, with a bed of moss above, and another below it. This discovery is likely to be attended with much advantage to the neighbourhood\ and there is little doubt that similar discoveries may be made in the adjacent carses. Marl has also been found, and dug in considerable quantities, in the parish of Muiravonside; and produces a good effect, when spread upon young grass and pasture lands. Marl is found in St Ninians parish; " but the use of it has, of late, been almost entirely " discontinued." There lime of the best quality is ~bundant.

2. Lime. Of all the substances which have been employed for the amelioration of the soil, that of lime is perhaps the most general. There are few soils of such a nature as not to receive benefit from the application of lime '9 and such is the liberality of nature, that there are few countries which are deprived of a substance so essential to vegetation- " Of all the saliiiable " bases," says Lavoisier, «lime is the most universally " spread through natrre."\*

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\* Km\ Translation of Lavoisier's Elements.

Though the practical use of lime, however, as a manure, is so ancient and universal, it does not appear that speculative men have hitherto agreed on any fixed principle with regard to the manner in which it acts; and there must consequently be a difference of opinion and of practice with respect to its application. Were the question concerning the precise effect of lime merely speculative, a difference of opinion on the subject would be of little consequence. But there is reason to believe that certain views, which have been entertained on this point, have led to errors in practice. Correct views, on the other hand, with regard to the theory, may be expected to lead to the most advantageous mode of applying this important substance. The Reporter then, who has frequently remarked the waste of calcareous substances, in their improper application, hopes that he will be forgiven both by the practical farmer and the philosopher, when he presumes to enter, at some more length, on this subject.

There is *\*ta* obvious and well known effect of lime, for the account of which, it would appear, that we have not far to search, and that is, its tendency to penetrate downwards through the porous mould, and to form a crust on the unfertile subsoil. It would seem that lime does not produce this part of its effect merely by the principle of gravity: for, in its progress downwards, it leaves behind it many substances heavier than itself; but by some chemical principle, analogous, perhaps, to that of *precipitation*. This property of lime is certainly, in one respect, beneficial *\*o* the soil, by extending the staple of the vegetable mould, and by rendering it porous, and less retentive of water.

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There is reason to believe, however, that this is but a very inconsiderable part of the effect of lime in ameliorating the soil; and that if this tendency to penetrate towards the subsoil be not counteracted by a judicious mode of application, its virtues will be in a great measure lost.

It has been the opinion of many, that the effect of lime in ameliorating the soil, consists chiefly in that caustic property which it possesses in an eminent degree immediately after it is burnt and in which state it is most generally applied. It has been supposed that by burning up the leaves and roots of useless and noxious plants which abound in the soil, it converts them into a rich manure. By those who embrace this opinion, lime will be applied to the soil immediately after it is calcined, and ploughed down as soon as possible, in order that none of its acrid and caustic qualities may be lost in the atmosphere.

There is no doubt that certain advantages arise from the impaction of lime in its caustic state:—it destroys noxious plants, particularly the mosses; and the soil is probably benefited by the temporary heat that is communicated. But there is reason to believe that the benefits derived from the mere causticity of lime are the least considerable of those which attend its application to the soil; and, if this opinion be just, it follows that to plough it down in this state is a pernicious practice.

In order to form a just estimate of the precise effect of lime in promoting vegetation, let us attend for a moment to its chemical principle. Limestone, in its uncalcined state, is well known to consist of an earthy basis/



basis, combined with carbonic acid gas. In this, state, it is called carbonat of lime. By calcination, which is generally effected by applying a strong heat, this gas is expelled, and the earth, now become quicklime, and of a highly caustic quality, remains.

Quicklime still continues to possess a very strong affinity to its proper gas, *the carbonic acid* and eagerly absorbs it, whenever it is presented. This gas exists, as has been stated, \* in the atmosphere. Quicklime, when exposed to the open air, is said by Mr Kirwan to recover its proper dose of carbonic acid gas in the space of a year. It has now become again carbonat of lime, possessed of precisely the same properties that it had before calcination, except that it is reduced by fire to an impalpable powder.

Quicklime is soluble in water. Dr ThdmsQn states, " That water, at *Wb* common temperature of the atmosphere, dissolves about 0 002 parts of its weight of lime. This solution is called *lime water*." It follows, that, when spread upon the ground in the state of quicklime, it will be dissolved during the short period that it continues in that state by the moisture that resides in the soil, and by the rains that fall from the sky. But it soon becomes again almost insoluble, by recovering its proper dose of carbonic acid gas from the atmosphere. The effect of lime, therefore, in its caustic state is transient and inconsiderable.

It is allowed by physiologists, that carbonic acid gas constitutes a great proportion of the food of vegetables the application of lime, then, is chiefly useful as it furnishes

rushes this food. The question comes to be how, after having been converted into carbonat of lime, is it rendered soluble and fit for entering into the composition of plants ? Could it be retained always in its caustic state, the account would be easy and obvious. But this state of lime is of very short duration, after it has been exposed to the atmosphere.

The fact seems to be, that certain acids are furnished partly by the atmosphere and partly by the soil itself, which produce the effect of dissolving the carbonat of lime, when triturated by calcination. Thus, for instance, it is well known that clay soils abound with the sulphuric acid which readily combines with the lime; it disengages the carbonic acid gas, and the vegetables are supplied with their proper food. Clay soils, accordingly, are found to receive the greatest benefit from the application of lime. Many vegetables also furnish themselves the neutralizing acids with which lime readily combines, in enumerating the affinities of lime, we find that with the oxalic acid in the forerank, hence, probably the good effects of lime in correcting soils over-run with sorrel.

From this view, many practical conclusions, of the highest importance to the agriculturist, necessarily follow.

I. It is evident that if limestone, in its native state, could be pounded by a machine into an impalpable powder, it would have nearly the same effect, in promoting vegetation that calcined lime possesses, the experiment has been tried; but it has been found, as might have been expected, that no machinery can reduce

bash, combined with carbonic acid gas. In this state, it is called carbonat of lime. By calcination) which is generally effected by applying a strong heat, this gas is expelled, and the earth, now become quicklime, and of a highly caustic quality, remains.

Quicklime still continues to possess a very strong affinity to its proper gas, *the carbonic acid*, and eagerly absorbs it whenever it is presented. This gas exists, as has been stated, \* in the atmosphere. Quicklime, when exposed to the open air, is said by Mr Kirwan to recover its proper dose of carbonic acid gas in the space of a year. It has now become again carbonat of lime, possessed of precisely ~~the same~~ properties that it had before calcination, except that it is reduced by fire to an impalpable **powder**.

Quicklime is soluble in water. Dr Thomson states, « That water, at the common temperature of the atmosphere, dissolves about 0 002 parts of its weight of lime. This solution is called *lime water*." It follows, that, when spread upon the ground in the state, of quicklime, it will be dissolved during the short period that it continues in that state by the moisture that resides in the soil, and by the rains that fall from the sky. But it soon becomes again almost insoluble, by recovering its proper dose of carbonic- acid gas from the atmosphere. The effect of lime, therefore, in its caustic state is transient and inconsiderable.

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From this view, many practical conclusions, of the highest importance to the agriculturist, necessarily follow;

1. It is evident that if limestone, in its native state, could be pounded by a machine into an impalpable powder, it would have nearly the same effect, in promoting vegetation that calcined lime possesses. The experiment has been tried but it has been found, as might have been expected, that no machinery can re-

duce limestone to a fine powder so effectually, or so cheaply, as burning does.

2. That Hrae is *principally* of use as a manure in its effete condition 5 and that it is of lit fie consequence. whether it be of 2 years old, after calcination, or of 500. As soon as it recovers from the atmosphere its proper dose of carbonic acid gas, it hts become carbonat of lime-, and, like the rock out of which it \ras originally dog, it will continue in that state until fire, or an acid, are again applied. Hence old rubbish of lime appears to be a most valuable manure. The age is nothing j the quantity of calcareous matter contained is every thing.

3. But the most important conclusion from this doc. ixine, is, that lime, after being calcined, should be spread upon the ground for a long while before it is ploughed down, in ferderto afford time for its neutralization by the acids which are furnished by the atmosphere, arid by the soil. It is then soluble in water, and capable of entering into the system of vegetation. -> In *thas* view it would seem to be the most proper practice to spread quicklime upon grass lands, for a season, or for two seasons, beiore they are to be broken up.

Another practice, which is altogether consonant with the principles which have been siiggeated, is not uncommon in this county j—and that is, *to harrow in* lime, along with wheat, barley, or potatoe oats, when the field is, at the same time, laid down, and to remain under grass, for a season or more. It is obvious that the lime, thus left almost wholly upon the surface, will become ever)' day more and more n<utraliz ed by the atmospheric gases: it will thus become soluble, and enter

ter easily into the food of the vegetables that had been  
 iown. Its virtues Ai 11 also continue long \ and the  
 crops that are to succeed, when the land is again to be  
 broken down, will feel the benefit of this practice.

4. In this theory> the agriculturist iruy find sufli-  
 cient security **in** his practice of laying on lime *alone*,  
 without any saline addition. Lord Dundonaldj **in** his  
 ingenious treatise,<sup>1\*</sup> " On the Connexion between Agri-  
 " culture and Chemistry," states the grand effect of  
 iine tobej «Its forming with the remains of vegetables  
 t( which it finds in the soil an almost insoluble matter ;  
 « unfit, indeed, for entering immediately into the pro-  
 \*< cess of **vegetation** j but which, with the addition of  
 " saline substances which art may supply, will form a  
 \*' rich, soapy, mucilaginous matter, which is highly  
 " conducive to the growth of plants."

His Lordship specifies several of those saline sub-  
 stances which ought to be **added** to lime\* in order  
 10 give solubility to the vegetable matter with which  
 it has been combined, **particularly** alkaline salts,—as  
 sola,\* potass, and animal substances; with Glauber's  
 salts, **Epsom** salts, sea salt, I<c.

But where, it may be a?ked, are such saline sub-  
 stances to be obtained in such a quantity as is requisite  
 to neutralize the calcareous matter which the farmer  
 must apply to his soil? and how can he afford the price  
 which must be paid for such an •xpensive mantire ?

It may ,be **admitted**\* with his Lordship, that the be-  
 neficial ellects of Hrae may be accelerated and increaseJ  
 by the addition of saline substances j but when we con-  
 sider the difficuky, and cveti the impossibility of **pro-**

curing them in an adequate quantity, it would seem th  
 at the **agriculturist** is abundantly justified in his ordi-  
 nary practice of laving on lime *alone*, by the doctrine  
 that has been suggested, of the provision of an acid  
 furnished by nature for neutralizing calcareous sub-  
 stances which have been applied to the soil

It is, at the same time, justly observed by Lord Dun-  
 donald, that lime should be applied to the ground with  
 caution; and that, from over-liming, many pernicious  
 consequences may ensue. These evil consequences,  
 however, do not appear to arise from the operation of  
 lime as an absorbent of the atmospheric acids; for the  
 more that is absorbed of these, the greater is the quan-  
 tity of saline substances that is generated. But the  
 truth seems to be, that lime applied in too great a  
 quantity is hurtful, **because**, by the peculiar property  
 which it possesses of penetrating downwards, it disturbs  
 the mechanical arrangement of the soil; it loosens the  
 soil and renders it too open and porous to sustain  
 the weight of a heavy crop. Where lime has been ap-  
 plied superabundantly, its effects may be corrected by  
 a proportioned use of alkaline salts, as dung, urine of  
 cattle &c.

These remarks may be concluded by adding that this  
 doctrine, with regard to the abundance of neutralizing  
 acids which nature furnishes, does not tend in any tie-  
 to the exertions of the husbandman, in ac-  
 cumulating the artificial salts in the greatest quantity  
 that he is in his power. It well might the manufacturer  
**say that**, as the influence of the sun, together with an  
 alkaline ley, will bleach his cloth,—he will not employ  
 the more **expeditious** method, lately invented, of bleach-  
 ing



ing by an acid in the concentrated form in which, it is furnished by art. Nature has, in this respect, done **roach j** but it **has** been left to **human** industry to concentrate, and to hasten the effects **which** she, by a more gradual process, would at length, accomplish.

HAVING stated the properties of lime, with its application and effects, at such length, it seems altogether **unnecessary** to add any thing with regard to the other calcareous substances which are suggested in this section; such as limestone gravel, gypsum, shell; Sic. The use of lime, in this district, is extremely limited and the principle upon which their effects depend is obvious.

## II. *Of Putrefactive Manures.*

AI.I. saline additions tend powerfully to promote the putrefaction of animal and vegetable substances, when applied in a proper proportion. In this view common salt might be used as a manure. It is well known that if common salt is applied to animal substances in a great quantity, it prevents putrefaction; it is only when applied in a small quantity that it accelerates that process. Were it to be obtained at an easy rate, it would be an **useful** addition to the dunghill.

Of all the putrefactive manures which are • **LOW-**ever, **the** dung and urine of cattle are those which are **applied**



applied most generally, and with the most powerful effect.

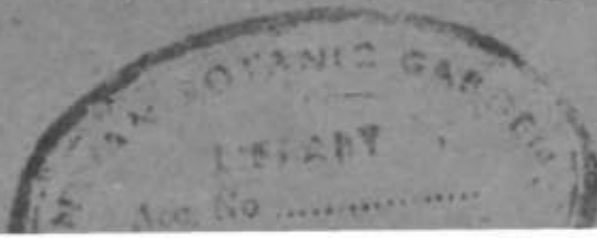
About 40 years ago, it was the universal practice in the western parts of this county to pen up both black cattle and sheep, during the night, in summer and harvest, in folds made up of hurdles fastened together, and enclosing a circular space of ley ground, as a preparation for breaking it up the ensuing\* season. After this space appeared to be sufficiently manured, the fold was shifted to another part of the field, and so on till the whole was gone over. This was called *Teatking*,—an unprofitable practice, as will be shewn, with regard to the quality of the manure ; and especially pernicious with regard to the cattle, who were let loose in a narrow enclosure, in which the weaker were continually liable to be injured by the stronger. From this circumstance, and from the abolition of the distinction of infield and outfield (to the latter of which this *teatking* was always limited) the practice of folding cattle by night has for many years been disused.

There is another species of *teathing*, however, which is very generally practised in this county, and which appears to be no less pernicious than that which has been described. It is an ordinary practice, not only in the higher parts of this district, but even in the rich carse situated on the Forth, to carry out and to spread upon the fields the farm-yard dung, in the months of October and November, as a preparation for the next year's crop. In the higher parts of the county the dung is, for the most part, laid on grass lands ; in the carse, it is laid on wheat stubble as a preparation for a crop of beans.

If we attend to the philosophy of 'his\* subject, (an attention which the most experienced **agriculture** should not despise)—it is evident **that** dung, like every other inflammable substance, when exposed for a considerable time to the atmosphere, will imbibe the oxygen of the air in a too abundant measure; **and** that, instead of remaining a putrified soluble substance, disposed to enter into the system of vegetation, it becomes inert and insoluble. Dung, by being long exposed to the air, will, in fact, be converted **into** a substance precisely of the same kind with the surface of peat mosses, which is equally unfit for fuel or for manure.

Add to this almost irreparable evil of oxygenation, that of the evaporation of the precious volatile salts with which dung is impregnated, together **with** the large proportion of its most **nutritive** juices, which, especially on sloping grounds, must be washed away by the rains, never to be recovered, and some estimate may be formed of the merit of the thing. Mr Walker of Falkirk, to whom the reporter has been so much indebted for important information on many subjects relating to **agriculture**, justly condemns this practice; **and** adds, « Would it not be better to plough in the dung to preserve the juices and to rot the stubble on which it is laid. ? But this," he adds, " **wou'd** etc;«  
 « **tion** a second ploughing before the beans are sown: « No matter," says Mr Walker, " but I'd pay « **for** the expence"

From these suggestions, it will easily follow that the proper management of the dung and urine of cattle is one of the most **important** concerns in agriculture.



Notwithstanding the acknowledged importance, and the generally increasing value of dung, it is a **fact** no less singular than true, that the magistrates of Stirling have **always** been obliged, and are so at this day, to give a premium for the removal of the *town dung*, instead of adding by its sale to the revenue of the town. About six years ago, the premium given for removing the town dung was L.80. It is now yearly reduced, as the value of this manure begins to be properly felt: In 1809, the premium given was L.48.

That *town dung*, the most valuable in its kind, should be thus undervalued in one of the first agricultural districts in Scotland, the vicinity of Stirling,—can be accounted for only from the low state of agriculture in this quarter, (which cannot be said to be the case)—or from the vast abundance of lime so easily to be obtained in that neighbourhood.

With regard to *farm yard* (notice has been taken already of the general introduction of straw-yards in every considerable farm of this county. By the proper construction of these;—by sloping the area gently towards the centre;—by paving it; and even by employing plaster of clay or lime, to prevent the escape of the *juices*,—the alkaline substances, which are so conducive to vegetation, may be easily preserved and accumulated.

Indeed, too much attention cannot be paid to the construction and **management** of dunghills. **But** as nothing peculiar to Stirlingshire occurs in this respect, it may suffice to, observe, that the intended object is, to produce **fermentation**, and the complete decomposition of the vegetable and animal substances of which the dung-

hill consists. In this view, it is evident, that if the surface is too widely diffused, it becomes oxygenated, and is reduced to the quality of peat-earth : that if it is placed in a hollow from which the superabundant water cannot escape, no fermentation can take place; and that if it is situated so **that** all the moisture runs off, it must, as in the first instance, become in some degree oxygenated, and crumble into dust. A dunghill, then, should be situated upon a very gentle declivity, so that the waters may not stagnate around it; and if any juices run off, they may be arrested in their course by the admixture of proper materials,—particularly of peat-earth.

I The putrescency of dung may be promoted by a due degree of heat and moisture, and also by the addition of certain saline substances. Lord Bunsby recommends to farmers on the sea-coast to drench their dunghills from time to time with sea-water, which may be easily conveyed by pipes, or by canals.

In the farm yard, and feeding houses of Mr Walker, on the estate of Westertown, the Reporter observed a most proper attention to the preservation of the urine of the cattle, by having a small reservoir for its reception, which is filled up, from time to time, with straw, chaff, or some other substance calculated to absorb it.

In the western district of **this** county, the common fern, (*pteris aquilina*) is much used, and with great advantage, for Utter, and for **encrasiog** the volume of the dunghill. The whole sides of the mountains are there covered, for many miles, with this plant, which had been hitherto applied <sup>to</sup> scarce any other use than that of thatching **cottages**. When it is considered that fern, before it has lost its sap and verdure, contains a large **proportion**

proportion of alkaline salts, it would seem that nature, in clothing our mountains with it so abundantly, had intended to compensate for their barrenness by their furnishing such a valuable material for the increase of fertilizing manures. The addition of fern, before it has become withered, to the straw yard **and dunghill**, cannot be too strongly recommended.

Previous to the prohibition of distil ring from grain, **the** most valuable manure of all others was obtained from the numerous and extensive distilleries that were established in this connty. Mr Belches states (1796) « That one cart load of that dung was reckoned equal . " to two of that which is produced upon a conimon <farm. The superior quality," he adds, "\*\* is ascribed " partly to the food on which the cattle are fattened, « being the grain and wash from the stills, and partly « that the cattle are very scantily littered, owing to the « great number of them, when compared with the « quantity of straw which the distillers can procure." Amongst the many evils which the agricultural interests of Scotland have stiffered from the suppression of distillation from grain, it may be permitted observe that this of withdrawing such a powerful mean of fertilizing the soil is not to be accounted the least conoiderable.

As to the comparative merit of *rotten* **dung**, on the one hand, and long and *fresh* dung, on the other \*, various opinions have been Entertained. The truth seems to be. That, for producing the next immediate crop in abundance, dung completely rotted is **the most** beneficial.

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\* Plan of the Board, article 21st of this section.

beneficial. But, if we attend to the subsequent crops, the preference is due to *long zndjreslt* dung, provided that it is ploughed ha, and completely covered by the mould. *Long* dung <ipems to be particularly adapted to the culture of potatoes ; and dung completely rotted has been found to cause that crop to be wornveaten and watery. Many persons ust\* only common straw or litter for their potatoes ; and there is reason to belt eve that it contributes more to their growth, by preserving; the soil in an open state, than by adding any thing of its own substance.

Before we **quit** the subject of manures, a short notice of the use *oipeat earth* (a substance with which this county so much abounds) seems indispensable.

Peat earth ought not to be applied as a manure in its natural state •, for> if taken from the surface of mosses, it is oxygenated ; and, if froi-i the bottom,—it is saturated with its peculiar acid. In both these states, it is completely insoluble : If it is applied to the soil, it **produces** only a crop of sorrel (the *rumex acetosella*) and it tan be reduced only by the application of saliu.c substances, especially the **alkaline**.

Lord Meadowbanlc has discovered, and introduced into practice, a method of reducing **p eat enth** into a state of solubility which fits it to promote vegetation, and which seems to be the most complete ;hat hai been hitherto devised. **With** the liberality of a true philosopher, his Lordship has communicated tin's method to the public ; and the Reporter has actually seen it practiced on his Grace the Duke of Montrone's farm at Iluchanan, as well as in many other parts of this county. **Th**ough this method h probably detailed in every county

county report connected with Scotland that has been published of late, it is considered as an attention due to the agriculturists of Stirlingshire to repeat the outlines of it.

Lord Meadowbank's method is "to mix, in as accurate a proportion as possible,  $\frac{1}{10}$  parts of peat-earth « with *one* part of dung : to divide the peat earth in-  
" to small pieces; and to throw up the whole mix-  
" ture in a loose state, in order to favour fermentation.  
" This compost is formed into longitudinal heaps not  
« exceeding fifteen feet in breadth, and four feet and a  
\*\* half in height. A fermentation soon takes place,  
« which should be allowed to rise to 90° of Fahrenheit;  
" and should it proceed beyond this, it must be check-  
" ed by the addition of more peat, or by throwing on  
" water. When this heat has subsided considerably,  
« the whole heap is to be completely turned over; and,  
" in about the space of three weeks, a new fermenta-  
" tion, somewhat more moderate than the former, fol-  
« lows. The operation is now completed; and the  
« whole mass is reduced to the state of the richest  
« dung."

The importance of this discovery and practice cannot be too highly estimated.

Of the various other species of manures enumerated in this section of the plan of the Board, such as hair, hoofs, bones, feathers, rape dust, &c. &c. it does not appear necessary to speak; as the use of them is either altogether unknown in this county, or at least extremely rare and circumscribed. It may suffice to suggest, in general, that nothing is more essential to agriculture than the preservation and accumulation of every substance

stance that is Convertible., into manure. Besides the substances mentioned, the scourings of ditches and ponds, culinary ashes, chamber ley, and, as has been hinted before, the weed ings of the fields, consisting of couch grass, swine's thistle, cursed thistle, senecio jacobea, artemisia vulgark, &c. (if laid up in heaps, for two seasons to ferment)—all contribute to furnish excellent manure.

#### SECT. IV.—IRRIGATION,

OF the subject of irrigation, the Reporter professes himself to have only a very slight knowledge, whether with regard to its general practice in agriculture, or its particular application in Stirlingshire.

There can be no doubt that irrigation, must prove highly **beneficial** to light and arenaceous I aids j and it is probable **that** it produces its **amelio**;-atiug effect principally by the deposition of calcareous **matters**, with which all waters are impregnated. **Even** rain water holds in **solution carbonic** acid, **carbonar** of Ume, and **a** little muriat oi lime \*. *h*rigati:n, accordingly, is found to be effectual in **des**tr~~oying~~ the mossy **tribes**, and in producing a deep **verdure**, just as lime does when used as a top dressing, This effect may be observed **ev**ery day on the grassy **dediv ities** of our mountains.

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\* The; nson's Chemistry, vol. iii. p. 366.



tains. Wherever a little rill descends, without forming a channel for itself, but gently oozing through the grass, we find the mosses extirpated, and a rich sward covering the ground.

**I**The only instances of irrigation which occurred in Stirlingshire were that of the great Carron Bog, of which notice has been taken already \* ; and that of an **K** experiment made by Mr Johnstone of Alva with a very **I** happy effect.

**I**Mr Johnstone procured a person from England well versed in the method by which this operation is conducted in those districts where it is most generally practised. The rules by which this operator proceeded, and which he left for future application, were as follows.

The field to be irrigated/ being situated upon a slope, at the bottom of the Ochill hills, a conduit is constructed along the upper extremity, in such a manner as to diffuse the water regularly over the surface of the lower grounds. Wherever this regularity of diffusion is interrupted by the inequality of the ground, cross Cuts, or *feeders* as they are called, of smaller dimensions are made. All these conduits must be regularly cleansed, and preserved in constant order, during the period of flooding.

About the beginning of December, the water is to be admitted, and allowed to run over the field for the space of 5<sup>4</sup> Jays } and then to be turned off till the end of the month \ it being idways understood, that in the severity of frost, the water is to be turned off the ground,

groundj and not admitted ^again till the return of open weather \*.

January 1st, admit the water for 10 days; turn it off for 3 days ; admit it for 6; turn it off for 2 days; admit it again for 5 days; turn it off for 2.

February 1st, admit the water upon the field for 10 days; turn it off for 6'; admit it for 8 days ; turn it off for 4 ; and (such is the minuteness of these instructions) if it be leap year, turn it off for 5 days.

During the month of March, if the weather is mild, the water should be admitted upon the field for 4 days, and turned off for 2 days, alternately If the weather is Xold, the alternation should be, 6 days on and two days off.

During the month of April, the alternation should be 3 days on, and 2 days off.

## CHAP.

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\* The philosophy of this part of the regulation (a matter not unwittlly of tle attenii'>u oi\* -lgricuitu i(s) probably is, that\* as is wi-ll known, in the proc«s of freez|fcg, th gases with \whicl> water is impregnated!, and particularly the carbonic acid gas, which is so conducive to vegetati- ii, arc rom- \)vii^ e^pell d. " SNOW water, when newly melted, is dcs« " litUtc of all «abcuus budies." Thumsoa ubi iupra.

## CHAPTER XIII

## EMBANKMENTS.

IN 2 county like Stirlingshire, swept and intersected by so many large rivers, and bounded for several miles by the Firth of Forth, the subject of *embankments* must necessarily appear to be of considerable importance.

The embankments which have been practised in this county may be described under two sections j 1. Embankments against the sea. 2. Embankment of rivers.

## SECT. 1.—EMBANKMENTS AGAINST THE SEA.

In describing the soils of Stirlingshire \*, it was particularly remarked, that the whole tract of carse land, which

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\* Ch. i, sect. 4.

which stretches along the Forth! appears evidently to have been covered, at some remote period, with the waters of the sea; which, gradually retiring, have left this soil, the richest in Scotland, exposed, and fit for the operations of agriculture. These carse lands are very little elevated above flood mark; and all along the coast, the firth is so shallow, that, at low water, many hundreds of acres are left dry, the soil of which, when recovered from the sea by embankments, is equally valuable with that which had been long under cultivation.

The idea of recovering this fertile soil from the sea by embankments seems to have been originally suggested by a Dutchman about the beginning of the last century. In the adjacent parish of Borrowstownness, " He " proposed \* to acquire, by this method, a tract of 2000 " acres, upon condition of his being allowed the possession of it for forty years, and the timber of the " wood of Kinneil for materials for erecting the dykes: " the proposal was rejected.<sup>19</sup> In the Statistical account of the same parish, a similar account of this proposal is given\* with the difference only, that « it was made " by a Dutch company, and for a lease of 99 years." , Had this proposal been accepted, it is evident that, at the current rent for which such lands are now let, the proprietor might enjoy, at this day, an additional income of L. 10,000 a-year. .

The proprietors of the adjacent shores in Stirlingshire have at length awakened to a just sense of their interest

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\* See Nimmo's History of Stirlingshire, p. 49 U

terest in this important species of improvement. A considerable deal has been done in embanking; but more yet remains to be done in the<sup>o</sup> parishes of St Ninians, Airth, Bothkenriar, and Falkirk.

In speaking of the soils \*, some account was given of the progress made in embankments in this district; the subject was there improperly anticipated. The<sup>1</sup> reader, it is hoped, will now forgive the introduction of the detail in its proper place.

The number of acres of carse soil, lately recovered from the Firth of Forth in Stirlingshire, is, as far as the Reporter has been able to ascertain, as follows: viz.

|  | <i>Acres.</i>                             |
|--|---|
| In 1788, by Lord Dundas            -        -  | 90  |
| In 1806, by the same                —        — | 24;                                       |
| In 1809, employed in reclaiming        —       | 60  |
| Within these 40 years, by the Earl of Dunmore  | 120                                       |
| About to be reclaimed, upon the same property  | 50  |
| Reclaimed by Mr Graham of Airth        —       | 70  |
| ————— by Mr Ogilvie of Gairdoch    —           | 70  |
| ————— by Mr Gilmour                —           | 50  |
|  | <hr style="width: 10%; margin: 0 auto;"/> |
|  | Acres, 514                                |

Thus it appears that, within these few years, there have been recovered, or are in the course of being recovered by embankments against the sea, no less than 514 acres of the richest soil in Scotland,—land which will let at five guineas per acre\*

It

It may be permitted to add, that on Lord Dundas's estate 500 acres more of the same value may be easily reclaimed in the same manner. An intelligent friend assures the Reporter, " On the authority of a **respect-** " able undertaker, that the expence would not exceed " L.50 per acre:" thus the whole expence **would** amount to about\* L. 10,000 ; and the return, at the ordinary rent of L.5 per acre, would be L.\*2,500 a-year, or about four years purchase of the soil ; 200 acres Anore of the same quality might be recovered in that neighbourhood at a similar expence.

Besides the private emolument which would #ccrue to individuals from the spirited prosecution of **these** embankments, a very important public benefit would arise; were they completed, to the extent of which they are capable, the navigation of the Forth, and Carron would be greatly improved; the waters of the Forth, which **are** now spread over a large surface, would' be confined within a narrower channel; and the depth would be so much increased at full tide as to admit vessels of a large burden.

Wherever, on the other hand, these embankments are neglected, the sea *U* gradually gaining upon the land, and washing off the **most** valuable soil •> a striking instance of which was **observed** to the north of the confluence of the Carron.

**M** But there is reason to hope that many years will not be allowed, to pass till, on the adjacent shores of Stirlingshire and Linlithgowshire\*- there shall be added at **list** 3000 acres to the **best** carse soil of Scotland." The Duke of Hamilton is said to be very active in recovering valuable soil on his **estate** of Kinneil

With regard to the manner in which these embankments are constructed, the Reporter finds that a year or more before the bank is built, facines of brushwood are fixed down in the clay, by strong palisades, in the line in which the embankment is to be conducted ; and over which It is afterwards actually built. By this line of facines, the mud and floating vegetables, which would otherwise be washed away, are arrested, and a considerable addition made to the soil.

The embankment is made of mud or earth, faced, on the side that presents itself to the sea, with large stones, which are procured from the quarry of Longannat, on the opposite side of the firth. The strongest of these embankments are 40 feet wide at the bottom, and 12 feet high, having a slope of two feet to every foot in height. In some situations, a bank of 7 or 8 feet in height is found to be sufficient. A dyke of this kind will defend from the sea for ages; and is kept in repair at an expence so trifling that tenants have no objection to take the burden upon themselves.

#### SECT. IX.—THE EMBANKMENT OF TILIVERS.

THE only instance of embankment on the Carron, which seems to merit attention, occurs towards its confluence with the Forth. There It formerly straggled, in various windings, through the rich coarse land that stretches along the coast; and Its ancient banks may still

still be traced through the fertile arable fields. Lord Dundas, with patriotic spirit, straightened the course of the Carron towards its *embouchure*, many years ago, and defended it, by suitable embankments entirely at his own expence. On the tongue of land included by the Carron on the north, and by the grand canal upon the south, stands the flourishing seaport town of Grangemouth.

The embankments on the **Kelvin**, in the parishes of Kilsyth and Baldernock, furnish the most extensive and important example of this species of improvement that occurs in this county.

In the parish of Inchuthy, this river has its course for upwards of four miles, over a plain of small declivity, and of a soft loamy soil. It formerly straggled in many directions over this plain, in a channel of very little depth; at every turn which it took it was gorged up into a pool, and was overgrown with aquatic vegetables. At every flood, the whole valley presented the appearance of a lake; the hay and corn harvests were frequently ruined; and several fields, naturally of a rich soil, were rendered incapable of cultivation.

About the year 1793, the late Sir Archibald Edmonstone of Duntreath, Bart, who was proprietor of the lands on the north side of the river for more than four miles, employed Mr Robert Wallace, the celebrated engineer, to form the plan of a new cut, sufficient at all times to contain the waters of the river, and as **nearly** in a straight line as the situation of the grounds and the course of the river would admit. To induce the proprietors on the south side to join in this most useful undertaking, he generously offered to lay out two



thirds of the expence himself. So slow, however, are persons of unenlightened minds in discerning their own interests, that only a few of them, at that period, acceded to these advantageous terms. During the first year, only about a mile and three quarters of the new cut was executed. But the advantages of this partial improvement soon became so obvious, that the great-est part of the conterminous heritors concurred with Sir Archibald in prosecuting the plan, though not altogether upon such liberal terms as a just sense of their own interest might have dictated. Early in the course of the second year the cut was completed in the parish of Kilsyth.

The dimensions of this cut are varied judiciously, according to the gradual increment which the river receives in its course. For the first mile from above, where the river is of inconsiderable extent, it is from 18 to 20 feet wide at the surface, by 10 to 12 at the bottom. Throughout the second mile it is from 22 to 24 feet wide at the surface by 14 to 16 at the bottom. Throughout the remaining part it is about 28 feet at the surface by 18 to 20 at the bottom.

The first part of this cut was undertaken by the contractor at twopence per cubic yard, but he was only bound to lay down the earth regularly at the distance of a yard from the edge of the cut, without any obligation to form it into a regular sloping bank. It was understood that the conterminous heritors would execute this part of the operation. As they, however, proved negligent in this respect, it was found necessary to enlarge the contract; and twopence farthing per cubic yard were allowed for cutting, and for forming the bank.

bank. The low rate at which this contract was entered into may be accounted for at this day,—not merely from the facility of working in a rich loam or clay, but chiefly from the well known, and, by many severely felt, depreciation of money from that period. Such a work would not probably be now undertaken for less than fourpence per cubic yard. The expence of the whole of this cut, through XUst, did not exceed **L.600.**

The embankment on the sides of the cut is erected about three feet from **the** brink, and is, for the most part, somewhat more than three feet in height. It may afterwards be raised, should it be found necessary, a foot or two higher, leaving a water course of between 30 and 40 feet, which would contain nearly double the quantity of water that now runs.

It may be proper to add, that whilst these public spirited operations of Sir Archibald Edmonstone, and of his son Sir Charles, who has prosecuted these improvements **with** redoubled vigour, were **thwarted** in no small degree by some neighbouring **heritors**, who are now highly benefited by their enlightened exertions; some compensation was afforded by the liberality and concurrence of a respectable heritor situated far above upon the river, the late Mr J. Knox of Antermont. **That** gentleman, sensible of the benefits that arise from **straightening** and embanking the river in this district immediately above, and free from any prejudice of the contrary; he, **the** heritor, conducted **the** operation through **his** estate upon an improved plan. **The** cut upon this estate is beautiful, and executed in the completest manner; and, whilst it carries off the waters of the Kelvin, furnishes a ready method of draining the

upper grounds. The undertaking and the execution do honour to the memory of the gentleman who conducted it.

This improvement, which has been described, has been productive of very important advantages in this naturally fertile district. The declivity, or foil of the river, throughout this tract, is about 18 feet. The waters which formerly, in their crooked course, were almost wholly stagnated\* now run at the ordinary rate of the declivity which is given them. They never overflow their banks. Cattle can now pasture over those grounds in which they would have formerly been swamped. The surface of the water being now, for the most part, four, and sometimes six feet, below that of the adjacent fields, this cut serves as a general drain to the whole valley; so that 300 acres of meadow may be converted into arable land; 60 acres of moss may be converted into meadow; and 500 acres of arable land are already rendered of double value\*.

In the parish of Baldernock, the Kelvin, which there forms the boundary between the counties of Stirling and Dumbarton, is embanked by a more simple process. In that district, it runs through a rich flat plain of about 6 or 700 acres; and often, by its inundations, injures, and even sweeps away, luxuriant crops. About

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\* For this account of the era bank ~~ments~~ *of that part of the Keixit*, which runs through Kihyth, the report is principally indebted to the *Statistical Account of that parish* (vol. xviii, p. 220.) and to the valuable communications of James Davidson, Esq. ~~writer~~ *to the signet.*

30 years ago, the proprietors united in erecting an embankment on each side of the river. This embankment is placed at the distance of four or five feet from the brink of the river. Its height is not above four or five feet. It slopes very gently from the ground,—apparently at an angle of about  $135^{\circ}$ . It is faced with sods or turf with the grassy side outwards. Thus, when the river swells, as it frequently does in this district by the confluence of mountain torrents in the higher parts of the country, the surface of its channel being here greatly enlarged, and one foot at the surface now containing as much as four feet does at the bottom,—the overflowing of the river is, except in cases of unforeseen accident, effectually prevented. It may be observed, in addition, that the sods, or turf, fixed on a slope declined at so wide an angle from the brink of the river, form a far more effectual barrier against the violence of the current than a perpendicular fence of much greater height and strength. The sloping sod allows the stream to glide off gently; and if, at any time, a portion of it is torn up by the torrent, it is an easy and cheap matter to renew it. The newly applied sod should always be fixed down to the soil by wooden pins\*

## CHAPTER XIV.

### LIVE STOCK.

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#### SECT. I.—CATTLE.

THOUGH some calves are reared upon almost every farm, yet Stirlingshire cannot properly be denominated a *breeding* county. In the rich arable lands in the lower parts of Stirlingshire, the number of cattle which is kept is barely sufficient to supply the family with milk and is not always adequate to the supply of the butter and cheese which is needed. In the grazing districts, gain, as in the uplands of St Ninians, in Fintry, Clislyth, Campsie, and Strathblane, a much greater proportion of calves is reared, but not so great as to constitute them *breeding* districts strictly speaking. It has been already noticed that in Strathbkne, where there are about 260 milch cows, only about *half* that number of calves is reared: the same may be taken as the proportion throughout the rest of the adjacent grazing districts.

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These grazing districts, it may be observed, are chiefly occupied in fattening cattle for the butcher j for which' they are admirably calculated by the abundance and the good qualities of the herbage, which has been already described'\*. The cattle that are found to fatten best on these pastures, and to afford the most delicious beef, are not those which have been reared upon the spot; but the small highland'breed from the Hebrides, »nd from the mainland of /rgyleshire and of Inverness-shir e. LStirlingshirc, situated in the very-opening to these breeding districts, is supplied abundantly, and with the utmost readiness, by dealers or tirovers who are constantly passing, during the summer months, with cattle of all ages, to the low country.

These highland cattle are bought in for fattening, in the beginning of summer ; and sold for **the shambles** in the end of autumn. The weight, when fat, runs from 18 to %i stones Tron,—with fr. om 4 to 5 stones of rallow. The exer: ions of an individual of this district, the late Mr David run, who rented lands entirely employed in grazing, to the amonn: of L. 1800 a-year, are mentioned with just praise by the author of The Statistical Account of Fin try f : " To his example in " the improved mode of grazing which he used, its " (\* **present advanced state**) through a <•nsiderable part " of the west <† Scotland/\* seems to be very properly ascribed. " He selected **the** most choice cattle to stock " his farm wiili ; he kept his gntss lighter, aris, be " put fewer cattle on than had been used in former " till:es.

« times. As a specimen of his success, it is stated that  
 " he sold a highland stot to a Glasgow butcher, which  
 « weighed 52 stones of beef, and 10 stones of tallow.  
 « The price he received (this was previous to 1791)  
 \*<sup>l</sup> was 25 guineas. The same person at another time  
 « sold 25 highland stots at L.12 each, the lightest of  
 « which weighed 30 stones,<sup>M</sup> Tron.weight is always  
 understood to be meant.

With regard to the *breed* of milch cows, in this important grazing district, a most laudable attention has been paid of late by the landed proprietors of the parishes of Kilsyth, Campsie, and Strathblane, by establishing an annual competition for premiums for the best bulls and cows; and it is proper in this place to observe that these gentlemen, from experience and observation, have given a decided preference to the Ayrshire breed.

The exertions of this association " for improving the  
 « breed of cattle in this district," may be considered in an interesting point of view,—not only as a present incitement to this and other counties, but as an example to posterity, of what has been done by patriotic individuals, and of what may henceforth be done. The following account, copied from the advertisement of the association, it is hoped will not be unacceptable.

« With a view to improve the breed of milch cows in  
 « the *COLtry*, Sir Charles Edmonstone of Duntreatb,  
 « Mr Lennox of Wopdhead, Mr Kincaid of Kincaid,  
 « Mr Buchanan of Carbeth, Mr Stirling of Craigbar-  
 « net, Mr M'Farlane of Kirkton, and some other pro-  
 " prietors of land in the parishes of Kijisyth, Campsie,  
 « and Strathblane, along with Mr StirUng of Keir, Mr

» Stirling



« Stirling of Kenmure, and Colonel Hamilton of Bar-  
 « dowie, propose, on Monday the 25th June 1808, at  
 « the New Inn at Kilsyth, to adjudge the prizes which  
 M are afterwards to be distributed to the proprietors of  
 (t *the Jeur finest bulls* that shall cover during the ensu-  
 " ing season, within the above mentioned parishes,  
 " and on the estates of Caddor, Kenmure, and Bar-  
 " dowie ; and to the proprietors of *the Jour fine\* cows*  
 " that can be shown from that district, the following  
 • premiums: viz.

« *Bulls.*

|                                |   |   |           |
|--------------------------------|---|---|-----------|
| « For the finest and best bull | — | — | L. 3 15 0 |
| %i For the second              | — | — | 10 10 0   |
| " For the third                | — | — | G 6 0     |
| " For the fourth               | — | — | 4 1 0     |

*Cows.*

|  |   |   |          |
|--|---|---|----------|
| « For the finest and best cow that can be<br>* < shown | — | — | L. 4 4 0 |
| ^£ For the second                                      | — | — | 3 3 0    |
| " For the third  | — | — | 2 2 0    |
| « For the fourth                                       | — | — | 1 J 0    |

By the proper emulation which is excited by this  
 competition, the breed of **cattle** in this district has, as  
 might have been expected, received, within these very  
 few years, a very perceptible amelioration. Mr Archi-  
 bald Edmonstone of **Strathblane** parish, to whom the  
 Reporter has already acknowledged his obligations for  
 valuable **information**, has now a bull from **Ayrshire**,  
 which, in the Kilsyth competition, obtained the first  
 prize



prize for the first year. This bull, being shewn afterwards at Glasgow, against a bull which had obtained the first prize in a Lanarkshire competition, on a bet of 10 guineas to 0«\*,^-^carried it. This same bull has now raised a remarkably fine stock in the neighbourhood. It is proper to add that Mr Edmonstone, in order still further to improve the breed' of cattle on his farm and in his neighbourhood, has been in the practice, for several years past, of buying in annually a parcel of queys of one year old from Ayrshire.

Similar premiums for improving the breed of cattle by the introduction of Ayrshire bulls are given by the Gargunnoch club,—of which institution an account will be afterwards offered. The premiums are:

|                   |     |   |      |   |   |
|-------------------|-----|---|------|---|---|
| For the best bull | —   | — | L. 8 | 8 | 0 |
| For the second    | —>• | — | 5    | 5 | 0 |
| For the third     | —   | — | 3*   | 3 | 0 |

It is a condition required in this competition, that the bulls shall be kept within the bounds of the club, till the month of August next ensuing after the prizes have been gained.

With regard to the *form* and *constitution* of the best kinds of cattle, the Reporter does not feel himself qualified to speak. Experience, and long habits of observation suggest, at a single glance, the forms most proper for the purposes of the dairy or of fattening •, and it is wonderful how quickly bur drovers and cattle-dealers can distinguish by the' eye the nativity, the breed, the age, and the uses of the different varieties of cattle. On this subject the valuable information contained

contained in Dr Coventry's pamphlet on *Live Stock* is earnestly recommended to the attention of dealers in cattle. The Ayrshire breed, which is so generally esteemed, is for the most part of a dappled colour, the mixture being a brown, or red, with white.

FOOD.—*In winter* milch cows are generally fed in this county with hay or oat straw, together with two feeds every day of boiled chaff,—turnips, potatoes, or cabbages: where the refuse of distilleries can be obtained, it is used with advantage.

With regard to the cattle that lie out of doors through the season, and which are here called *tmnten rs*, they are chiefly of the highland breed, bought in at the end of autumn, and fed during the winter for the May and June markets, when they are sold for fattening on the rich pastures of England, or in the feeding districts of **Scftland**. The *wintering* of cattle is principally practised in the western parts of this county \ in Buchanan, Drymen, Fintry, Strathblane, Campsie, Kilsyth, and the higher grounds of St Ninians. Situations which afford the shelter of woods, or of deep ravines and vallies, are the most favourable. Until the rigours of winter set in, which is for the most part from the 10th to the 25th of December, the cattle are left to provide for themselves, by what they can pick up in the fields, or what is here termed *thejbggage*. After that period they are fed every evening and morning with straw, or with bog hay, scattered about in proper proportions by the *h?M*. It is remarked that the coarsest natural grasses afford the heartiest bite to winterers. The *juncus articulatus*, or spret, which grows.

in vast abundance on the Fintry and Campsie Fells, is, as was formerly noticed, made into hay, and much used for this purpose.

The return produced by the wintering of cattle varies, according to the state of markets, from one to two pounds Sterling per head.

Much cattle is also fed for the butcher in straw-yards, and stalls, and sheds, and at distilleries, during the winter. Their principal food is turnips and potatoes, with the occasional addition of straw and hay. In feeding for the butcher, it is of great importance to keep the cattle warm and well Uttered, and to expose them to the least possible exertion and fatigue ; and it is probably upon this principle of not disturbing their repose, that it is recommended to keep cattle that are in the course of fattening in the dark.

It is hoped that it may not be deemed impertinent to the subject to notice in this place, that during the suppression of the distillation from grain, the want of the regular supply of fresh animal food which had been formerly afforded by the distilleries was severely felt in the eastern district of this county, not merely with respect to the *quality*, but chiefly with respect to the *quantity* of butcher meat that was exhibited during the winter months in the markets of Falkirk and Stirling. In the years 1809 and 1810, on account of the small supply which these markets afforded, a greater quantity of beef was salted for winter store in that neighbourhood than had been done for many years before. Thus, if a famine in grain was by that measure prevented, a proportional deficiency in animal food was, at the same time, occasioned; and it came

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to be a question, whether a scanty supply of barley cakes, or of the more nutritive aliment of beef and mutton, and pork, which is most severely felt by the hard labouring peasant.

*In summer*, cattle that are intended for the shambles\* lie out day and night in the rich feeding grounds of this county. Milch cows are generally kept within doors, not only during the night, but also during the heat of the day\* in summer. They are fed in the house with cut clover, tares, or the outer leaves of cabbages and colewort. In some places a more improved method of managing milch cows is adopted. They are allowed to lie in the fields the whole night, and kept within doors, where they are fed by soiling, during the heat of the day. By this method, they enjoy the cool and free air, and have an opportunity of pasturing in the morning as soon as it is light, whilst they are 'freed, through the day, from the excessive heats, and from the annoyance of insects.

*Salt* is little employed in this district in feeding cattle, though it is certain that its use would prove of great advantage. We observe that saline substances are eagerly sought after by cows; they will greedily devour the refuse of straw left by horses, which has been trodden under their feet, and drenched with their urine. There seems to be something in the state of their stomachs that requires the stimulus of the volatile alkali contained in this refuse.

*Worked Oxen compared with Horses.*

As no instance of working by oxen has fallen under the Reporter's observation in this County, it appears altogether unnecessary to enlarge upon the subject.

Much has been said and written on the comparative use of horses and oxen in husbandry. Horses, it is argued, perform their work more expeditiously than oxen; they require shorter intervals of rest than oxen, which must have a long time allowed them to ruminate their food before they are put to work again; and the hoofs of horses admit of a more effectual defence against the flinty hardness of our improved roads than those of oxen.

On the other hand, horses are very high priced compared with oxen; they arrive at their most perfect state at the age of five years; from that period they decline every year in value; and in the end, they are worth only the price of the hide: add to all this, that the expence of feeding a horse through the year is near four times as much as that of feeding an ox.

\*With regard to the ox, he performs his work slowly; but the Reporter has met with a newspaper account of the work performed by oxen, which deserves to be recorded. It is stated, " That at a ploughing-match " which took place at Pet worth in Sussex, the plough- " man finished an acre with two oxen, without a driv- " er, in five hours and 56 minutes; the furrows being " from five to seven inches deep \*." The ox is fit for labour

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\* Sun of London, 30th Nov. 1707.

labour at two years of age.; and, at five years, he is of more value than when he was first yoked ; he may be wrought with advantage from the age of four to that of ten years ; but the principal advantage is, that during the whole period of working, his size increases by proper feeding, and his final value in beef and tallow is as great as if he had never been wrought.

In point of theory, then, every argument seems to be in favour of the use of the ox in husbandry. *in* point of practice, the very reverse appears to have taken place. About half a century ago, the use of oxen prevailed much in Stirlingshire; that it is **now entirely** laid aside seems evidently to imply some fallacy in the theory : and practice, upon so extensive a scale, **must** be allowed to rest, at least upon<sup>1</sup> a **plausible** foundation. The probable reason of the practice is,- that a certain number of horses being found indispensable on every farm, for the purposes of travelling, and other operations for which oxen are unfit, it has been found too expensive to maintain the double establishment of horses and oxen.

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SECT. II.—SHEEP.

A VERY large portion of the lands of Stirlingshire is occupied, as has been stated \*, in pasturing sheep.

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In this section, the Reporter does not pretend to offer a complete detail of the economy of sheep farming in this county. He must satisfy himself with giving some miscellaneous information which he has obtained from the most authentic sources.

The breed that is almost universally used is the *black-faced* or muir breed, also called the Linton breed. An enterprising farmer of Mr. Johnstone's of Alva, from Roxburghshire, whose lease had been lately renewed, in 1869 introduced the Cheviot breed, the wool of which is of a very superior quality; he entertains great hopes of success in the fine sheep walks of the Ochills; but the experiment is too recent to warrant, as yet, any certain conclusion.

Mr Edmonstone of Spittal, in Strathblane parish, states, « That some time ago he made a trial of Cheviot and Spanish ewes, which he kept on his farm for several years; but he found that they did not pay so well as the black faced; their wool was, no doubt, twice the value of that of the common breed ; but they had not so much of it by a third. Two of the black-faced lambs were as good as three of the Cheviot; and in a severe winter, or bad lambing season, there was a double loss of the latter; that, in short, he gave them up, convinced that the black-faced kind is better fitted for the soil and

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" climate, being both better breeders and better feeders than the Cheviot."

With regard to the *food* of sheep in this county almost no instance occurs where they receive any by the hand. In summer they feed up to the very summit of our highest mountains: when the rigours of winter

winter set in, they are brought down to the low-grounds, the pasture of which had been saved through the autumn for their use.

Sheep are not folded through the night, for many years past. In the vicinity of the farmer's dwelling there is a *pm*, he're called *&fank*, erected, of stone and turf, in which the sheep are enclosed only at the four great *gatherings* which take place in the year, and of which mention will afterwards be made.

The Reporter offers the following miscellaneous observations on the economy of a sheep farm, upon the authority of an extensive occupant of sheep pastures in the western district of this county \*.

The stock of a sheep farm may consist *oCewa* only, or of *wed lens*; or, partly of the one and partly of the other.

### ,1. Of an Ewe Stock.

Suppose the stock to consist of 1000 ewes, to every 50 ewes one ram is necessary. The number of lambs produced by such a stock varies from 700 to 900. To keep up this stock, 200 of the best lambs must be added to it annually, and 10 of the best tup lambs to supply the place of 10 of the worst tups or rams, which are to be sold off\* when four years old.

The remainder of the lambs, together with 100 old ewes, are to be sold off to make up the rent. The ewes

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\* Mr Duncan Graham, Brachorn-more.



are sold to the butcher between the age of three and **r**ven years. None are kept beyond this last age.

The greater proportion of lambs annually kept above that of ewes sold, is necessary in order to supply losses sustained by diseases and other casualties. These lambs are not allowed to approach the tup till they are 18 months old-

The rent of a sheep being estimated in this district at As. the rent of a farm that maintains a stock of 1000 ewes will be L.200. It is evident that no rent should be added in this estimate for the 210 lambs annually added, till they are at least a year and a half old, as they produce nothing till that period.

In favourable situations, that is» in sheep pastures which are not very mountainous and rocky, and where a large space of ground can be taken in at once by the eye, one shepherd is able to manage 1000 sheep ; in unfavourable situations, he cannot manage above one half of that number.

» It is necessary to collect the whole flock at the *pen* *fank at least* four times in the year, for the following purposes ; viz. first, to cut the lambs where a wether stock is kept ^ this is generally done early in June. 2 To clip or shear the wool, early in July 3. To take the lambs off from the sheep in order to wean them, which is done about the 20th of August. 4. To pick out the old ewes that are to be sold about Martinmas.

In order that the lambs may drop at a suitable season of the year and of the weather, the tups are separated from the ewes about the 11th of October and kept in inclosures in the low grounds constructed for that purpose. They are admitted to the ewes about

the 26th of November., The ewe goes with lamb 21 weeks.

It was, till of late, the almost universal practice to *lay* or *smear* the whole stock with an ointment composed of butter and tar; this was done in the end of October and beginning of November. This served several important purposes: it preserved the wool upon the body, it prevented vermin, and it afforded protection against the severities of the ensuing winter.

Every farmer would wish to continue this practice of smearing his whole stock; but the price of tar has lately become so high, on account of the interruption of our trade with the northern states, that the expence cannot be encountered on a large scale. Smearing is now seldom used except for the year old lambs, or *hogs* as they are called, and for the tups. The older part of the stock are generally *washed* with tobacco juice, so which that of broom is sometimes added. This is found equally effectual with smearing, for the purpose of destroying vermin, but not for defending the animal from cold. Tobacco juice is also found to be the most effectual cure for the scab in sheep. This washing is performed in December. The expence of *smearing* with butter and tar in IS 10 was (id. per sheep; that of *washing* with tobacco juice 2d.

- The wool of sheep that have undergone the operation of *smearing* is called *dun* wool, in opposition to that of sheep which have not been smeared, which is called *white* wool. The *dun* wool generally sells Ss. or 2s. below the white. It requires much purification, but is equally valuable with the white for all kinds of cloth that is to be dyed. In IS 10 **white** wool sold at

1 Is. per stone, and dun wool at 9s. Seven fleeces of the former generally make a stone, and four or five of the latter.

## 2. *Of a Wedder Stocky*

Wedder mutton is much more esteemed than ewe \ it is well known that all animals designed for the food of man are improved in the delicacy and fla\ our of their fle^h by castration. Wedder mutton brings from a penny to twopence per ppund more in the market than cue mutton.

A wedder stock is kept on many sheep farms of this county. If it is kept on the same farm with an ewe stock, they must be kept completely separated from one another, for various reasons ; but chiclly because the wedders, being the strongest, agitate and toss about the ewes when feeble and **heavy with** lamb, so as to do them much injury. Besides, the wedder stock being intended for the market, in. order to fatten them properly, they must be placed vpon the richest pasture that the farm affords.

As the stock of a sheep farm generally consists partly of ewes, and **partly** of v edders, let us suppose a farm capable of maintaining 2000 sheep, and that the wedder stock constitutes one **half**, tight hundred lambs, at an average; as already stated, are annually produced. One half of these are generally males. All of these are cut in the beginning of June, and added tp the wedder stock ; few of them die under the operation. It is remarked, however, that more of the wedder lambs than  
of

, of the ewes are carried off by the disease called the *braxy*, of which notice will afterwards be taken. From this circumstance, though 400 are annually added to the wedder stock, the farm can send only about 300 widders to the market. On the highland pastures, it is observed that a i widder gets worse after the age of three years. They are accordingly disposed of to the butcher at that age.

Some farmers of this district do not rear widders of their own stock. They buy them in at the age of *two* years, and sell them off at that of *three*. On such a plan there can be very little loss. The only inconvenience is the difficulty of keeping them on the farm at that age. They are continually attempting to go off to their native soil.



It only remains to add a few observations with regard to the *distempers* to which sheep are liable.

1. The first and the most formidable of these is the disease here denominated the *braxy*. It chiefly attacks lambs and young sheep. Very few die of this disease after the age of 18 months. It is remarked that the fattest and best conditioned of the flock are those which are most generally carried off by it. It is reckoned, that on some farms, four lambs out of twenty die of this disease. There have been instances where the one half of the whole has perished by it.

Of

Of the cause and nature of this disease, the Reporter has never met with an account that fully satisfied him. It **makes** its appearance on some farms earlier in the winter than on others, according to circumstances. On wet, spouty pastures, it commences <sup>^</sup>Tom the first setting in of winter. On dry, elevated foils, it sometimes does not appear till about new year's day ; and as the winter • advances, it again gradually disappears. The progress of the disease is extremely rapid. Its attack begins through the course of the night, and the animal 13 generally found dead or **expiring** in the morning. It seldom survives till the middle of the day. The whole body is found bloated and swelled; the bladder burst, and the urine diffused through the intestines. The flesh becomes black) and the whole carcase foetid.

Were it permitted to offer a conjecture **with** regard to the cause of this ruinous disease, it might be suggested that it is probably c>ccasioned by tl sudden interruption of the perspiration. Its attacks commence for the most- part in the early part of the winter, when the days are yet of considerable length, and the sun for a long while above the horizon. The animal, not yet braced against the colda of winter, had been basking through the day in the sun, and perhaps heated with exercise; it lies down at night in this condition on the damp ground: before day it becomes benumbed by the ho..r frosts; perspiration is suspended; the valves of the urinary duct are paralyzed j the bladder bursts, and the creature dies.

This view of the subject was originally suggested t,, the Reporter by a practice which has been observed for many years by Malcolm Maciuiime, who has long occupied  
cupied

occupied a considerable sheep-farm on the estate of Duchray, the property of General Graham Stirling. It is this; every morning, a considerable time before day-light, during the early part of the winter, (the period when the braxy prevails) he, or some of his people, visit the flock on that spot where they are resting; he rouses them from their sleep, and agitates and drives them about for a long time with his dogs. By this process, the animal heat is again excited, the perspiration restored, and the tone of the urinary passages renewed. It is certain that on this farm the depredations of the braxy are very inconsiderable or even scarcely known. The suggestion, of this practice will surely be allowed to merit the serious consideration of sheep farmers; and should it be found as effectual in other situations as on this farm, Malcolm Macfarlane will merit the gratitude of his country.

There is a **distemper** called the *fly* in sheep, which has been known in this country only within these very few years but which has, of late, become very general. It appears to be occasioned by the deposition of the eggs of some species of fly (probably not indigenous to Scotland) under the scarf skin of the animal; these soon become maggots, and devour the flesh miserably, occasioning a loathsome ulcer, which enlarges rapidly, and if not cured, kills the creature in the space of six days. It is said that this distemper has prevailed in England for about ten years. In tracing its progress, it appears to have travelled, and to be still travelling northwards, from one district after another, in that direction. It was observed in the very western extremity of the county for the first time only

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in 1808. It is as yet unknown in Lochaber, and in the north ; but it seems to be advancing with rapid strides.

The principal cure which has hitherto been applied with any effect, is to cut off the wool carefully about the ulcer, and to anoint it with tar. This application must be made at an early period of the disease.

### SECT. III.—HORSES.

ON the subject of horses nothing occurs peculiar to Stirlingshire. Very few horses are bred within the bounds of the county. Riding and carriage horses are generally procured at high prices from England; draught horses chiefly from the counties of Lanark and Ayr. The price of work horses varies extremely \ they cost from L.13 to L.45. Two horses are reckoned sufficient to labour a farm of 35 acres arable. A good horse will draw from 15 to 20 hundred weight, and scivietimes more.

With regard to the food of work horses, no accurate estimate can be offered, as the farmer generally maintains them through the winter on straw and the offals of his grain; in the spring, on hay, with oats or beans, in the time of working ; and in summer on cut clover. In the corses the horses feed much through the winter on bean straw, which is reckoned much heartier than the straw of oats or barley.

Potatoes, either raw or steamed, have of late years been much used in feeding horses ; and perhaps it is  
one

one of the most important improvements that could be adopted in this respect. A horse will eat as many potatoes as will maintain him in good condition, in one-tenth part of the time that he will eat as much hay as will be necessary for that purpose; he will therefore be sooner ready for returning to his work. The succulence of this food will preserve his body open, and keep his skin and hair sleek. With the potatoes, he must have a certain proportion of oats and hay to prevent flatulency.

All grain given to horses should be previously broken or bruised between rollers, by which much waste will be prevented; and if the grain were malted before it is given to them, a great advantage would arise from the superior degree of nutrition afforded by the saccharine matter. In this view it may be added, that, did the relative prices of barley and of oats allow it, the former would furnish a more nutritive food for horses than the latter, as containing much more farinaceous matter. Carrots have also been lately introduced with great advantage as a food for horses.

SECT. IV. & V. —ASSES AND MULES.

Of the uses of these animals in agriculture, the Reporter has met with no instance in Stirlingshire.



## SECT. VI.—HOGS.

THE introduction of swine into this district is of recent date, and is not as yet universal. The people in general, and highlanders in **particular**, have an aversion founded on very ancient prejudices, against the flesh of swine. This prejudice, however, is rapidly wearing out. Though swine are not reared upon a large scale, yet for some years past almost every family, and even those of cottagers, feed a sow or two for their own use. It was only at the distilleries, previous to the suspension of the use of grain, that swine were fed to any considerable extent.

The breed which is most generally esteemed is the Chinese, which was imported directly from China by some public-spirited gentlemen connected with this county, and commanding East India ships. The **advantages** of this breed are stated to be, that they are easily fed, that they produce the best sucking pigs, and pork and bacon of the finest quality and flavour. At the distilleries, the large Hampshire breed was chiefly used. A cross breed betwixt this and the Chinese is held in **great** repute.

Swine feed on all kinds of vegetable offals. Calf clover is sufficient to maintain them through the summer, with the addition of what whey and butter-milk can be spared. Potatoes, especially, form an acceptable

and

and nutritive food. When they are to be fattened for the butcher, after they have been fed for six or eight weeks on potatoes, it is necessary, in order to render their flesh firm and fit for salting, to feed them partly with oats or beans well dried, and it would be of great advantage to give them bruised or broken. Swine, when killed, are almost never skinned, but have the hair taken off by scalding with boiling water. In this practice there is evidently much loss. The skin of a well grown sow brings a high price, and is valuable for many purposes, particularly for saddlery. Why should it not be taken off as from other animals slaughtered for food? The pork or bacon would not suffer by it.

The only distemper of swine which has fallen under the Reporter's observation is the fly, similar in its progress and effects to that which has been described as affecting sheep. It is to be cured in the same manner by anointing with tar.

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SECT. VI.—DEER AND GOATS.

THE Reporter hopes that he will be forgiven for substituting a few remarks on *deer* and *goats*, (some of which species of live stock still exist in this county) in the place of those which he is called upon by *the plan of the Board*, to offer on the subject of *rabbits*, none  
of

of which have fallen under his observation in Stirlingshire

1. DEER.—The island of Inchmurrin, in Lochlomond, the property of his Grace the Duke of Montrose, extending about two miles in length by one in breadth, finely wooded, and affording excellent pasture, has been for more than a century past well stocked with fallow-deer. The stock of deer of all ages upon this delightful island, amounts to about 240, and furnishes venison distinguished by its admirable flavour. On the island there is a neat hunting seat and offices, built by the Duke in 1793, where his game-keeper is situated with his family. Every attention is paid to supply the deer with hay for their winter feeding. The climate is mild, from the little elevation of the lake above the level of the sea, and the woods afford shelter from every blast that blows. The stock is, on these accounts, in a very thriving condition.

2. GOATS abounded within less than half a century, on Benlomond, and in the upper parts of Buchanan. A considerable portion of the rents was paid, at that period, in kids, and in goat-milk cheese. The flesh of the kid is delicate, savouring somewhat like venison. Goat-milk cheese, which could be obtained in this quarter within these 20 years, is particularly fine flavoured; it resembles Parmesan. It is within the memory of the Reporter when the flock of goats was regularly brought to the pen every evening and milked for a certain period during the summer. Goat-milk and goat-milk whey, were in those days esteemed a cure for many disorders

disorders of the constitution ; and it was as common for ailing people to repair to goat-whey quarters in the highlands, as it is at present to go to sea bathing.

The goat is a picturesque animal: its tapering horns, its flowing beard, and the agility of its gait appear striking to a strange/. Its bad qualities, however, preponderate. It is > less useful than the sheep in many respects. It is particularly injurious to oak coppice woods, which are at present of such value: it crops the tender shoots, and peels off the bark. The proprietor of oak coppice, therefore, permits no goats to be kept upon his estate. They are now almost entirely exterminated in this district. In the barony of Duchray, in Drymen parish, about 40 goats may still be found. A few stragglers yet remain, in a wild state, upon the out skirts of Benlomond. In the parish of Logie, on the rugged precipices of the Ochills, where no oak woods occur, some goats are still to be met with and thither some invalids still resort for the use of goat\* milk and goat-milk whey.



#### SECTION VIII.—POULTRY.

POULTRY of various kinds are bred in considerable numbers in this county. On many estates, as has been noticed already, kain fpwls are paid in part of rent\* \* most pernicious burden to the tenant, and little profitable to the landlord. The former often prefers buy-

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ing the fowls in the market to the rearing of them on his farm . and the latter receives the poorest and leanest fowls that can be had.

Cottagers rear dunghill fowls to bring them and their eggs to market. Carriers and small dealers abound in every district, who are ready to pick them up, and to dispose of them in the adjacent towns and villages.

Turkies, geese, and ducks, are also reared, principally about gwitlemens\* seats, and on large farms. In rearing all these kinds of poultry, there is more of family accommodation than of real profit.

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#### SECTION IX\_\_PICEOMS.

PIGEONS, being extremely voracious, have, from a very early period, been considered as a nuisance to the farmer in Scotland and certain laws have been passed to restrict the multiplication of them. By an act 1617, ch. 19. proprietors are discharged from building dove cotes, unless their yearly rent, lying within two miles thereof, extend to ten chalcters of victual. A purchaser of lands, with a dove cote, is not obliged to pull it down, though he should not be qualified to build one in the terms of the act; but if it becomes ruinous, he cannot rebuild it\*.

Pigeons

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\* Erskine's Principles of the Law of Scotland, b. ii. tit. 6.

Pigeons are particularly destructive during the seed time; and, in the harvest, after the corns are reaped, and put up in shocks. They do little injury while the corns are standing.

It has been suggested that the pigeons of the carse of Stirlingshire are of a larger size than in other districts, probably from the idea of the superior quality and quantity of their food. The Reporter, after the most minute enquiry, has not found that there is any difference



#### SECTION X.—BEES.

BEES are bred in Stirlingshire, but not on a considerable scale. The western district of the county, where heath and wild flowers abound, seems the most proper for them. They are chiefly bred by cottagers, and small occupants. The minute attention which they require, especially about the period of swarming, is incompatible with the labours of the farmer. The profit arising from bees is very precarious, and depends much upon the state of the seasons. A district may be overstocked with bees, as well as with any other species of live stock. They derive their wax from *the farina*, and their honey from the *nectaria* of flowers: if there is an insufficiency of these, the bees must perish. A restriction on the number of hives to be maintained in every district would seem highly reasonable.

## CHAPTER XV;

### RURAL ECONOMY

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#### SECTION J.—LABOUR.

THE *labour* of a farm is performed either by servants hired by the year, or half year, or by labourers hired by the day. Under this last class may be included mechanics occasionally employed about a farm, and persons who labour by piece work\*

1. *Hired servants*\*—Men and women servants are generally hired *by* the year: this is the interest of the farmer, as it must prove *very* inconvenient for him to make frequent changes in the hands which he employs. Servants, on the other hand, feeling a spirit of independence from the increasing demand for their labour, and the high wages they receive, and, at the same time, anxious to abridge the period of their bondage, prefer, for the most part, an engagement for the half year. The periods of service are generally from old  
Martinmas

from Martinmas to old Whitsunday; and from old Whitsunday to old Martinmas,

There is little variation in the wages of servants during the winter and summer half years: there is sometimes, however, an advance during the latter period.

In 1810, in the Kilsyth district, the wages were as follows by the year:

A married man servant, L.34 with a house.

Unmarried do. from L.25 to L.28, with bed, board, and washing.

Women: servants, from L.6 to L.10, with bed, board, and washing.

Through the eastern district of the county the same rate of wages obtains.

On the northern side of the Lennox-hills, and to the westward of Stirling, the rate of wages is as follows:

A ploughman, living in the family, from L.18 to L.24 a year.

A woman servant from L.6 to L.9.

On the sheep farms, in the highland district of this country, a good shepherd, living in the family, receives L.20 a year. A married shepherd, living out of the family (as is most generally the case) has a house, two cows grass, with liberty to rear a quey till it is two years old, grass for forty ewes, potatoe ground, and six bolls and a half of oat meal.



A distinction has been made, in this account, between married and unmarried men servants; the former being, in many situations, particularly in pasturing districts, preferred to the latter. The married manservant, accommodated with a house and garden, and a cow's grass, becomes attached to the spot, and disposed to be stationary; much trouble is also saved to his master's family in respect of his accommodation and maintenance, he will be contented in his own house with such cheer as he would spurn at in his master's kitchen. On the other hand, it may be argued that a married servant may be tempted to neglect his master's interest in order to attend to his own;—if he is dishonest, he has many opportunities of defrauding his master. An instance occurred lately to the Reporter of a shepherd who took especial care, every day, to place *his own forty ewes* on the best pasture of the mountain, whilst he left his master's sheep to shift for themselves on inferior grass.

Many young men and women of this county decline to engage themselves at the Whitsunday term, in the prospect of earning equal wages, with more liberty, by occasional work, and especially by a *harvest fee*. In the western parts of the county many persons of both sexes find employment, during the early part of the summer, in the oak coppice woods, which are annually cut down. There they either take a small lot, each for themselves, to be cut down and peeled, or they engage with those who occupy a lot of wood by day's wages; the occupiers of lots are paid by the bolls of bark which they produce; for a boll of bark, the person who cuts and peels receives from 2s. to 4s. By  
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the month of August\* these young people are ready to engage for harvest work; and their wages vary every year according to the urgency of the season, or the expected price of victual. Men receive for harvest work from L.2 to L.4 ; women from L.1. 10s. to L.3. Their engagement is either for a certain number of weeks, or until the whole crop is cut down, whenever that may be.

2. *Labourers.*—*"Day labourers receive in summer,*  
 \V ith victuals, from Is. 6d. to 2s. per day.  
 'V\* khout victuals,—————2 6  
 In winter, with victuals,—————1 0 to 1 6  
 Masons and wrights receive  
 With victuals,—————2 0 to 2 6  
 Without victuals — 3 0 to 3 \*\*

With regard to the hours of work, they are not rigidly attended to by servants in the upper districts of the county, or in situations remote from towns' and villages. Servants work there from six o'clock A. M. during the whole season till it is dusk. The women servants, after having wrought in the field, during tht day, perform the necessary work of the house and byre in the evening.

In the eastern districts, and every where in the neighbourhood of towns and manufacturing establish\* ments, men-servants work only from six o'clock A M. to six o'clock P M\ with an hour for breakfast, and an hour for dinner.

The price of labour\* and the wages of servants have advanced of late years in an enormous proportion.

**I**The *present* rates are stated above. It would be an easy matter to state, from the Statistical Account of Scotland, the progressive advance of the price of labour in this county till the present period.

Without swelling this Report by a detail which can be easily obtained, let it suffice to say that, in 1794\*, the price of labour was nearly as follows:

|   |              |
|---|--------------|
| A man servant, living in the family, by the year, |              |
| from  | L.10 to L.12 |
| A woman servant                                   | 1*4          |
| A day labourer in summer, with victuals           | 1s,          |

About 40 years before the above period the <sup>ages</sup> were,

|                              |                      |
|------------------------------|----------------------|
| A "iw" servant, by the year  | L.2 0 0              |
| A woman servant, by do. from | 0 15s. 0 to 16s. 8d. |

*Baunties*, as they were called, were then given, consisting of clothes, wool, or flax.

Before the year 1760, tailors and day labourers had 4d. per day with victuals.

In 1783, they received 6d. per day, with victuals.  
— 1793, — 10d. with victuals.

About 1760, carpenters and masons had 6d. per day, with victuals.

In 1793 — — — Is. 2cL\*

In 1810, as has been stated, from 2s. 6d. to 3s.

Smiths

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\* Stat. Account, vl. xviii. P. 120 and 3\*2.

Smiths do their work, in almost every instance, by the piece.

In former times, tailors and shoemakers went about and performed their work in the families of their employers. They now, almost universally, remain at home, and do their work by the piece.

The late great advance of the price of labour is evidently to be attributed to the rapid depreciation of money, and to the removal of so many of our young men from the country for the supply of the army and navy. Women are now, upon this account, pretty generally employed to perform out-work, in which men only were formerly engaged. There are few operations of husbandry in which women are not employed at present, excepting those of ploughing and threshing. But even the wages of women have, chiefly upon this account, advanced in a high degree; and if to this we add the abstraction of female labour, by the numerous manufactures with which this county abounds, the cause of the rise of their wages may be easily traced.

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SECT. II.—PRICE OF PROVISIONS.

THE ordinary breakfast of the peasantry, in this county, is porridge, made of oatmeal, well boiled, and stirred about in water till it has assumed the consistency of a pudding, this is eaten with skimmed milk, butter milk, or small beer. During the summer, the labourers,

labourers, besides breakfast, receive bread and milk, or bread and cheese, before going to work in the morning. In the western parts of the county, potatoes bruised or beaten into a pudding, with milk, form the breakfast as well as the supper of the peasantry from September to April or May. For dinner, broth, made of barley, or groats, with garden stuffs, and the addition of some animal food, or potatoe soup, as formerly described, are in common use. Sowens, or the jelly of oatmeal, as already described, is generally used for supper. In the beginning of winter, householders, according to their circumstances, lay in a store of salted beef, or mutton, or pork. Herrings, which, during the latter part of the season, are caught in abundance in the Firth, constitute an essential article of food. During the summer, little animal food is used in the families of the peasantry; milk then abounds, and is served up in various forms.

With regard to the present prices of provisions, reserving that of grain of every kind for the accompanying table of prices, it may be remarked that, though the price of animal food has nearly doubled within these twenty years, yet it varies but little from one end of the year to the other. That the price of animal food continues nearly the same through the winter and summer, is to be accounted for by the regular economy which is now so generally introduced in the article of feeding cattle. By stall feeding on turnips and potatoes in winter, and by feeding in grass parks, and by soiling in summer, the markets are regularly supplied at all seasons; and the prices of meat continue, in a great measure, stationary.

stationary. The only deviation from this regularity of price was occasioned by the late suppression of distillation from grain, by which one important source of supply was withdrawn for a time.

*Present Prices.*

Beef - - - from 8½d. to 9d. per lib.  
 Mutton, the same.  
 Lamb, in general, through the summer, from 6d. to 7d.  
 Veal, from 8d. to 10d. according to the season.

The above articles are sold by Tron weight, the pound consisting of 22 oz. Troy.

Pork, about 7d. per lib. pf 17½ oz. Troy.

|                               |   |   |   | \$• | d. |
|-------------------------------|---|---|---|-----|----|
| A pair of dunghill fowls      | - | - |   | 7   | 6  |
| A turkey                      | - | - | - | 7   | 0  |
| A goose                       | - | - | - | 5   | 0  |
| A pair of ducks               | - | . | - | 3   | 6  |
| A pair of pigeons             | - | - | - | 0   | 10 |
| Eggs per dozen, from 9d. to   | - |   | - | 0   | 10 |
| Butter per lib.               | - | - | - |     | 15 |
| Common cheese, 6s. per stone. |   |   |   |     |    |

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SECTION III.—FUEL.

THE extensile peat mosses of this county supply abundance of peat or turf for fuel; and peats are in, very

very general use, especially in the western district, from which coal lies at a great distance. The time and labour employed in digging and in preparing peats, however, is very great; and when it is considered, that the season of digging them, which is the month of May, and the beginning of June, interferes materially with some of the most important operations of the farm, it comes to be a doubtful point whether coal will not be found the cheapest fuel, upon the whole, even in the most distant parts of the county.

In the eastern and southern parts of Stirlingshire coals abound; and some account having been given, in **the** first chapter, of this valuable mineral, it does not appear necessary to resume the subject. Coals cost from 8s. to 10s. per ton. Where oak coppice is annually cut, **the** refuse of the wood is sold for fuel, and furnishes a strong and cheerful fire.

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## CHAPTER XVI.

### POLITICAL ECONOMY, CIRCUMSTANCES DEPENDENT ON LEGISLATIVE AUTHORITY.



#### SECT. 1.—ROADS.

GOOD roads constitute the foundation of all national improvements, whether in manufactures or in agriculture. \* In Stirlingshire, the attention which is due to this subject has been paid only of a late date. About sixty years ago, any gentleman, setting out from the western district of this county for Edinburgh, considered it necessary to make his will, and to settle his worldly affairs, previously to his undertaking so hazardous a peregrination. It is little more than twenty years since! turnpike roads have been introduced upon a general scale and the cross or country roads were, till about that period, as many of them still are, in a very wretched condition.



For the sake of distinctness, the roads of Stirlingshire may be subdivided into turnpike, country roads, and farm ways.

### 1. *Turnpike,*

When it is considered that no traveller, or owner of heavy carriages, who is duly sensible of the difference, in point of comfort, or of the tear and wear of horse furniture, upon a smooth firm road, compared with that on a broken and rugged road, can possibly grudge the payment of a moderate toll, it may appear wonderful how slowly turnpike roads have found an introduction into this county. One cause, indeed, may be easily assigned why they have not been introduced in particular situations; that is, the general inadequacy of the funds arising from the tolls to defray the expences of the interest of the money laid out originally, together with those of the necessary annual repairs. The price of labour, and the depreciation of money rapidly increasing, render it a matter of very serious consideration to introduce a new turnpike road in any district, in which there is not a certain prospect of an adequate revenue from increasing trade and intercourse.

The only resource which presents itself, and to which recourse must be soon had, if the convenience of good roads, so necessary to a commercial and manufacturing country, is to be maintained, is to increase the rate of the toll to be paid. In Stirlingshire, the almost universal rate for a single horse, at every toll-bar, is three halfpence, and so in proportion for more, a<sup>\*1</sup> every

every bar must be distant from the nearest adjacent bar six miles\*. There is an instance or two where, from particular circumstances, the rate is twopence. In **the** western district of the county, it was enacted, by **the** suggestion of a well meaning heritor, **that** persons travelling on Sunday should pay double toll. A clergyman, riding on a Sunday morning to assist at a neighbourihg communion, has some cause to complain of thh regulation. Upon the whole, the period seems not to be far distant when, in order to maintain the toads in a proper condition, the tolls in this county must be raised by at least one-third.

.Stirlingshire is now intersected in almost every direction by turnpike roads. It is reckoned, from actual observation, that there are, within the limits of this county, about one huridered and sixteen miles of turnpike road. In the annexed map, these are marked by a double line, with the exception of about *four* miles which escaped the attention of the delineator. The particulars are given with all the correctness that could be obtained belowf.

**the**

\* In u. few instances, in the Campsie and i<sup>l</sup> Kils; th district, the distance is iiu more Ut?m four mil'>.

|  | Miles. |
|--|--------|
| † Turnpike road—from: lite river Avon to < Siirlim | 17     |
| From Stirling to Kippen                            | 10;    |
| Kippen to Buchlyvie, (deduc-                       |        |
| ting 2 miles intervening in                        |        |
| Perthshire)  | 3      |

The materials for making roads, are in general, abundant, and of the best quality. In the Strathblane and Campsie district, whinstone is to be found every where\* In the neighbourhood of Stirling, trap, or an imperfect species of basalt, excellently calculated for forming roads, abounds. From Gargunnoch, westwards, to the junction of this country with Dunbartonshire, through a tract of about 15 miles, the materials are more unfavourable

|   | <i>Miles.</i> |
|---|---------------|
| To Catter Bridge near Drynugh   | 8             |
| Turnpike road in Stockic Muir, in Stirlingshire   | 6             |
| From the great Stirling road to <b>Killearn</b> , by Bullion                              | 5             |
| From Killearn to Strathblane - - -  | 6             |
| From Strathblane towards Glasgow, in Stirlingshire  | 6             |
| from Kippton to Campsie by Fintry - - -   | 13½           |
| From Campsie towards Glasgow to the limits of<br>the county •* - - -                      | 3             |
| From Stirling to the Glasgow road by Denny -  | 9½            |
| From Fulkirk road to the limits of the county<br>by the Glasgow road - - -                | 6½            |
| From the Glasgow road by Kilsyth to the limits<br>of the county - - -                     | 8             |
| Turnpike road west from Denny - - -   | 1             |
| To the north of the Bridge of Stirling, including<br>the road in the parish of Alva - - - | 9½            |

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1121

Add to the above 2 miles of turnpike road, leading from the Glasgow road across the Blance to Killearn, together with 2 miles from the

Bridge

•favourable, consisting "almost entirely of a reddish free stone of a soft texture, which soon moulders under pressure into dust or "clay.

With regard to the form of these turnpike roads, they are from 30 to 40 feet wide, independent of the drains on each side. They are *met ailed* ^ as it is called, with stones broken to a small size, in the middle, to a depth of 10 or 12 inches, gradually decreasing to 4 inches at the sides. The most advantageous form is evidently that degree of convexity which is just sufficient to allow the water to run fairly off; and this form is accordingly adopted here.

In former times, when heavy carriages were almost unknown, and when grain, and every other subject of commerce, was carried by back loads, little attention was paid to the direction of roads in this as well as in many other districts of Scotland j the neare^' iine was generally adopted, without much regard to the interference of hills and valh'es. Though nature and common sense point out the southern verge of the Carse as the proper line of the road through Stirlingshire, from the Avon on the east to Buchlyvie on ;lu-west, yet little regard has been had to this direction, which would have afforded a nearly compleat level for about thirty four miles. Local interests, and particular-

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Bridge of Blanc to tlu Strath Mane road, not  
marked in ilie map

Miles.

4

Total turnpike road in Stirlifl gshire,

116½

ly the accommodation of villages which occur in this,\* line, have drawn the roads over many very inconvenient heights. A line of road, however, has been planned in this direction from Polmont to Stirling -, a part of it has been formed, and a small part of it executed j a bridge, in the line of this road, has been thrown over the Carron, a little above Grangemouth> having a drawbridge of 30 feet wide over the middle arch, for the convenience of small craft passing up and down the river. This bridge has cost above L.4Q00. This road, so desirable for 'he accommodation of travellers and of heavy carriages, will, it is hoped, be soon carried\* on with increased funds and spirit

An instance of the successful direction of a turnpike road, in a situation naturally the most unfavourable), occurs in that which has been carried over a branch of Lei.urnc-hjlls which separates the vale of Campsie **from** that of Fintry. The height of the mountain is about 600 feet. The ascent from Campsie by the old road was one foot in seven. It was called **the** *Craw* (or *Crow*) *road*, probably from the idea that it was accessible only to winged animals. By judicious direction and management, it is now easily passable to carriages of every kind : the ascent, even in the most precipitous parts above the village of Campsie, does not exceed one foot in twenty. By this road, and that which leads from Ualfron by Strathbbne, (for which the public is indebted to Mr Speirs of Culcruich, and the late Mr Duninore of Bandalloch.) a district of this county, formerly almost inaccessible, is now opened up to social intercourse, and to the extensive manufactures carried on, upon the banks of the Eudric,

## 2. *Country Roads\**

By these are understood the cross roads of the county on which no toll is paid, and which are made and repaired by statute labour alone, or by its conversion into money. These country roads, reckoning from Rbwardennan on the west to the Avon on the east, and from the Kelvin on the south to the Forth on the north, may be estimated altogether at 117 miles. To these the whole statute labour of the county, or its conversion, is solely applied. Till the introduction of turnpike roads, (which is of recent date) *no* other provision existed in Scotland for making and repairing roads besides the statute of 1669, ch. 16. by which it is ordained, " That all tenants and cottars " shall be called out on the highways, with all their <sup>cc</sup> carts, sledges, shovels, pitches, mattocks, &c. to work <sup>cc</sup> *six days* of the year, between bear seed time and " harvest, for three years ; and *four days*, ever after- " wards " Heritors are by this act authorised to assess themselves to a certain extent, in proportion to their property, to be laid out in building and repairing bridges, &c.

The inconveniences arising from the requisition of the actual labour of the inhabitants of districts were early felt. On the one hand, it was felt as an intolerable grievance upon the tenants and their cottars to devote the required time to labour on the high roads, at a season of the year when so many other important

operations of agriculture urged; and, on the other, it was observed, that the persons who were called out upon these occasions exerted neither skill or industry in performing the reluctant task. It is in the memory of the Reporter, when all the inhabitants of a parish in this district employed the whole of the allotted time in repairing a few yards only of the worst of the road, occupying the *lucid* intervals of suspended labour in drinking whisky, furnished by themselves, or by the accidental liberality of travellers.

In 1778, an act of Parliament was passed converting the statute labour in Stirlingshire at the rate of 18s. Sterling, for every L.100 Scots of valuation, and that of 2s. Sterling for every cottager and householder.

This act having expired in 1805, the gentlemen of the county drew up the heads of a bill, to be presented to the Legislature, by which it was proposed to raise the conversion money on every L.100 Scots to L 1. 10s.; and that all cottagers and householders, not receiving aid from the parochial poor's funds, should pay 3s.

<sup>1</sup> When the depreciation of money, and the consequent advance of the price of labour are considered, it must be allowed, that the sum of 3s. is a far too moderate compensation for the labour of a man for six or even for four days in summer; and it will scarcely be credited that any opposition was given to so reasonable a proposition. Truth, however, compels the Reporter to state, that It was decidedly opposed by the Carron Company, who alleged, that the additional conversion money would bear hard upon their work people •, they laid claim to a long list of exemptions, td  
which

which the country gentlemen declined to submit, and withdrew their bill, after it had been for some time before a committee of the House of Commons. The company having at length relaxed somewhat in their claims of exemption, a new bill has been lately passed fixing the conversion as above: The Carron Company have still some privileges, however, such as that of carrying on their carts five cwt. more than is permitted to others\* without having wheels of a particular breadth.

### 3. *Farm Roads.* -

The country roads in the carse are in general very indifferent, on account of the softness of the bottom, and the great scarcity and distance of materials for repairing them. In the neighbourhood of the Carron works, especially, the condition of the roads beggars all description. The materials employed to repair them are chiefly the *scoriae* or danders of the furnaces, which soon crumble into dust, under the numerous and heavy carriages which lire every hour passing to and from **the** extensive establishment. It may be hoped that a proper sense, of **personal** interest and convenience will lead the enlightened proprietors of these works to cooperate cordially with the gentlemen of **the** district in introducing, good roads in this neighbourhood.



## SfcCT. II.—IKON RA;-LWATI&gt;.

RAILWAYS, which have been introduced upon a large scale in the adjacent county of Clackmannan, are, from some unaccountable circumstance, scarcely known in Stirlingshire. Though it is certain that the Carron Company, by establishing railways throughout the vicinity of their important works, would make an immense saving; whilst they could, at the same time, construct them at a much cheaper rate than others, they have hitherto done nothing in this way. The only instances of railways that fell under the Reporter's notice in this county, are those leading from Lord Dundas's coat-works to the shipping place at Carron sho?e, of which mention has been made already\*, and another, extending about a mile, from theBanton coal-work, in the parish of Kilsyth, to the Great Canal. The declivity of this last is very great; but a proper provision is made for retarding the motion in the descend. Six small waggons, containing altogether about four tons of coals, are connected with one another by chains; one horse draws the whole; and so nicely are the railway and the wheels adjusted to each other, that the same horse draw? back the empty waggons without .my difficulty. On the level railway on Lord Dundas's estate, one horse draws six tons; and it is presumed might draw two or three more.

Of

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\* P. 4<). to which ilit<sup>1</sup> reader is referred.

Of the great advantage of railways, and of dividing the load, by connecting several small waggons together, it seems to be unnecessary to speak here at great length. The subject is now pretty generally understood, and extensive lines of railway are proposed, and, it is hoped, will be executed in Scotland ; no where could they be more easily or 'cheaply executed, and no where can they prove more beneficial than in the level cargs of Stirlingshire, which abound so much in heavy articles of commerce, as well as in important and extensive manufactures.

A particular description of these railways belongs more properly to the report of the county of Clackmannan, where they were originally introduced, and where they are now carried to the greatest perfection. Suffice it to say, that they are formed by fixing down wooden sleepers of considerable breadth on the clay; a wooden rail of four inches square is then pinned down to the sleeper with oak pins ; and over that, another rail, of the same dimensions, is pinned down in the same manner, care being taken that this last always crosses or overlaps the joints of the lower rail. On the top of this uppermost rail is fixed a bar of malleable iron, of  $1\frac{1}{2}$  inch in breadth, and about five-eighths of an inch in thickness. To this rail, the wheels of the waggons which are used are carefully adjusted.

## SECT. III.—CANALS.

A SLIGHT attention to the circumstances of the isthmus of Scotland, formed by the near approach of the Firths of Forth and Clyde, and of which Stirlingshire forms so considerable a portion, must have suggested at an early period the possibility as well as the advantages of forming a junction between the Atlantic and the German Oceans. The idea of forming a canal to join the Forth and Clyde appears to have been entertained as far back as the reign of Charles II. But it was not till about forty years ago that any active step.\* were taken to carry it into execution.

' That extensive tract of country which stretches westwards from Stirling to Gartmore, in the course of which, for twenty miles, the whole rise above the level of the sea does not exceed eighteen feet, seems to have originally suggested the line of a canal in that direction. -From the neighbourhood of Buchlyvie, it was proposed to carry this canal through a valley of considerable elevation, by a farm called Bolatt, into Lochlomond, and to have the communication by the Clyde completed by rendering the river Leven navigable.

The Reporter recollects his having read, many years ago, a report of this line of canal by Messrs Goldborne and Watt, on which, however, h<sup>n</sup> cannot now lay his hands. The levels were'taken with all the accuracy

curacy that might be expected from gentlemen so eminent in science; and if a copy of the report can be obtained, a short account of that survey may form an acceptable article in the Appendix.

Mr Smeaton, too, under whose direction this great undertaking was at last commenced, surveyed this line; and he found the highest level at Bolatt to be 222 feet above that of the sea\*.

That line was accordingly abandoned, and the present line by Falkirk and Kilsyth, the highest level of which is only 141 feet, adopted, á till, however, it may be permitted to remark, that much advantage would arise to that whole district of country which stretches westward from Stirling to Gartmore and Buchlyvie, by carrying a canal of small dimensions as far as the level tract extends. It could be executed at a very inconsiderable expence; the ground, being either moss or clay, could be easily cut. Mr Smeaton, in his report of this line, remarks, " That two locks and " one dam would make an open navigation from Gart- " n\*ore at all seasons of the year. One lock ought " to be placed opposite Craigforth-mill; and the lock " and dam at the ford of Frew. This, with a little " clearance of the shoal at Cardross, would make a " navigable passage over the same." If such a canal, it may be added, the coal and lime of the lower parts of the county could be carried to the highlands, where they

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\* See Mr Smeaton's report in the Scots Magazine of 1777, p. 77-

they are so much wanted ; and the Oak bark, wood, slate, and wool of the highlands, could be returned to the low country!

The present line of the great canal was adopted not only upon account of the favourableness of the level, but chiefly upon that of the facilities which it afforded to the rapidly increasing commerce of Glasgow, and the other towns upon the Clyde.

This great national *work* was at length undertaken, under the sanction of an act of Parliament authorising the raising of a stock of 1500 shares of L.100 each; the whole sum amounting to L.150,000. On the 10th of July 1768, the work commenced at the eastern extremity, on the estate of Sir Laurence Dundas of Kerse, Bart, under his direction of Mr Smeaton ; and on the 28th of July 1790, the communication between the Firths of Forth and Clyde was finally accomplished under the direction of Mr Robert Whitworth, after a period of twenty two years and eighteen days.

The great canal has its course, within the bounds of this county, for about eleven miles. A little to the westward of Falkirk, it is carried by an aqueduct bridge of one arch over the public road to Edinburgh. The medium breadth of the canal is 56 feet at the surface, and 47 at the bottom-, the depth is such as to admit of vessels drawing eight feet of water. The length of the locks between the gates is 74 feet, and the width is 20 feet. Loaded vessels of 50 tons burden, and fit for a sea voyage pass, if properly constructed\* through the canal ; and vessels of 110 or 115 tons, if not too wide for the locks, may pass in ballast. The whole length of the canal from Grangemouth

mouth upon the Forth, to Dalmuir upon the Clyde, is 35 miles. It passes over rocks, and quicksands, and mosses, in its course; in some instances, it is banked up to the height of 20 feet. Besides passing over the road near Falkirk, it passes over two considerable rivers, the Kelvine and the Luggie, by large aqueduct bridges: That over the Kelvine is 420 feet long, and 65 feet high. It is supplied with water by numerous reservoirs, conveniently situated, and covering several hundred acres of ground. They are calculated to contain 12,679 lock fulls of water, and the company are authorised to encrease the number of these, reservoirs, if they find it necessary.

The number of locks to the east of the highest level is 20, that of those to the west is 19; a circumstance which some have found it difficult to account for, as there cannot possibly be any difference between the levels of the eastern and western Firths. The difficulty, however, will vanish when it is considered, that the easterly extremity of the canal terminates in the Graugeburn, where, at ebb tide, vessels are left nearly dry; whilst the western extremity terminates in the Clyde, where the river, independent of the tide, is eight feet deep. Hence it takes place that on the west one lock is saved.

By this canal, the commodities of the coasts of the Baltic and German Ocean are conveyed to the western coast of this island and to Ireland; whilst those of the western coast, as well as all kinds of colonial produce, are transported to the east; a commerce of which the account is reserved for the ninth section of this chapter.

The

The tonnage dues on the canal are twopence per ton for every mile. The revenue arising from this duty was annually encreasing from the first opening of the canal till 1792, when it amounted to. L. 14,000. On account of the stagnation in trade in 1793, it fell somewhat below L. 12,000. Since that period, it has encreased rapidly. In 1810, the canal dues amounted to L. 40\*000; but it is justly apprehended, that they will fall far short of that sum in 1811, from the general stagnation of trade, and from the present commercial embarassments. The shares in the canal company stock sell from 25 to 30 per cent, above par.

With regard to the influence of the great canal on the agriculture of the district through which it passes, it must be evident that the facilities which it furnishes to the conveyance of every kind of manure must have a beneficial effect. The increase of commerce, too, must be taken into the account, for wherever commerce, advances, agriculture will maintain a proportioned pace. The cheap and commodious conveyance, afforded to travellers by the track boats, is not unworthy of attention in this estimate.

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#### SECT. IV.—FAIR?.

THE central situation of Stirlingshire, with regard to the breeders of cattle in the northern and western counties on the one hand, and the buyers or dealers from  
from

•from the southern and eastern parts of the island, on the other, has, for a long period, rendered it the theatre of the principal fairs or cattle markets in Scotland. Of these, the Falkirk *trysts*\*, as they are called, are the most distinguished. These trysts were originally held upon a large common in the vicinity of Falkirk) which is, at present, in the course of being brought under cultivation; they are now held, on that account, upon a field in the parish of Larbert ; but though the site be changed, the ancient name remains. They were formerly held upon a fixed day of certain months, but on account of the inconvenience which often arose from these days falling too early or too late in the week, they have been lately fixed to a certain Tuesday of those months.

1. The first Falkirk tryst is held upon the second Tuesday of August. There are generally exhibited there from 5 to 6,000 black cattle.

2. The second tryst is held upon the second Tuesday of September. There are generally exhibited about 15,000 black cattle, and 15,000 sheep.

3. The third tryst is held upon the second Tuesday of October, when there are generally\* exhibited from 25 to 30,000 black cattle, even 40,000 have been known to have been exhibited at this *tryst* \ there are also, at an average, 25,000 sheep exposed to sale.

At the two last trysts, especially at that of October, a great number of horses are also exposed to sale.

Thus

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\* Tryst is a Scots term, signifying a preconcerted meeting, i. e. of the buyers and sellers of cattle.



Thus it appears that there are annually exhibited at these trysts above 50,000 black cattle, together with about 40,000 sheep. Taking the former at the moderate average value of L.8, and the latter at that of 15s. each, the value of the whole will amount to L.430,000. An intelligent friend, who lives near the spot, calculates that 50,000 black cattle are exposed to sale at the two last trysts alone; and he estimates, on good grounds, that the total value of the cattle bought and sold at these trysts must amount to half a million Sterling. All the black cattle brought to these markets are lean stock intended for wintering.

It is remarked that the number of cattle brought to these trysts is diminishing of late, from the circumstance that many dealers are now in the habit of driving their own cattle to England, instead of disposing of them at these fairs to English dealers, who are the principal purchasers.

Within these few years past, a fair has been established at Balgair near Fintry, which is fast rising into consequence. It is held annually on the Friday immediately preceding the 24th of July. There are, at an average, between 3 and 4,000 black cattle exhibited there. This fair has almost entirely supplanted a fair, formerly of some consideration, which was held about that period at Buchlyvie.

There are several other fairs for cattle held in this county, as at Denny, Balfron, Strathblafte, Kippen, &c. The three former are held chiefly for the sale of milch cows. On the second Wednesday of November, and on two succeeding Wednesdays, a fair is held at  
Kippen

Kippen for the sale of fat-cattle. About 12& cattle are sold at these fairs.

Of the inferior fairs of this county, and of the particular days and months on which they are held, it does not appear necessary to offer a particular enumeration ; it may be obtained by consulting any Scots almanack. Almojt every village has its annual or monthly fair -, many of these are held for the purpose of selling grain arjd articles of accommodation for country families, who might find it difficult to procure them from the great towns ; many of them are also held principally for the purpose of hiring farm servants.



#### SECT. V.—MARKETS.

STIRLING is the county town and chief market place of the shire. It is a place of great antiquity. Commanding the principal pass to the north of Scotland, and being naturally a place of great strength, it was probably occupied by the Romans as a military station. Many remains of their operations may still be traced in the neighbourhood. It was erected into a royal borough by David I. about the year 1150. In point of antiquity it is considered as the fifth borough in Scotland

The weekly market 0/ Stirling is held on Friday. The revenue of the borough being ample,, the magistrates have very laudably employed a part of it in erect-

ing commodious public buildings, and particularly in erecting excellent market places and granaries. The flesh market of Stirling, upon a Friday morning, exhibits A pleasing spectacle of the greatest abundance and variety of animal food, all of the best quality, and in the best condition, laid out on stalls in the cleanliest style, or hung up under sheds which effectually prevent any injury from the sun or rain. It is singular that on no other day of the week, not even,? on the morning of the next day, is one pound of meat to be seen in the market; the inhabitants of the town and neighbourhood, aware that they cannot procure a supply for their families till the next Friday, lay in their weekly stores \*, and as most of the butchers, who expose their meat to sale in this market, have their residence in the adjacent villages, they carry home with them in the evening what remains unsold, to be disposed of elsewhere. In summer, it would certainly be a more convenient arrangement to partition this market between two days of the week! at some distance from each other.

Falkirk is naturally the centre of trade to the richest and most populous part of the county of Stirling It was formerly a borough of regality. It is now governed by a baron bailie appointed by William Forbes, Esq the Lord of the manor.

The market day is Thursday. Great quantities of grain of every denomination are sold there. The butcher meat is also most abundant, and of the very best quality. But Falkirk exhibits the most striking contrast to Stirling, in its total want of accommodation for these important articles of agricultural commerce.

There

There are no public granaries to protect the grain from the weather, or to receive what remains unsold from week to week. There are no sheds to shelter the butcher meat ; but the traveller is presented with the disgusting spectacle of the finest beef and mutton, pork, veal, and lamb, hung up, or hid out on temporary stalls in the open street } and deprived in a short time of their inviting appearance and qualities by the dashing rains, or scorching sun. (e) where are proper market places more necessary than in this thriving village, surrounded as it is by so numerous a population.

Kilsyth is also a market town, but being situated halfway between Glasgow and Falkirk, and only 12 miles distant from either, its markets are not much frequented.

There are several large and populous villages in the county, as Balfron, Buchlyvie, New Fintry, Kippen\* Gargunnoch, Bannockburn, St Ninians, Bainsford, Lauristown, &c. &c, from which the adjacent districts are supplied with the necessaries and conveniences of life. '



SECT. VI. WEIGHTS AND MEASURES.

THE great advantages which would accrue from the establishment of an uniformity in weights and measures

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were\*

were, at an early period felt and acknowledged ; and many attempts have been made by political economists, and even by the legislature itself, to carry this measure into effect. The bulk of the nation, however, unenlightened by science, and wedded to ancient practice, has persisted in adhering to local customs, and hitherto defeated every endeavour to attain this desirable end.

It would be highly improper *ut* on this occasion to enter into a detail of the general system of weights and measures as it affects the empire at large. It seems only necessary to bring into view those regulations which are either peculiarly applicable to Stirlingshire, or which may appear to affect its practice in this respect.

In this view, it may suffice to remark that, when the commissioners appointed by the Scottish Parliament in 1617, to establish an uniformity of weights and measures through Scotland, committed the Scots ell, the standard of lineal measure, to the Magistrates of Edinburgh; the firloft, the standard of dry measure, to those of Linlithgow •, and the standard stone to those of Lanark; they committed the jug or pint, the standard of liquid measure, to the Magistrates of Stirling.

This jug, or Scots pint, is accordingly still preserved by the borough, and contains 103,404 cubic inches, or Slbs. 7oz. Scots troy weight of clear river water, which are equal to 3lbs. 1 loz. 13.44 drains avoirdupois ; each cubic inch of this water weighs 253.18 English Troy grains\*

The

The various articles of commerce, which are submitted to weight and measure, are regulated in Stirlingshire as follows, viz.

i. *Land\**

Land is universally measured in this county by the Scots acre, which fi to the English acre nearly as 1 to 1.27, or, in other words, one Scots acre is a little more than one acre and one-fourth English.

The Scots ell is equal to 37 *i* English inches. The Scots mile of about 1973 yards is now in disuse ; and the English mile of 1760 yards, universally adopted.

2. *Corn.*

The legal standards for all sorts of grain in this county were adjusted in the year 1754, by Dr Stewart, Professor of Natural Philosophy in the University of Edinburgh, and Mr James Gray. According to the standard established by them, wheat, rye, beans, pease, and white salt, are to be sold by the firloot, containing 21<sup>^</sup> pints of clear river water, measured by the Stirling pint jug. Oats, barley, and malt, are to be measured by the firloot, containing 31 Scots pints, measured as above.

|   |               |
|---|---------------|
|   | Cubic Inches. |
| Hence the above wheatmeasure will contain | 2197.294.     |
| That for oats and barley will contain     | 3205.524.     |
| The Winchester bushel contains            | 2150.042.     |

From this statement, it appears that the Linlithgow boll of wheat is somewhat more than four Winchester bushels; and the Linlithgow boll of oats almost equal, to six Winchester bushels. The wheat firloft of Linlithgow appears to be about 2 per cent, larger than the Winchester bushel; and the Linlithgow firloft for oats nearly 50 per cent, larger.

Notwithstanding the above adjustment of the standards by those learned gentlemen certain customary measures are still very generally in use, which are as follows, viz.

1. Wheat, beans, pease, and rye, are sold by the customary firloft, containing 2378.292 cubic inches, according to the following table:

Standard Pints.

|                |    |         |    |       |   |          |
|----------------|----|---------|----|-------|---|----------|
| V <sub>T</sub> | SB | Forpet. |    |       |   |          |
| 5£             | =  | 4       | ps | Peck. |   |          |
| 23             | =  | 16      | =  | 4     | « | Firloft. |
| 91             | =  | 64      | =  | 16    | = | 4 » Boll |

Hence it appears, that the above boll is 8.935 per cent, better than the Scots standard measure.

2. Oats, barley, and malt, are sold by the customary firloft, containing 3438.183 cubic inches, as by the following table:

Standard Pints.

|                   |    |         |   |       |    |            |
|-------------------|----|---------|---|-------|----|------------|
| <sup>2</sup> tt   | =  | Forpet. |   |       |    |            |
| 8z <sup>*7</sup>  | ss | 4       | = | Peck. |    |            |
| 33/- <sub>5</sub> | ss | 16      | = | 4     | »  | FUot.      |
| MS                | ^  | 64      | = | 16    | *s | * <ap Boll |

Hence

Hence it appears, that the above boll is 7.258 per cent, better than the Scots standard measure.

### 3. *Liquids.*

The Stirling<sup>^</sup> pint jug, the standard measure of liquids, has been already described as containing 103.40\* cubic inches. E<sup>^</sup>f a Scots pint is a chopin; half a chopin is a mutchkin; a mutchkin contains four gills. The ale pint used in Stirlingshire contains about one sixteenth more than the standard measure\*

### 4. *Wood.*

There is not much wood sold by measurement \\\f this county. . Oak coppice wood, including the large' trees which have become timber, is sold in lots by public auction. Even full grown fir, and ash, and elir<sup>^</sup> are sold, for the most part, in the same way. The purchasers of these lots sometimes retail single trees by the usual mode of measurement; that is, by calculating the contents of the frustum of the cone formed by the tree.

### 5. *Wool.*

Wool is usually sold by the tron weight of 16 lbs. an additional pound \$ given to the stone in whole sale bargains.



SECTION VII.—PRICE OF PRODUCTS, COMPARED  
WITH EXPENCES.

OF the object of the Honourable Board, in the title of this Section, the Reporter professes, himself unable to form a precise idea. If it is meant that an estimate should be given of the expences and profits of the various branches of agricultural industry, he must beg leave to recur to the apology already offered on this subject, in Chapter IV. Section VII. to which the reader is referred\*.



SECTION VIII.—MANUFACTURES.

VARIOUS manufactures, of greater or less importance, are successfully carried on in Stirlingshire. Of these, however, it is not now proposed to enter into a detailed account \ nor does their influence' upon agriculture appear to be so direct as to require it.

1. *Weaving.*

Coarse woollens have been long manufactured in Stirling and in the adjacent villages. This neighbourhood

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\* See p. 104 and 105

hood was formerly famous for weaving *tartans*, the celebrated garb of the highlanders. In Stirling and in Bannockburn, the whole of the tartan employed in clothing the highland battalions in His Majesty's service was manufactured. The wool was procured chiefly from the counties of Peebles and Roxburgh, and spun and dyed here. A considerable change, however, having been made in the dress of the highland regiments, by laying aside the belted plaid, and by the introduction of pantaloons, this manufacture has dwindled away considerably. *Carpets* still form an important article of manufacture in Stirling; this carpeting is sold from 2s. to 4s. 6d. per yard. *Serge*, a coarse kind of woollen cloth, is manufactured every where about Stirling; it is sold from 1s. to 1s. 6d. per yard.

In all the considerable villages of this county, a number of looms are employed by the Glasgow manufacturers. In Kilsyth alone, there are between 4 and 500.

## 2. *Print/elds.*

Of these there is a considerable number in Stirlingshire. The abundance of running water, with a sufficient fall, which is so frequently to be met with in this county, is highly favourable to such establishments. In the parish of Denny, there are two extensive printfields. There is a printfield on the estate of Mr Kincaid of Kincaid, in the parish of Campsie, in the buildings of which alone £.14,000 have been sunk.

### 3. *Cotton Mills.*

At Fintry, on the estate of Peter Speirs of Culcruios,\* Esq. there is a cotton-work upon a very extensive scale, in which a great number of hands are employed. There is another large work of the same kind at Balfron. Here 400 people are employed, drawing at an average L.150 a week. There is a small mill upon the Endric, for the woollen branch, constructed nearly upon the same principles with the cotton ones.

It cannot be questioned that these establishments are of advantage to the agricultural interests of the districts in which they are set down. They afford a convenient asylum and the means of subsistence to the small occupants who had been ejected from their farms, to make way for tenants of proper skill and capital, who are now so generally introduced. They increase the consumption of the produce of the ground, and furnish a ready market for every article that is produced on the farm. The farmer, however, complains, that *the* wages of servants of both sexes are greatly advanced by the facility which these establishments afford of obtaining work at all times.

### 4. *Alutry Copperas, &c.*

In the immediate vicinity of Campsie, there are considerable chemical works carried on, where alum, copperas, soda, Prussian blue, &c. are manufactured on an extensive scale; and in which a very large capital appears to be embarked. The following account of  
of

of these works, liberally communicated to the Reporter by a gentleman who is concerned in them, must be interesting to the reader.

«The company produces the alum and copperas from a decomposed aluminous schistus found in a considerable quantity in the adjoining coal wastes. This schistus forms originally the covering or roof of the coal strata of the district, and is composed of silex, alumine, or clay iron and sulphur; the two latter probably in a state of chemical union. Soon after the coal is wrought, this schistus, of various thickness, separates from a limestone stratum immediately above; thus falling down into the waste. In process of time, indeed, generally after the lapse of many years, owing to a constant circulation of air through these wastes, which, being level free, are always dry (an indispensable requisite to this operation of nature) the sulphur becomes oxygenated; and is converted into vitriolic or sulphuric acid \*, this, uniting with the iron, forms copperas, and with clay, sulphat of alumine, from which chrystallized alum is afterwards made.

"The decomposed schistus, as taken out of the wastes, is lixivated, and the lixivia evaporated. Upon cooling, pure sulphat of iron, or copperas, separates. The mother waters are then boiled with a solution of sulphat of pot-ash, by which (the triple salt) chrystallized alum is formed \*, this separates in its turn by cooling, and is purified by subsequent chrystallizations.

"The making of Prussian blue, being a delicate and intricate process, although it is known that alum and copperas enter into its composition, the manipulation of this process is not divulged by the company; (the theory

theory is no secret.) Neither is that of the soda manufacture made public ; for which it is presumable that the company has local facilities; amongst these\* the abundance and moderate price of coal is *no* doubt<sup>u</sup> to be reckoned."

### 5. *Iron.*

About 50 years ago, the most celebrated iron-work in Europe was established upon the banks of the Carron in this county, by Dr Roebuck, and Messrs Cad-del and Garbet, who were joined in the undertaking by many gentlemen of great respectability. Perhaps there is no spot in Britain which affords greater facilities for such an establishment than that on which the\*'Jarron-works are erected. These works are supplied with iron ore from Cumberland and Lancashire. Iron stone abounds in the neighbourhood, as at Denny, Banton, Bonnyhill, &c. Limeston is carried by water from the Fife coast: and coal is found every whet-e at no great distance\*. Excepting coal, all the other materials used in these works are conveyed by water carriage.

Some idea may be formed of the extent of these works, by stating, that they give employment *to* upwards of two thousand able bodied meii; and that the  
annual

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\* A large supply of coal is furnished frofli the Parkhall estate, where the fir&t scam is 3 feet thick ; and the second from 4 to 6\ There are upwards of 1000 acres of this estate which abound in iron stone.

annual expenditure in labour, is not less than from £20,000 to L 130,000. Of the quantity of coal, iron stone, and limestone used, the Reporter cannot obtain information.

It is not proposed here to enter into a minute detail of the operations carried on at the Carron-works : Suffice it to say that there are five blast furnaces connected with these works, which are supplied with strong currents of air from iron cylinders, which are not only more durable than bellows, but produce a more powerful effect. These cylinders act as forcing pumps, There are also three cupolas, which receive a proper supply of air by means of pipes connected with the forcing cylinders. There are fifteen furnaces, which are kept in action by the external air, without the aid of an artificial blast.

At Carron, all kinds of cast iron goods are made in the most elegant forms, and of the most substantial kind. The vignette designs, on some of these articles, are models of good taste. Here was *invented that* kind of cannon which is now introduced into such general use on ship board, called, from the name of the place, *carronades*\* It is a short gun which is moved in grooves, by which the friction is increased, and the recoil consequently diminished. The calibre of the cannons which are cast here, is bored out of the solid metal, which renders it more smooth and just in its direction, and hence less ready to burst in the time of action than when cast with a core. The operation of boring cannon affords an interesting spectacle. It is performed in the space of about 48 hours by machinery moved by water.

At

At these works, bar-iron is also made, according to the following process. The pig-iron is melted in a finery, and afterwards beaten out into plates about an inch thick. These plates are again broken into pieces, about two inches square, for the convenience of scouring them, &c. They are scoured in an iron cylinder connected with the water wheel; and when they are properly prepared by this operation, they are put into pots which are made of fire clay and, in an air furnace, they are brought to a welding heat. In this state, they are brought under the hammer, and wrought into what are called *blooms*. The blooms are heated in a chafery, or hollow fire, and then drawn out into bars for various uses. In this condition, the iron is equal in goodness to that which is imported from Russia, under the name of *new sable* iron.

The machinery is moved by the water of the river Carron, and, as a provision against times of drought, there is a reservoir constructed in the neighbourhood which covers 30 acres of ground. But in very dry seasons, even this provision is not found sufficient. An engine has been contrived for throwing back the water which has been used, that it may be employed again. This engine raises about 4 tons of water at every stroke, and it makes about 7 strokes in a minute\*.

By

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# For the above account of the Carron-works, the Reporter is principally indebted to the excellent Statistical Account of Falkirk, by Dr Wilson, Stat. *Lccx*. Vol. XIX. p. 93.

By the charter of the Carron Company, they are authorized to employ a capital of L.150,000. This is divided into 600 shares, and ten shares are required to a vote in the management, that these extensive works, in which so many hands are employed, have some influence on the agriculture of this district, cannot be doubted. They increase the demand, and give an additional spring to industry. In this view, they have led to the general improvement of the country ; but the Reporter feels himself bound to add, in the words of an intelligent friend well acquainted with that neighbourhood, " That they have contributed little to the improvement of the *particular* district in which they are situated." They consume, he remarks, « A great quantity of oats ; but the oats of Hull or Aberdeen, being cheaper than those of Stirlingshire, they procure them from these places so that the agriculture of these is more benefited by the Carron-works than that of Stirlingshire. IF the barley of this county bears in general a better price, it arises from our vicinity to Glasgoij, where pot barley is in great demand. I have no hesitation, therefore," he adds, « to say, that the Carron-works have only, in a very remote, and not in an immediate degree, affected the agriculture of this part of the county."

€. *Distilleries,*

Many large establishments for the distillation of spiritous liquors are to be found in Stirlingshire. They are



are of advantage to the agriculture of the district, by procuring a ready sale for barley; and the culture of barley is undeniably an important article in the rotation of crops; as it is always accompanied by a rich addition of manure, and a succeeding rest under a crop of ameliorating grasses. At these distilleries, too, great numbers of cattle are fed and fattened for the butcher, which furnish a convenient supply of animal food, at all times, for the market. During the suppression of the distillation from grain, many of the distillers of this county used sugar; but the spirit produced was esteemed harsh and unpalatable; the beneficial rotation of crops, into which barley should always be introduced, suffered a derangement, and the supply of animal food was, in a certain degree, cut off. With the removal of the prohibition, the distillers of Stirlingshire have returned to the use of grain.

Besides the above, there are various other manufactures which are carried on to a considerable extent in this county.

There are many extensive tan-works, to which the abundance of oak bark, to be had in the vicinity, is favourable.

The numerous falls of the Carron, in the parish of Denny, have furnished favourable situations for mills of different kinds in that district. In the parish of Denny, there are nine mills for grinding grain; there are two for spinning wool; a mill for preparing dye stuffs; and one for chipping wood. There are also three paper mills, where that manufacture is carried on to a considerable extent particularly that of coarse paper, which

- \* which is furnished to Government for cartridges for  
 • Kat army.

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SUTT. IX.—COMMERCE.

STIRLINGSHIRE, in former times, could scarcely be called a commercial county. A few vessels of small burthen come up, as some still do, as far as Stirling. Airth also enjoyed a considerable trade by sea. The sea port of Grangemouth, however, which is daily rising into increased consequence, and which actually occupies a distinguished rank amongst the trading towns of Scotland, claims our principal attention in this Report. The following account of the origin, and progress, and present state of the port and trade of Grangemouth, derived from the valuable communications of Alexander Laird, Esq. of that place, a gentleman intimately acquainted with the subject, will, it is hoped, be found interesting.

\*• The situation on which the town of Crangemouth stands was nothing but sleet and salt greens\*, previous  
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\* *Sietch*, or soft mud, with *greens*, or the marine vegetables, which naturally grow on it, art-, as was noticed  
 in

to the opening of the Forth and Clyde navigation. About the year 1772, when the canal was opened as far *v, \*\*u* as Kirkintilloch, there was only a trifling coasting trade, with a few corn cargoes from the Baltic. After the commencement of the American war, about the years 1776 and 1777, a considerable foreign trade took place, particularly in the articles of timber from Memel; and of hemp, flax, iron, and deals from St Petersburg. It is from that period that Grangemouth may be considered as a sea port. At that time, it had no other name than *sea-lock*, which it retained till 1783, when Sir Thomas, now Lord Dundas, the proprietor, gave it the name which it now bears. The name is given from the circumstance, that the river Grange, or, as it is commonly called, the Grange-burn, runs from the south through the harbour, and is of such magnitude as to form part of the said harbour, above which it is navigable to vessels of 70 or 80 tons, as far as Grange; a barony belonging to Mr Home of Kaimies, about a mile south from Grangemouth.

Grangemouth is situated upon an angle formed by the junction of the river Carron with the Great Canal.

The

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in speaking of the *soils* of Stirlingshire, the character of the shallows on the Firth of Forth, which are left dry at ebb tide, and of which so many acres have been lately added to the Carse grounds of this county by embankments. This soft soil is of great depth. Mr Macnab of Grangemouth informed the Reporter, that the elegant houses which he has built there, and of which he is the proprietor, are founded, like the city of Venice, upon piles of wood.

The present site of the town is not of great extent, only about half a mile from east to west, and about a quarter of a mile from north to south. There are several handsome streets already built, and the plan of several more is formed. The northern boundary being the river Carron, a street is proposed to be built parallel to it, to be called Carron street; the southern boundary being the canal, the bason and the harbour; there is already built, South Bason street \* and parallel thereto, Grange Street has been laid out this season, (1811) and partly built. Across these, run South Charlotte and South Bridge streets, the south and east boundaries on this side being the river Grange. But if the proposed wet dock, to enter from Carron river at Holemerry, and to communicate with the present harbour, be carried into effect, it will be necessary to cut the river Grange to the southward thereof; in which case the site of the town may be carried south to any extent that may be required.

" To the westward of the south side, of the town, is a large bason, which communicates with the canal opposite to Canal Street; it is<sup>1</sup> formed for holding timber, and is capable of containing 300,000 feet in rafts. It generally remains in the bason until it is sold, or till there is occasion to send it up the canal, or in any other direction in the Firth.

<sup>a</sup> There are several very neat, and even elegant houses in Grangemouth; there is particularly in North Bason street a range of fine buildings on the same plan with those of Princes' street in Edinburgh, with a sunk area, and iron railing, and pavement in front. This street, when finished, will form a kind of half square.

The custom-house, built by Lord Fundas, at the head\* of Harbour and North Charlotte streets, is a neat i?\*A+ building. The foundation stone of the edifice, so necessary and so convenient to this thriving sea port, was laid on the 21st February 1810, and business commenced in it upon the 1st of December thereafter. The present population of Grangemoyth *if.* about 920, and is daily increasing

" In speaking of the site of Graflgemouth, it may be proper to observe, that the straight ing of the river Carron from the mouth of the harbour to Holomcrry, (where it was originally intended that the canal should, terminate) has been attended with very great advantage > the distance is shortened by about a mile ; the access to the harbour is made easy by cutting off a very intricate part of the navigation ; and upwards of sixty acres of land have been gained within these two years, where was formerly the bed of the river. At Greenbrae, where ships of 300 to 500 tons burden were in use to discharge, because they drew too much water to get into the harbour, the ground is now under a crop of corn\*.

• The harbour of Grangemoyth was formerly attached to the Custom-house of Borrowstounness, which is eight miles distant; and when the river Avon is not fbrdable, the journey is four miles longer by Linlithgow bridge. The trouble and expence daily incurred by this arrangement proved intolerable. Grangemoyth is now rendered independent, by having obtained a custom-house for itself. j an indulgence to which its importance unquestionably

questionably entitles it; and to which it is principally indebted to the exertions of the noble Lord Lieutenant of the county.

« The depth of water in the harbour of Grangemouth is generally in spring tides from 16\* to 18 feet; and in neap-tides from 10 to 12 feet; but, in very high spring tides, there are frequently from 20 to 22 feet.

« The new dry dock, at the west end of the town, and entering from the river Carron, is expected to be finished this season; it is 190 feet in length by 31 feet in width. There will be 13<sup>1</sup>/<sub>2</sub> feet water on the top of the blocks at spring tides, which will be sufficient to admit vessels of 500 tons burthen.

\*\* The *proposed* wet dock, to enter from the river Carron at Holemerry, is meant to be 1500 feet in length by 300 feet in breadth, with 20 feet of water in the gates at spring tides; the gates to be 40 feet wide. This dock will contain 100 square rigged vessels with ease. This dock or bason is to communicate with the present harbour of Grangemouth, by a canal of 10 feet deep, 40 feet broad at bottom, and 60 feet at top. The whole expence of this undertaking was estimated several years ago at L.30,000; but, from the increased price of labour and of materials, it cannot now be finished for Less than L.120,000,

" With regard to the commerce of Grangemouth, it may be observed, that it consists in an **extensive** coasting trade to and from London, and all the intermediate ports on the east **and north** coasts of **England** and **Scotland**; there is also a very extensive **commerce** from **Norfolk** and the other corn counties of **Britain**, and occasionally to some of those places, particularly

in supplying them with Irish oats, of which large quantities, brought from the Clyde by the canal, \* \_ T ? in the end of the year 1809, sent to the London and Newcastle markets.

« But the most important branch of the commerce of Grangemouth consists in its foreign trade. From Norway, are imported timber and dea<sup>1</sup>\* : From Sweden, timber, deals, iron and tar : From Prussia, corn, timber, deals, &c.: From Russia, hemp, flax, iron, deals, linens, &c. Within these few years, timber has been imported in considerable quantities, from the British colonies in America. The Carron Company conveys from this port the goods which are manufactured at their works, *by sea* to London, and the other cities and towns on the east coast of the island ; and *by the canal* to Glasgow, and consequently to the whole western hemisphere. The shipping of the Carron Company brings in return from England, grocery goods, dye stuffs, &c. for the supply of Glasgow, Paisley, Falkirk, Stirling, and many other inland towns and districts\*.

"When trade was open to the Baltic, there was a very considerable export of colonial produce, and of British goods from Grangemouth, which may indeed be justly denominated the Port-Glasgow of the eastern coast. From its contiguity to the city of Glasgow,  
and

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• The shipment of coals forms a considerable part of the trade of this port. Those of the Pmmford coallicry are sent both foreign and coastwise: From 50 lo 100 tons per day can be sent down and shipped. Large quantities of (he Kanton coal for smithies arc shipped for Norway and the Baltic.

and the other ports on the Clyde, and especially by the facilities afforded to commercial communication by the great canal, Grangemouth is evidently the most convenient station for an extensive commerce on the eastern coast of Scotland.

•\* This, however, is to be said only of times of peace with the northern powers. In 1805, when our trade was open with the northern powers, the commerce of Grangemouth may be estimated in some measure, by stating that the revenue paid by it, at the Custom-house of Borrowstounness, (to which this port was, as has been said, then attached,) was about L.44,000 sterling. The tonnage of shipping, foreign and coast ways, was then 45,000 tons. In 1810, from the circumstance that the principal imports consisted of coarse articles from Norway and Sweden (a few cargoes from Russia and Prussia excepted) although the shipping was upwards of 60,000 tons, the duties did not exceed L.30,000. A custom-house being now obtained, and the bonding system being expected to be extended to this port, there is no doubt that the trade will increase as soon as the communication between this country and the northern powers, so mutually advantageous to both, is re-established.

" The charges on shipping and goods at Grangemouth are very low in comparison with most of other ports in the kingdom. The harbour dues for British ships are only one penny halfpenny per ton register; on foreign ships, three pence per ton: I have from the harbour to the roads, that is, from the mouth of the river Carron nearly to Culross, a distance of 30 miles, is generally from five to ten shilling\* for small



vessels, and from that sum to two guineas, for larger vessels. The shore dues on all goods landed and shipped are one penny per ton ; and the basonage on timber is two pence per ton per month."

To complete the history of the trade of Grangemouth, it may be proper to add to Mr Laird's account, the statement given about twelve years ago by Dr Wilson, the intelligent minister of Falkirk.

"The tonnage at this port is at a medium as follows: Vessels from England, which bring cargoes from foreign places, about 5,000 tons annually -, coasting vessels from England about 4,000 tons ; vessels belonging to Scotland, employed in foreign trade, 10,000; Scotch vessels employed in the coasting trade, 9,000 tons ; vessels employed by the Carron Company, at least 9,000 tons ; and foreign vessels, about 2,000 tons."

From these accounts, some estimate may be formed of the progress of commerce at this port: It appears that the shipping of Grangemouth amounted,

|          |   |   |                            |
|----------|---|---|----------------------------|
| In 1799, | - | - | To about 39,000 tofts,-    |
| In 1805, | - | - | To 45,000 tons.            |
| In 1810, | - | - | To upwards of 60,000 tons. |

It may be questioned whether this be the proper place for noticing, that in winter 1796—7, more than 500 vessels, from 20 to 80 tons burthen, were employed in the herring fishery on the coast adjacent to Grangemouth. They belonged<sup>1</sup> to different parts of England and Scotland. Besides great quantities of herrings disposed of in that populous neighbourhood, in a fresh state, it was computed that above 300,000 barrels;

rels were cured, as no less than 600,000 bushels of salt were used on the occasion. \*

*Influence of Commerce on Agriculture.*

On this subject a few words will suffice. It cannot be questioned that a commercial town contributes to the amelioration of the adjacent district of country; it increases the population, and consequently affords a consumption for the produce of the soil. Perhaps the most beneficial effect of commerce upon the agriculture of the neighbouring country, is the stimulus which is given by the example of industry, of attention to business, and of increasing opulence, to the exertion of an order of persons who, without this spur to exertion, would have been contented to live, as their fathers had done, in sordid inactivity and want. The influence of the trade of Grangemouth is evident in the adjacent territory.

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SECT. X.—THE POOR.

THE maintenance of the poor, and of those who by disease or accident have been rendered unable to provide for themselves, forms an important object in the political economy of every civilized country. It is not intended in this place to enter into an examination of the various schemes which have been suggested or adopted for this purpose, but only to advert to the mode of providing for the poor which is most generally prevalent in Stirlingshire.

Though there is an act of Privy Council still in force\*, by which the heritors and kirk-session are appointed to impose a parochial assessment for the support of the poor, the one half upon the heritors according to their valuation, and the other upon the tenants and householders according to their ability, only a few of the more opulent and populous parishes have had recourse to an assessment. These parishes, with their respective assessments, are, as far as the Reporter can learn, as follows :

Airth, a small assessment.

Falkirk, L.I Sterling on every L.100 Scots of valued  
rent.

Larbert *2ixd* Dunipace, about one penny on the pound  
Sterling.

Logie, 8s. 4d. on the L.100 Scots of valuation.

St. Ninians, from 12s. to 16s. on the L.100 Scots of  
valuation.

To our southern neighbours, on whom the oppression of poor rates weighs so vexatiously, it must appear truly wonderful that, in so extensive a county, a proportion so very small of the maintenance of its poor should be raised by an immediate tax on property. The poor of Stirlingshire, as is the general case over Scotland, are supported, as has been formerly observed, by the weekly collections at the churches, with other incidental funds raised under the direction of the kirk-session.

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\* Sec p. 100-

† *Ib.* *ib.*

session. Almost every parish in the county has, besides a sum of mortified money, the donation of charitable persons, and the interest of which is added to the distributions. An account of the income of the poor of the several parishes, from whatever source arising, will be given, as far as it has been ascertained, in the annexed Tables.

The whole of these funds are administered almost exclusively by the minister and elders of the parish, who are necessarily the best acquainted with the circumstances of the poor; and it is certain that never were funds of such an extent administered more faithfully or more gratuitously. Though the heritors are entitled to assume their share in the management, they seldom interfere, probably from a well founded conviction of the integrity and attention with which the kirk-session discharges this important duty.

It is necessary in this place to observe, that there is reason to apprehend, that the mode of providing for the\* poor by *assessment* will, in process of time, be more generally resorted to. When trade and manufactures are advancing so rapidly, the poor must become more numerous, as well as more clamorous. But it may be permitted to say, that the longer the heritors and kirk-session can ward off' the measure of *assessments*\* the better it will be for the country, and even for the poor themselves. Wherever ample funds for charity are held out, the industry of the poor will flag \ and the demands upon the fund will proportionably increase.

At present, there exists very generally amongst the labouring and lower orders, an honest pride of independence, which prompts them to continue the exertion

tion of personal industry as long as they are able to earn any tiling for themselves. They are averse to any application for parochial aid till the utmost necessity compels them.

This spirit prevails chiefly among the lower orders in the country parishes. It ought to be carefully cherished; whilst it is maintained amongst us, it will constitute a valuable addition to our national industry; and the poor man, whilst he feels it, will be a better man, and have more true enjoyment in the scanty meal which he has earned by his own exertions, than in the insipid provision which is made for him in a parish asylum, or by a parish assessment.

Mendicity is, at the same time, too frequent amongst us. In our towns and villages, beggars infest us in every corner and alley; and from these towns and villages, they sally forth and overrun the country parishes. Indeed, almost all our beggars are the refuse of towns and manufacturing districts; by their idleness, profusion, and dissipation, they have reduced themselves to want, and, in the infamy of their morals, they have lost the sense of shame.

An intelligent gentleman of this county, himself the proprietor of a flourishing manufactory on his own estate, pointed out to the Reporter the pernicious effect of manufacturing villages on the morals of the people. « The working people at these manufactories," he observed, " are generally persons of dissipated habits. « When trade is brisk, they sometimes earn 20s. a " week or more; with the incensideration of depraved " minds, they spend all as soon as it is earned; when « work fails, they have no resource for themselves " and

\*« and for their families, but begging; and td beg, " *they* are not ashamed."

This is unquestionably a great political evil; and in a manufacturing state like this, it becomes an important question where the remedy is to be found. Would it not be a proper measure, that the proprietors and managers of these manufactories should admit none into their works without binding th&m down, under pain of forfeiting a certain portion of their wages, to lay aside, in a well secured fund, a weekly sum out of their earnings, as a resource for themselves and their families in the day of calamity.

Friendly societies of this kind, or box clubs, as they are called, are common in this county, as well as through the rest of Scotland. There are two of these in the town of Stirling. They are common in every district. When persons, who had contributed for a certain time to the common fund, become disabled for work, or when they die, leaving a widow or children, a certain weekly sum is given from the fund, proportioned to the ratp which had been contributed. This beneficent scheme has lately received the sanction of the legislature. The only addition that seems to be required, is *to oblige* every person, in the labouring and manufacturing line, to become a member of one of these societies ; and this can be done only by the influence of masters and proprietors of great establishments.

In every populous district, there should be houses of industry as well > as houses of discipline. In {the former, the well disposed poor might find useful employment;

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in the latter, the profligate might be restrained, and in some measure reclaimed.

In both these respects, Stirlingshire is miserably deficient. Houses of correction, in the several districts of the county, are particularly required. How many petty crimes and misdemeanours which harass the public, and occasion serious evils to individuals, are allowed to pass unpunished, because they are not of such magnitude as to call the attention of the public prosecutor; whilst the private sufferer is disposed to submit to the injury, rather than incur the trouble and expence of sending the offender to the county jail, and bringing him to condign punishment? Were there houses of discipline erected in proper situations, under proper regulations, and under the direction of the Justices of the Peace, those petty crimes would soon cease to be heard of.

If Stirlingshire, however, be deficient in houses of industry and correction, it possesses abundance of richly endowed hospitals. These charitable establishments have evidently had their origin in the same principle, which led, at a still more remote period, to the endowment of monasteries, and the liberal donations of land and money, which were made to particular churches, *pro salute animæ*; and it may be questioned, whether the utility of these endowments is not, in both these cases, nearly equal. A very amusing account of the hospitals of Stirling, given by the Rev. Mr Somerville\*, of which a short notice will suffice: The *present* revenue

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\* Stat. Account, vol. xviii. p. 283.

revenue of these hospitals is given on the unquestionable authority of Mr William Mackinlay writer there.

1. Robert Spittal tailor to King James V. of chivalrous memory, founded an hospital in Stirling, about 1530, for the support and relief of poor tradesmen; the funds arise from the rent of lands.

2. James Cowan merchant in Stirling, in 1639, founded an hospital for the support of 12 decayed guild brethren. An elegant house, which still remains, was built for their reception -, but the objects of this charity persisted in refusing to leave their own homes, and to occupy it. The funds accumulated; lands were purchased with them ; not only decayed guild brethren, but their widows and daughters are admitted to a share in these funds, which, as it appears, are still accumulating.

3. John Allan writer in Stirling, about the year 1725, mortified the sum of 30,000 merks Scots, for the maintenance and education of the children of decayed tradesmen, a charity of all others the most judicious and the most useful; the fund consists of the rent of lands in which the money was invested.

4. Besides these charitable foundations, the funds of the guildry, or merchant company, defray the expence of educating the poor guild brethrens children, and assist them in purchasing clothes, and in paying their apprentice fees.

In order to enable the reader to form an adequate idea of the progress and state of the funds of these hospitals, and of the number of persons to whom their benefits extend, the account given by Dr Somerville

in



in 1793, and that given by Mr Mackinlay in 1810, are subjoined.

In 1793, the state was as follows:

|            | Income. | No. of Paupers.   | Receive per week. |    |        |   |
|------------|---------|---|-------------------|----|--------|---|
|            |         |   | £                 | s. | d.     |   |
| Spittal'a, | L. 291  | 44'   | Prom              | 1  | 1 to 2 | 4 |
| Cowan's,   | L. 1158 | above 100   | Horn              | 1  | 6 to 2 | 6 |
| Allan's,   | L. 298  | 14 boys maintained, clothed* and educated, from the age of 7 to that of 14 years; and on leaving the hospital, 100 merits to put them to a trade. |                   |    |        |   |

**Mr Allan** besides, by a clause in his will, ordered supply from these funds to be given to any of his poor relations who might be in indigent circumstances.

Mr Mackinla/s account of these hospitals in IS 10.

|            | Income.         | Paupers  | Average allowance per week. |
|------------|-----------------|--|-----------------------------|
| Cowan's,   | L. 3000         | 113  | 5s. 3d. to 2s.              |
| Spittal's, | L. 561.4s 10c!  | 104  | 1s. 8d. to 2s.              |
| Allan's,   | £. 568.16s. 9d. | 43, 36 of whom are boys, who are educated and clothed th.ic. |                             |

Though the account of the ordinary poor's funds of the parish of Stirling must appear in its proper place in the statistical table, it may be proper, in connexion with the above statement of the hospital funds, to add that of the other charitable funds of that town as they stood in 1810.

|   | L. | s. | (I.      |
|---|----|----|----------|
| From ordinary collections, and interest of money      | -  | -  | 208 14 6 |
| From voluntary contributions for poor householders    | -  | -  | 230 0. 0 |
| From these funds, 110 paupers receive from 6d. to 1s. |    |    |          |

'Sd. weekly. Thus it appears, that the annual income of the charitable establishments in the parish of Stirling, amounts to L.<sup>468</sup>. 15s. Id. and that the number of persons who receive charity from these funds is 370. Taking the population of the parish as it was stated in 1802, at 5256, it follows, that every 14th person nearly receives public charity; and perhaps, if the population of the country part of the parish (to which the hospital charities do not extend) be deducted, it may be reckoned, that nearly every 12th inhabitant of the town receives charity.

The managers of Cowan's hospital are the Town Council, together with the first minister of Stirling, The managers of Allan's hospital are the Town Council, and the second minister.

The Reporter has discovered one other institution of this kind in the county. There is in the town of Falkirk an hospital for the support of four aged and infirm persons. It was founded and endowed by Lord Livingstone of Almond and Callander, in 16\*0. Certain parts of the estate of Callander are burthened with this endowment; the proprietor of the estate of Callander presents to it -, but if he refuses or neglects to do so, the minister of Falkirk is authorised to fill up the vacancy.

## SECTION XI.—POPULATION.

INSTEAD of giving the statistical table of the county of Stirling in one view, as is done in the Report of the county of Bamff^ which was transmitted as a model in this respect, it is presumed that it will contribute to perspicuity to give the tables of population separately in this Section; and to give the tables, of rent, minister's stipends, schoolmaster's emoluments, income of the poor, &c. in an Appendix.

In the following table, the population is given by parishes, with references to the volume and page of the Statistical Account of Scotland; a work which cannot be too highly estimated. It is given at three different periods, viz. the year 1755, from Dr Webster \$ the years 1790-1798, from the Statistical Account; and the year 1801, from the enumeration made under Mr Abbot's bill. The number of *inhabited* houses in the county is added from this last source. The increase and decrease, from 1755 to 1801, is given in separate columns. The Reporter having obtained still more recent information concerning the population of *ten* parishes of the county, chiefly from the ministers of these parishes, this is joined in a separate column. With regard to the *Jour* parishes that are situated partly in Stirlingshire, and partly in other counties, the population of that part only which lies in Stirlingshire is given. The Reporter has some expectation of obtaining the lists of population taken up this year (18\*1) under the late act; if he is fortunate enough, to procure these, they will be given in the Appendix.

Table

TABLE of the POPULATION of STIRLINGSHIRE,

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ECT. XI

| I. Statistical Account.  |        |       | II. JJHI.           | iv.                   | v.               | i                      | vi.                         | i        | vII.              | VIII.        | IX. | X. |
|--------------------------|--------|-------|---------------------|-----------------------|------------------|------------------------|-----------------------------|----------|-------------------|--------------|-----|----|
| Parish.                  | Vol.   | Page. | Population in 1755. | Population 1790, 1798 | Population 1801. | Population 1806, 1811. | Increase from 1755 to 1801. | Decrease | Inhabited Houses. | Observations |     |    |
| 1 Airth                  | III.   | 186   | 2316                | 2350                  | 1855             | 2000                   | —                           | 495      | 523               |              |     |    |
| 2 Alva                   | XVII.  | 125   | 436                 | 612                   | 787              | 800                    | 351                         | —        | 153               |              |     |    |
| 3 Baldernock             | XV.    | 271   | 611                 | 620                   | 796              | —                      | 185                         | —        | 150               |              |     |    |
| 4 Balfour                | XVII.  | 580   | 753                 | 1381                  | 1634             | 1800                   | 879                         | —        | 206               |              |     |    |
| 5 Bothkonnar             | XVII.  | 295   | 529                 | 600                   | 575              | —                      | 46                          | —        | 125               |              |     |    |
| 6 Buchanau               | IX.    | 12    | 1699                | 1111                  | 748              | —                      | —                           | 951      | 121               |              |     |    |
| 7 Campsie                | XV.    | 314   | 1399                | 2517                  | 2906             | —                      | 1507                        | —        | 509               |              |     |    |
| 8 Denny                  | II.    | 420   | 1392                | 1400                  | 2033             | —                      | 641                         | —        | 247               |              |     |    |
| 9 Drymen                 | VIII.  | 546   | 2789                | 1607                  | 1608             | 1500                   | —                           | 1181     | 324               |              |     |    |
| 10 Falkirk               | XIX.   | 71    | 3932                | 8020                  | 8833             | 10,395                 | 4906                        | —        | —                 |              |     |    |
| 11 Fintry                | XI.    | 371   | 891                 | 543                   | 958              | 910                    | 67                          | —        | 107               |              |     |    |
| 12 Cargunnoch            | XVIII. | 90    | 956                 | 830                   | 954              | —                      | —                           | 2        | 176               |              |     |    |
| 13 Kilsyth               | XVI.   | 100   | 959                 | 973                   | 1039             | —                      | 80                          | —        | 173               |              |     |    |
| 14 Kilsyth               | XVIII. | 214   | 1393                | 2150                  | 1762             | 2300                   | 367                         | —        | 515               |              |     |    |
| 15 Kippon                | XVIII. | 317   | —                   | —                     | 1248             | 1331                   | —                           | —        | 238               |              |     |    |
| 16 Larbert vV Dunipace   | III.   | 333   | 1864                | 4000                  | 4217             | 5000                   | 2353                        | —        | 653               |              |     |    |
| 17 Muiravonside          | I.     | 206   | 1539                | 1065                  | 1070             | —                      | —                           | 469      | 241               |              |     |    |
| 18 Polmont               | III.   | 344   | 1094                | 1400                  | 2194             | —                      | 1100                        | —        | 430               |              |     |    |
| 19 St. Ninians           | XVIII. | 335   | 6491                | 7079                  | 6849             | —                      | 358                         | —        | 1324              |              |     |    |
| 20 Slamannan             | XIV.   | 78    | 1209                | 1010                  | 923              | —                      | —                           | 286      | 183               |              |     |    |
| 21 Stirling              | VIII.  | 271   | 3951                | 4698                  | 5356             | —                      | 1305                        | —        | 614               |              |     |    |
| 22 Stithbane             | XVIII. | 363   | 797                 | 620                   | 734              | 821                    | —                           | 63       | 112               |              |     |    |
| 23 Pan of N. Kilpatrick. | —      | —     | —                   | —                     | 908              | 965                    | —                           | —        | 77                |              |     |    |
| 24 Part of Lecropt       | —      | —     | —                   | —                     | 248              | —                      | —                           | —        | 37                |              |     |    |
| 26 Part of Logie         | —      | —     | —                   | —                     | 671              | —                      | —                           | —        | 141               |              |     |    |
| Total                    | —      | —     | 37,004              | 44,886                | 50,817           | —                      | 14,146                      | 3427     | 7308              |              |     |    |

Observations

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*Observations on the Population Table of Stirlingshire.*

*Isf* In the population lists of the parish of Kippen, New Kiptfrick, Lecropt, and Logie, (which are partly situated in other counties,) the number of inhabitants belonging to Stirlingshire was never particularly stated until the enumeration was made under the act in 1801. The population of these parishes, therefore, is omitted in columns 4 and 5 : But there is good reason to conclude, that it has increased considerably since the year 1755, and even since the years 1790—1794, (or, as it may be taken at a medium, the year 1794.)

The parishes of Kippen and New Kilpatrick are known, (as will be afterwards stated,) to have increased, the former by 132 souls, from the year 1801 to 1808 ; and the latter by 57, from 1801 to 1811. If the same proportion be assumed with regard to Letiropt and Logie, the increase of the former will be about 15 souls; and that of the latter about 42; making in all an addition of 246 souls since the year 1801.

To complete the above two columns of the table, therefore, it will be necessary to add to them the population of 1801 nearly. Taking it, however, without any deduction, the population of the Stirlingshire district of these four parishes amounts to 5075. This added to column 4, gives the total population of Stirlingshire in 1755 at 40,079 ; and, added to column 5, it gives the population of 1794 at 47,9617: The population of 1801 is 50,ftL.

24, The total increase of the population of the county from 1755 to 1801, appears to be 14,145; from which, if the total decrease, being 3447, be deducted, there will remain 10,698 of absolute increase, independent of that which has taken place in the four parishes which have been mentioned, and which has been calculated at 246 souls; this makes in all an absolute increase of 10,944.

3f, Froita column 7 of the table, in which the Reporter gives the population of *eleven* parishes of the county\* from information recently obtained from sources apparently most authentic, it appears that in 9 of these parishes, there has been an additional increase since the year 1801 of no less than 3879 souls; whilst in the other 2 parishes, there has been a decrease of only 156; thus leaving an absolute increase from the above period of 3723\*.

41/J, If it be admitted (as it would seem it ought to be) that the population of these *eleven* parishes has increased since 1801 by 3879, whilst it has decreased by only, 156, leaving a general increase of 3723, it will

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follow

\* The Reporter acknowledges that, in the part of the table that relates to Kilsyth parish, there is something which he cannot satisfactorily explain\*, in 1790—1798, the population is stated at 2450. In the government census, 1801, it dwindles down to 1762, leaving a decrease of 688. Dr Hennie, again, writes in 1808, "That in a survey made in 1800, the population was 2800; that it was rapidly increasing during the last eight years, and might then be taken at not less than 3,000 souls." There seems evidently to be some error in the estimate made under the act in 1801.

follow that, taking the number of parishes as in the table at twenty-five, the increase on the whole since 1801 should be 5665, whilst the decrease should be only 380; thus leaving a general increase during that period of 5,285 souls. The whole population of the county of Stirling will then amount to about 56,000.

*5tk*, It appears that the increased population has taken place in those parishes in which manufacturing establishments have been introduced or extended, as in Balfron, Campsie, Denny, Falkirk, Larbert, Polmont, &c. The decrease has taken place in parishes where agriculture, and particularly grazing, are exercised, as in Airth, Buchanan, Drymen, Muiravonside, Slamannan, and Strathblane. But it must be observed, that the depopulation which has taken place in these districts is not to be regarded as the mark of a deteriorated, but, on the contrary, of an improved system of agriculture. In former times, when the price of labour was low, and manufactures unknown, every occupant of land retained upon his farm and in his house a great number of starving cottars, and of idle and unskilful servants. Every farm was a petty village, the farms themselves were small, and the tenants were numerous and poor. This slovenly system is now happily done away. In the agricultural districts, the farms are enlarged; and from the superior skill of servants, and the improvements introduced in the implements and machinery that are employed, fewer hands are necessary. In the grazing districts especially, the farms are extensive, and very few servants are sufficient to tend the cattle. In Fintry for example, though a large cotton-work and a very considerable village have been lately

ately erected, it will be seen, by column 7 of the table, that the population has decreased since 1801, by 48 souls; that of Buchanan has decreased since 1755, by 951; and Drymeo, by no less a number than 1181. But let it suffice, in answer to the croakers against the enlargement of farms, and the exchanging of men for sheep, that the general population of Stirlingshire has undeniably increased within these few years, by at least 12,000, or more probably by 16,000 souls.

With regard to the question, whether the county be *over* or *under* peopled, it may be sufficient to observe, that if by being; *under peopled* is meant, that the number of the inhabitants is insufficient, to consume the produce of the soil, whether in grain or in animal food, it must unquestionably be considered as under peopled. Stirlingshire certainly produces more wheat, barley, oats, &c. as well as more beef, mutton, and other kinds of animal food, than what is sufficient for its own consumption, and consequently sends large supplies of these to other parts of the country.

But there is another point of view in which it may be styled merely a *well peopled* county. It abounds in villages, many of which are populous, and yearly increasing. There is a sufficient number of hands to carry on the operations of agricultural and manufacturing enterprise; and as all the districts of the kingdom are not equally productive of food for man, it seems necessary and proper, that the richer districts (of which number this certainly is to be reckoned,) should not consume all their produce within themselves, but that they should contribute from their superabundance to the subsistence of the poorer.



With regard to the number of persons inhabiting towns and villages, no very certain estimate can be given. After premising that most of these towns and villages are daily increasing in population and size, the following enumeration is offered.

*Teams and Villages in Stirlingshire.*

|  |   |   |   |   | Population, |
|--|---|---|---|---|-------------|
| Airtli   | - | - | - | - | 800         |
| Baliron  | - | - | - | - | 1,400       |
| Bainsford  | - | - | - | - | 800         |
| Buchlyvie  | - | - | - | - | 510         |
| Caxndon  | - | - | - | - | 565         |
| Fulkirk  | - | - | - | - | 410         |
| Gargunock  | - | - | - | - | 400         |
| Grangcpiouth   | - | - | - | - | 920         |
| Killcam  | - | - | - | - | 230         |
| Kilsyth, Old and New Towns                                   | - | - | - | - | 1,200       |
| Kippen   | - | - | - | - | • 500       |
| Lauristowr   | - | - | - | - | 400*        |
| Stirling   | - | - | - | - | 5900        |
| St. Ninians  | } | - | - | - | 5000*       |
| Bannockburn  |   |   |   |   |             |
| Larb   |   |   |   |   |             |
| Den  |   |   |   |   |             |
| Polmont  |   |   |   |   |             |
| New huiry  |   |   |   |   |             |
| Total population of towns and villages<br>in Stirlingshire.} |   |   |   |   | 22,501      |

With regard to the *healthiness of the district*, ~~some~~ **data** have been already furnished in treating of the climate

'dimate and soil of the county. It is liubleto no peculiar distempers. Some account has been given of the disappearance of intermittent fevers, in consequence of draining and deep ploughing in the Caries\*. In this moist and weeping climate, working people, who have much occasion to be exposed to the weather, are frequently aSJKted, especially in advanced life, with rheumatic complaints. A careful attention to putting on dry clothes, immediately after leaving off work and coming home, cannot be too earnestly recommended to persons in such circumstances.

With regard to *thef'xyl and mode of living*, it does not scern necessary to add auy thing to what has been snggested under tie articles of the *pr-pttrator* of the different kinds of grain, and particularly tij^t of the *price of provisions*. Chap. XV. Sect. ii. It may be observed, upon the whole\* that thp peasantry of tirtingshire, especially those who farm upon a large scale, either in the grazing or agricultural line, enjoy the comforts and conveniencies of life in as great abundance as persons of the same order do in any county of beet? land,

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CHAP,

## CHAPTER XVII.

### OBSTACLES TO IMPROVEMENT-

ON this part of the subject it will be unnecessary to enlarge. Some of the obstacles to the improvement of this county have been already alluded to ; and many of those which are suggested in the plan of the Board of Agriculture have no existence in it. No instance, for example, occurs to the Reporter of the want of *power* to improve by *inclosing*; unless by the want of *power* be meant the want of *means*, which is a not unfrequent occurrence. *Tithes* are unknown in Stirlingshire, the *porr*, as has been stated, are supported principally by voluntary contributions ; and in the few instances in which assessments have been resorted to they are so trifling as to be scarcely felt.

With regard to the obstacles to improvement from *enemies*, they are, no doubt, common to Stirlingshire with other counties of Scotland. The red or wire worm, and slug, do not appear to be particularly destructive in this district. A singular phenomenon that occurred in this, and the adjacent counties in 1808, of the devastation so widely threatened by the slug, has been already,

already, perhaps by an improper anticipation, described\*.

Rats and mice abound here as elsewhere. Their depredations in the farm yard may be prevented effectual\*  
ty> by placing the stack, as is here frequently done, up\*  
on a frame of wood, supported by small pillars of stone,  
with a coping which projects so that no vermin can  
ascend. The Reporter has some where seen it assert\*  
ed, that vermin may be expelled by strewing about  
the leaves and stem of the cyneglossum officinale bruised,  
when full of sapf. Such an easy process deserves  
a trial. Rats are too cunning to devour arsenic as it is  
to be had from the hops ; its grittiness, in that -state,  
offends and alarm^pem. A gentleman of this county  
purchased the secret of the preparation from a rat-  
catcher for a guinea; and it consists only in triturating  
it in a mortar till it has become an impalpable  
powder, and, when mixed with meal, rats will devour  
it freely.

Sparrows and other small birds are accounted enemies,  
and they no doubt do much imVHtf; bntjj; may be  
justly questioned w hether they do not effect a greater  
good, by destroying the eggs and larvae of insects,  
which, were they permitted to multiply without such  
a check, would over-run and lay waste the vegetable  
kingdom.

Moles

f P. ill.

tThe cynoglossum officinale grows, though sparingly, on  
a bank a little to the north of the church of Bulfron. It  
may probably be found in many other parts of the county.

Moles are by some accounted enemies, but the prejudice is founded in ignorance ; they furnish always a certain indication of a well conditioned soil. Moles feed on worms \* and worms serve many important purposes in the economy of nature; without them, the superficial stratum of the earth would either be locked up in an impervious paste, or drowned in a miry swamp. Worms, and the moles which feed upon them\* by perforating the soil in a thousand directions, keep the vegetable mould open; they furnish, innumerable natural drains that lead off, by the declivities, the water which would otherwise accumulate under the surface; and they thus preserve the soil in a state admirably fitted for the expansion of the roots of plants. Mole-hills are indeed a nuisance in grass lands, but they can be easily spread and made to serve as a topdressing.

Pernicious insects may be destroyed by the application of *quick-Urns*, of alkaline and neutral salts, of sea salt, and of soot.

From the great and increasing extent of the woods and plantations of this county, foxes, martins, polecats, and wild cats are frequent, and commit many depredations on the flocks and poultry. On the Duke of Montrose's estate a fox-hunter, furnished with a proper pack of hounds, is regularly employed and paid by the grazing tenants according to the extent of their possessions.

The want of shelter from planting (though there are many extensive plantations in this country,) is, in many instances, to be accounted an obstacle to improvements in a district like this, which forms the narrowest part of Scotland, and is exposed, during so long a proportion

tion of the year, to the south-western blast. This part of the subject, however, has been already exhausted in speaking of *thejorm of plantations* \*• Great exertions are now making in various parts of the county to remedy this evil; and it may be hoped that, by the judicious application of shelter, its bleakest soils will in process of time be rendered fertile.

'The disadvantage\*: arising- from the small siase of farms, an evil too prevalent in some parts of thi\$ county, where a better system might have been expect\* ted, have been noticed already ii> Chap. IV, Sect. i.

But the great and leading obstacle to improvement in this, as weU as μ^ many other counties, is the *want of disseminated bnorj^Jfee* on subjects connected with agriculture. Agriculture is a Science, to the right understanding of which many subsidiary branches of knowledge are indispensably requisite.

An agriculturist should be so far acquainted with the principles of mechanics, as to be able to judge of, and direct, as well as occasionally to improve, and even to invent, the most useful instrumntw used :r. mral eco» nomy.

He should know the principles pf botany, at least so far as to be able to distinguish the families and species of the native vegetables of his own country; nor will it be sufficient to know them by their trivial English names •, these are frequently too vague to furnish a precise distinction 5 they must be known by the accurate characters of the Linnaean nomenclature.

But

But the most important branch of subsidiary knowledge which claims the attention of the agriculturist is chemistry, so far as it relates to the process of vegetation\* and the use and application of manures. Without this knowledge, he is exposed to the risk of making many useless and expensive experiments, and of wasting much precious time, as well as materials.

The Reporter acknowledges that, in suggesting some views which had occurred to him on the two last of these subjects, it has been his object to excite a taste in agriculturists for sciences so intimately connected with their profession : he is no adept in either of them ; he professes to be only a humble amateur.

Till a taste for such studies becomes more prevalent, especially in agriculturists possessed of a suitable capital to enable them to engage in improvements upon an enlarged scale, no very considerable advances can be looked for in this department. It is with men of science and of comparative opulence that all the late spirited improvements have<sup>1</sup> had their rise. Such only can encounter the expense and the casual losses which attend new experiments ; and it is in such only, that we can expect that spirit of enlightened investigation which leads to important discoveries, or which can apply these to their proper use.. Never can such discoveries, or the application of them, be expected from the groping of ignorance, or from the grovelling of poverty;

• This *disseminated knowledge* must begin with the landed proprietors, who though many of them hold a portion of their lands in their own possession, are very generally strangers to the philosophy of agriculture. They do not know how much they abridge their own enjoyments,

enjoyments, as well as their profits, by neglecting such amusing and important studies; the general science which country gentlemen almost always possess would render the acquisition of the scientific principles of agriculture both easy and agreeable. A professorship of agriculture being now established in the university of our metropolis, and held by a gentleman so eminently qualified for the office, every landed proprietor who sends his son to be educated there, should consider it\* at least, as necessary for him to study agriculture and the subsidiary sciences, as to study Greek or Logic.

The example, and even a portion of the knowledge of the landed gentlemen, will soon descend, and diffuse themselves among their tenants ; and at length knowledge and practice will combine in carrying agriculture to all the perfection which the soil and climate admit.

CHAP.



## CHAPTER XVIII.

### MISCELLANEOUS ARTICLES.

#### SECTION 1.—AGRICULTURAL SOCIETIES\*

MANY associations have been formed in different parts of Stirlingshire, for the purpose either of improving the breed of cattle, or of improvement in ploughing, or for both if the?; Reiner.

The exertions of the Kilsyth association, and of the Gargunock club, in promoting the former of these purposes, as well as the premiums given to the successful candidates, have been detailed in a former Section, when speaking of live stock\*.

The following account of the Gargunock Farmer Club, communicated by the Rev. Mr Tait, one of its most ancient members, will be found interesting.

“ This

"This club was instituted in 1796, by the late General Fletcher Campbell of Salton and Boquhaxi, with the concurrence of several of the most respectable gentlemen in the neighbourhood.

Its principal object is to promote improvements in agriculture by the united endeavours of the proprietors of land, the clergy and the farmer, and also of the Merchants and artificers. The institutors of the club had it further in their view, to obviate that tendency which the increasing refinement of manners has, to confine social intercourse in the country, chiefly to ceremonious visits between persons of similar fortune and rank and, by bringing the landlord and tenant more frequently together in familiar converse, to connect them more closely with each other.

From the commencement of the club, premiums have been given for different objects and particularly for encouraging improvements in ploughing and in breeding cattle. The club has much cause to congratulate itself on its success in promoting the first of these purposes, the mode of ploughing with the share of the club having been already improved beyond its most sanguine expectation.

The funds of the club arose solely from the contributions of the members until 1807, when the late Lieut. General Fletcher Campbell bequeathed the sum of five hundred pounds Sterling, to Peter Speirs Esq. of Culcruich, the Rev. Mr Tait of Kincardine, and Sir Lyle John writer in Stirling, as trustees for the benefit of the club.

The ordinary meetings of the club are held once in three months. Extraordinary meetings are sometimes held

held by appointment of the club, or may be called at the discretion of the conveyer. A similar power, in this respect/ is vested in the respective conveyers of the several districts.

The several districts of the club are as follows : viz\*

1. Gargunnoch, comprehending that parish.
2. Stirling, comprehending the parishes of Stirling and St. Ninians.
3. Kippen, comprehending that parish.
4. Fintry, comprehending that parish.
5. Balfron, comprehending the parishes of Balfron, Killearn, and Drymen.
- 6 Fort, comprehending that pftish.
7. Kincardine.
8. Kilmadock.

The three last of these are in the county of Perth.

The number of the members of the club at present amounts to sixty, including some noblemen, and some of the most respectable gentlemen and clergymen of the neighborhoods-*tfE&hs* club is regulated by proper rules well suited to circumstances, but which it is not here necessary to detail."

Of the utility of instituting ploughing matches, in particular, some have entertained doubts. It has been alleged that the ploughmen who have been successful in these competitions become henceforth insolent and extravagant in their demands of wages \* it is presumed, however, that the superior dexterity acquired, and widely diffused among plougkmen by these competitions far outweighs the' evil complained of. There needs no other proof of this than the difference that

is

is to be observed in respect to ploughing, between the corses of Stirlingshire, where ploughing matches are unknown, and the tounds of the Gargunnoch club. In the former, the operation is performed, for the most part, in a slovenly manner; the ridges are broad and crooked, in the latter, the form of the ridges, and the manner in which the furrow is turned, furnish a model.

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SECT. I. — PROVINCIAL TERMS,

ON this subject, it is altogether unnecessary to detain the reader. **The Reporter** observes nothing that is peculiar either to the language or **pronunciation** of Stirlingshire. In the higher parts of the parishes of Drymen and Buchanan, the Gaelic language still continues to be spoken, though almost every body understands English. Throughout the rest of the country, the Scots dialect is spoken very nearly as in the North. Many *cots* *tetks*, which might have proved unintelligible to our southern neighbours, had been incidentally explained in the course of this Report.

## CONCLUSION.

### *Means of Improvement\* and the Measures Calculated for that purpose.*

IT appears to the Reporter, that he has already exhausted this subject, as far as his information extends. In Chapter XII. he has suggested every thing that occurred to him on the important *improvements* of draining, paring and burning, manuring, and irrigation. In Chapter XVII in adverting to *the obstacles* to improvement, he has at the same time attempted to suggest the means of obviating these obstacles, by the judicious enlargement of farms, by the increase of shelter, and by the more general dissemination of knowledge in subjects connected with agriculture. To what he has advanced on these subjects, he has nothing to add.

Stirlingshire, throughout so great a proportion of its extent, a grazing district, it is thought necessary to repeat a hint formerly thrown out\*, of the propriety of improving the staple of its pastures, by propagating the most valuable of our native grasses. In a late number of the Farmer's Magazine, the Reporter observed a short notice of a premium bestowed by the Highland Society of Scotland, on the Reverend and ingenious Dr Singers-of Kirkpatrick-juxta, for his Essay on that subject. The selection of the plants made  
by

by the Horticulturist appears to be very judicious. A list of the greater number of these has been given in a former part of this Report\* ;\*and it maybe added, that as nature propagate these plants abundantly, by the mere dropping of *the* seeds upon the groundj without any previous preparation of the soil, it may be sufficient to sow them upon the surface, and, to ensure their growth, it may be proper to pass the roller gently over them. The seeds themselves are easily preserved, especially those of the *Oiadelphia* class ••, which is by far the most valuable in this point of view. In bogs and meadows, where no good herbage will grow, it might be useful to sow the seeds even of the *Carex* tribe, and of the *Poa aquatica*.

B b 2

## APPENDIX.

\* P. 189, 190.

f The Pea Flowered Plants.

Income, Poor, and their Funds, 3-c. by Parishes.

| No. | Name    | Schoolmaster** |    |    | No. of Poor | Capital of Poor's Fund.-. |    |    | Collections, Ac. |    |    | Income of Poor. |    |    |
|-----|---------|----------------|----|----|-------------|---------------------------|----|----|------------------|----|----|-----------------|----|----|
|     |         | L.             | s. | d. |             | L.                        | s. | d. | L.               | s. | d. | L.              | s. | d. |
| 1   | Ai 75*  | 45             | 0  | 0* | 42          | 300                       | 0  | 0  | 100              | 0  | 0  | 15              | 0  | 0  |
| 2   | AI60    | 40             | 0  | 0* | 30          | 50                        | 0  | 0  | 30               | 0  | 0  | 34              | 0  | 0  |
| 3   | Ra 55*  | 40             | 0  | 0* | 6           | 420                       | 0  | 0  | 20               | 0  | 0  | 41              | 0  | 0  |
| 4   | Ba 80   | 60             | 0  | 0  | 30"         | 100                       | 0  | 0  |                  |    |    | 35              | 0  | 0  |
| 6   | Be 50*  | 45             | 0  | 0* | 7           | 130                       | 0  | 0  |                  |    |    | 25              | 0  | 0  |
| 6   | Bt 00   | 50             | 0  | 0» | 12          | 280                       | 0  | 0  | 20               | 0  | 0  | 34              | 0  | 0  |
| 7   | WOO     | 150            | 0  | 0» | 40*         | 570                       | 0  | 0  | 41               | 10 | 0  | 70              | 0  | 0  |
| 8   | Ht 00   | 90             | 0  | 0* | 17          | 51                        | 0  | 0  | 41               | 0  | 0  | 50              | 0  | 0  |
| 9   | Di 75   | 40             | 0  | 0* | 32          | 120                       | 0  | 0  | 21               | 0  | 0  | 14              | 0  | 0  |
| 10  | Fa 00*  | 280            | 0  | 0* | 160*        |                           |    |    |                  |    |    | 300             | 0  | 0* |
| 11  | Fii 0.i | 88             | 0  | 0* | 6           | 370                       | 0  | 0  | SB               | 0  | 0  | 48              | 10 | 0  |
| 15  | Gsii 0* | 50             | 0  | 0* | 10*         | 365                       | 0  | 0  | in fl            | 0* | 0* | 48              | 5  | 0* |
| 23  | Ki 40   | 41             | 17 | 0* | 10          | 156                       | 0  | 0  | 25               | 0  | 6  | 40              | 0  | 0  |
| 24  | Ki 70   | 280            | 0  | 0* | 30*         | 0.10                      | 0  | 0  | t.;5 JO          | 0  | 0  | 200             | 0  | 0  |
| 15  | Ki 83   | 120            | 0  | 0* | 30          | 450                       | 0  | 0  | L                | 40 | 0  | 73              | 0  | 0r |
| 41  | La 00   | 250            | 0  | 0  | 25          |                           |    |    | 48               | 0  | 0  | 100             | 0  | 0  |
| 17  | lh 60»  | 50             | 0  | 0* |             |                           |    |    |                  |    |    |                 |    | *  |
| id  | Pi 50   | 130            | 0  | 0# | 30          | 120                       | 0  | 0  | 36               | 0  | 0  | 65              | 0  | 0  |
| id  | 5r.50»  | 100            | 0  | 0* | 100*        | 1000                      | 0  | 0  |                  |    |    | Ho              | 0  | 0  |
| JX* | Jla 85  | 100            | 0  | 0  | 12<         | 100                       | 0  | 0  | 20               | 0  | 0  | 30              | 0  | 0* |
| SIS | fi 00   | 260            | 0  | 0  | 110         |                           |    |    |                  |    |    | 138             | u  | 6' |
| 22  | >tr 50  | 45             | 0  | 0# | 8           | 331                       | 0  | 0  | 23               | 10 | 0  | 45              | 0  | 0  |
| IN. | 00      | 90             | 0  | 0» | 16'         | 560                       | 0  | 0  |                  |    |    | 100             | 0  | 0  |
| Kx  | <40     | 25             | 0  | 0  | 4           | 90                        | 0  | 0  | 15               | 0  | 0  | 19              | 10 | 0  |
| i   | 0.30    | 20             | 0  | 0  | 3           |                           |    |    |                  |    |    |                 |    |    |
| 08  | 265Q    | 17             | 5  | 0  | 96          | 5255                      | 0  | 0  | 174              | 10 | 0  | 157             | 5  | 0  |

U \* boat for fishing salmon ; the compensation is sufficiently low

*Observations on the preceding Statistical Table.*

The foregoing table has been constructed with all the attention of which the Reporter is capable; he is still sensible, however, that it contains some defects, which he finds it impossible to remedy: the following remarks may account for some of these, whilst they may, at the same time, assist future inquirers in supplying them.

1. Where any doubt is entertained concerning the precision of any article in the table, though the most probable approximation has been attempted, an asterisk is affixed to that article, thus {\*.)

2. In column second, the valued rent of Alva is stated, from Sir John Sinclair's Table, at L 2032. Os. 4<sup>s</sup>. L Scots, Mr Johnstone of Alva, in his valuable communication, states it at L.4100 Scots. The valued rent of Polmont is not stated in Sir John's Tables, but included in that of Faikitfc, <{\* ith which tljat parish was\* formerly united: It is here given separately from the best data that could be obtained. The table shews the valued rent of Stirlingshire to be L. 108,425. 15s. lid. Scots; but it appears, from authentic documents, that the valued rent of the county is really L. 108,516. 16s. 7d. Scots. The difference is probably owing to some error respecting the parishes of Alva or Polmont.

3. The real rent Sterling is given under the separate heads of lands, houses\* and minerals. The data on which this estimate is founded are derived from an authentic source. The whole amounts to L. 189,627.12s.



4- In column fourth, the ministers stipends are given, as far as they can be ascertained, under the two heads of grain and money Sterling. In this article, few deficiencies will be met with. No distinction is made between bear and oatmeal though grain stipends are sometimes paid in the one, and sometimes in the other. If the boll of victual be taken at the average price of L. 1 Sterling, the whole money and victual stipend of the clergy of Stirlingshire will amount to L.44-21. 19s. 4d. From this estimate, however, there must be deducted that proportion of the stipends of the three parishes, Kippen, N. KHpatrik and 1 ecropt\*, which is paid by other 'counties in which they are partly situated \*, the whole deduction necessary to be made may amount to about L.300, leaving the sum-of L.4121. 19s. 4d. The value of the glebes has not been ascertained; it may be taken at the average of L 12 each ; making an addition to the income of the clergy of \*Z<sup>C</sup>2 parishes of L.264. The whole income being L.4385. 19s. 4d.

5 In the column of the number of scholars, many marks of doubt a?cur. In the tgwn of Stirling especially, where there are many eminent schools for the education of boys, as well as some respectable boarding schools for young ladies, the number of scholars, upon the whole, was stated upon good authority at 1120; there is reason, however, to believe that some of them had been reckoned twice; the same boys being stated under the articles of the grammar school, and the writ-  
ing

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\* The proportion of the stipend of Logic paid by Stir\* lingshire. is ac<ursttely given in the table, as well as att the other particulars relating to that parish.

*mg* school. They may be taken in all at 1000 scholars, one fourth of whom probably are from the adjacent country.

6. Column sixth gives a very imperfect view of the schoolmasters emoluments, which it is very difficult to ascertain. The salaries are by law from 300 to 400 merks Scots, with a house and a rod of ground inclosed for a garden; the school wages are now very generally augmented. From every view which the Reporter is enabled to form of the subject, he is of opinion that, between salary and wages, the schoolmaster has, at an average, 18 and sometimes 20s a year for every scholar: The number of these being pretty accurately calculated, it is presumed that the emoluments of all the teachers of schools in Stirlingshire may be taken at L.265<sup>C</sup>. 17s. 5d. as stated in the table.

It is to be observed, that in many populous parishes, there is more than one established schoolmaster, besides private teachers. Thus in Denny, there are three private schools, attended by 180 scholars. In Falkirk, there are two parochial schoolmasters, each having emoluments to the amount of L.100 a year; there are also several private teachers. In Kilsyth, there are four teachers, the emoluments of each of whom amounts to L.70. In the table, the whole emoluments of the different teachers in one parish are given *in ciimulo*.

7. As to the number of the poor (column seventh) several marks of uncertainty also occur. The truth is, that it varies in every parish from year to year. In the enumeration of the poor of the parish of Stirling, those only are stated who receive alms from the funds of the kirk-session, or from voluntary contributions. An ac-

count of those who are maintained or assisted by the hospitals has been already given.

• With regard to the stock of the poor, it is given accurately in almost every instance. It may be proper to state, that the stock of the poor of Kilsyth consists of 20 acres of land, which have been let at L.23; and will now probably let for more. The value of this land has been calculated at 30 years purchase.

In many instances, it has been impossible to ascertain the collections; but it may be proper to observe, that under this head, the produce of the mortcloth, proclamations for marriage, and fines for immorality, are included.

The annual income of the poor has been pretty accurately ascertained, except in one or two parishes, whether it arises from the interest of money, from collections, from parochial assessments (of which an account has been already given) or from any other source. The amount, as far as it has been ascertained, is L.2157. 5s. For the unascertained parish of Muiravonside, and a part of Log;\*, JL 40 may be added, making in all L/2197 5s.

If to this we add the income of the Stirling hospitals, amounting, as has been stated<sup>#</sup>, to JL.4130. Is. 7d. the total provision for the poor of the county of Stirling will appear to be L.6327. Us. 7d. The poor of the county, including the hospital pensioners, being 1056, (here will remain on an average for each the sum of L5. 19s. 10M. nearly.

SECT,

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\* P. Z66. See Note, p. 396.

## SECT. II.—LIVE STOCK.

|  |          |
|--|----------|
| The number of riding horses in Stirlingshire, is | 319      |
| _____ of work horses                             | * - 3516 |
| Total  | 3565     |

Accurate returns have been obtained of the number of black cattle and sheep in the following parishes.

|                 | Black Cattle.      | Sheep.                       |
|-----------------|--------------------|------------------------------|
| 1. Alva         | you*               | 4,164                        |
| 2. Balfron      | 615                | 1,330                        |
| 3. Buchanan     | 590                | 11,110                       |
| 4. Dtyinon      | 2,013              | 7,700                        |
| 5. Fintry       | 1,320              | 2,810                        |
| 6. Giirgittmock | 800                | 2,000                        |
| 7. Killoarg     | 800 <sup>ii*</sup> | 4,314                        |
| 8. Kilsyilt     | 1,070              | 1,000                        |
| 9. Kippon       | 1,500              | 200                          |
| 10. Sirathblae  | 5,000              | 1,000                        |
| M. Campsie      | 1,000              | 1,600. From [the Stat. Acct. |
| 12. Logre       | 173                | 520                          |
|                 | <hr/> 11,775       | <hr/> 34,177                 |

<sup>1</sup> In the remaining parishes, which are situated in the eastern district of this county, and principally occupied in mining, no accurate account has been obtained of the live stock. By a particular analysis of every parish, however, upon the best data that occur, it is conjectured that the

the number of black cattle in these parishes, is about 7450, and that of sheep, about 3800 : Thus the amount of live stock JD the whole county Hill *be*,

|  |           |       |   |
|--|-----------|-------|---|
| Horses, * 3564, at the average value of      |           |       |   |
| L.22 each . . . . .                          | L.78,430  | 0     | 0 |
| Black cattle, 19,225, at dc* of L.6.5s. each | 120,150   | 5     | 0 |
| Sheep, - 37,977, at do. of l&.ctiCh          | 30,38i    | 12    | 0 |
|  |           | <hr/> |   |
| Total value uf li\c stock                    | L 228,967 | j     | Q |

The number of the horses being taken from a public register, it is presumed that it is considerably below the truth. Of the number of swine, no account has been obtained, only three parishes having made a return, viz Drymen 100, Balfron 19, and Killearn 30.

Of the agricultural produce of the county, it is impossible to form any accurate estimate. The number of acres of carse in the county haviflg been reckoned at 28,500, and that of lighter soils held under cultivation, at 80,000\* ; if the agricultural produce of the former be taken at L 8 'pdr acre; and that of the latter at L.4, die result will be L.491,000.

As to the'manufactured produce, the fisheries, and the minerals or\* the county, to form a just estimate of their animal value is attended with equal difficulty. A reverend gentleman well acquainted with the subject, states the manufactured produce of the parish of Larbert alone (in which the Carron-works are situated) at L.300,000 a year. If to this we add the various other

other manufactures which have been formerly alluded to, together with the minerals, the whole may be taken at i.,500,000. The fishery at Stirling produces about L.J200.

*General View of the County of Stirling.*

|   |         |           |               |                |
|---|---------|-----------|---------------|----------------|
| Extent in square miles                              | -       | -         | -             | 615            |
| in English acres, statute measure                   | -       |           |               | <b>412,800</b> |
| in Scots acres                                      | -       | -         | -             | 328 300        |
| in do. arable                                       | -       | -         | -             | 106,500        |
| in mountain and valley pastures                     | -       |           |               | 194,800        |
| in woods and plantations                            | —       | —         |               | 8000           |
| in deep mosses and wastes                           | -       | -         | -             | 17,000         |
| Horses  | -       | 3161      |               |                |
| Black cattle  | -       | 119,225   |               |                |
| Sheep   | -       | 37,077    | L. s. d.      |                |
| Value of livestock                                  | -       | • 288,617 | 17            | 0              |
| Value of manufactures, produce, fishery, and morals | 501,200 | 0         | 0             | 0              |
| Value of agricultural produce                       | -       | -         | 491,000       | 0 0            |
| Value of woods cut annually                         | • 4000  | 0         | 0             | 0              |
| Value of rent, Scots                                | -       | 108,516   | 16            | 7              |
| Value of rent Sterling in houses and lands          | -       | -         | <b>£3,143</b> | <b>4 0</b>     |
| Number of the inhabitants in 1750                   | -       | -         | -             | 37,004         |
| Do. in 1750—1798                                    | -       | -         | -             | 44,836         |
| Do. in 1801   | -       | *         | -             | 50,811         |
| Increase from 1755 to 1795, being 40 years          |         |           |               | 7882           |
| Do. from 1795, to 1801 being 6 years                |         |           |               | 5925           |
| Inhabiting towns and villages                       | -       | -         | -             | 22,804         |
|   |         |           |               | 28,007         |
|   |         |           |               | Number         |

**K**

Inhabiting the country part - -

|   |   |   |        |    |     |   |      |
|---|---|---|--------|----|-----|---|------|
| Number of-inhabitants in 1801, to every square mile     | - | - | .      | -  | -   | - | 199½ |
| English acres to each inhabitant in ISO 1               |   |   |        |    |     | - | 8½   |
| Ministers stipends, including glebes                    | - | - | L.4385 | 19 | 4   |   |      |
| Average to each minister nearly, reckoning 25 ministers | - | - | 190    | 13 | 10^ |   |      |
| Number of scholar*                                      |   |   | -      | -  | -   |   | 4008 |
| Schoolmaster* salaries and emoluments                   | - | - | 2559   | 17 | 5   |   |      |
| Number of poor, including the Stirling hospitals        |   |   | -      | -  | -   |   | 103C |
| Capital stock of poors funds                            |   |   | 6233   | 0  | 0   |   |      |
| Annual income of the poor, including the hospitals      | - |   | 6187   | 5  | 6   |   |      |
| Average to each   | - | - | 5      | 17 | 2*  |   |      |

No.

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• N. B.—In p. 366', an error of the press in stating the present income of Allan's hospital at L.56'8. 16s. 9d. escaped notice : It should have been stated at L.46S. 15s. 9d. This circumstance occasions some discrepancy between the above statement and that in p. 366.

No. II.

The Tians of Stirlingshire for 40 years

First Series.

|                            | Wheat. |    |    | Carse Barley |    | Dryfield Do |    | Ommt;il per Boll. |    |
|----------------------------|--------|----|----|--------------|----|-------------|----|-------------------|----|
|                            | L.     | s. | d. | L.           | s. | d.          | L. | s.                | d. |
| 1757                       | 0      | 13 | 4  | 0            | 12 | 11          | 0  | 13                | 0  |
| 1758                       | 0      | 9  | 5  | 0            | 9  | 2           | 0  | 9                 | 2  |
| 1759                       | 0      | 13 | 0  | 0            | 9  | 0           | 0  | 8                 | 4  |
| 1760                       | 0      | 13 | 6  | 0            | 9  | 2           | 0  | 8                 | 9  |
| 1761                       | 0      | 13 | 6  | 0            | 10 | 0           | 0  | 9                 | 7  |
| 1762                       | 0      | 17 | 0  | 0            | 13 | 10          | 0  | 13                | 4  |
| 1763                       | 0      | 15 | 0  | 0            | 13 | 4           | 0  | 14                | 2  |
| 1764                       | 0      | 16 | 0  | 0            | 15 | 0           | 0  | 14                | 6  |
| 1765                       | 0      | 19 | 0  | 0            | 19 | 0           | 0  | 19                | 0  |
| 1766                       | 0      | 18 | 0  | 0            | 18 | 0           | 0  | 17                | 0  |
| 1767                       | 0      | 15 | 0  | 0            | 17 | 0           | 0  | 15                | 0  |
| 1768                       | 0      | 13 | 0  | 0            | 13 | 0           | 0  | 12                | 8  |
| 1769                       | 0      | 17 | 0  | 0            | 14 | 2           | 0  | 13                | 10 |
| 1770                       | 0      | 17 | 0  | 0            | 14 | 6           | 0  | 14                | 0  |
| 1771                       | 0      | 17 | 0  | 0            | 17 | 0           | 0  | 15                | 6  |
| 1772                       | 0      | 17 | 6  | 0            | 17 | 6           | 0  | 16                | 8  |
| 1773                       | 0      | 17 | 6  | 0            | 17 | 6           | 0  | 16                | 8  |
| 1774                       | 0      | 16 | 8  | 0            | 16 | 8           | 0  | 16                | 0  |
| 1775                       | 0      | 17 | 0  | 0            | 17 | 0           | 0  | 13                | 4  |
| 1776                       | 0      | 17 | 0  | 0            | 13 | 0           | 0  | 11                | 8  |
| Medium price for 20 years. | 0      | 14 | 0  | 0            | 13 | 0           | 0  | 12                | 10 |



First Series Continued.

|        | Wheat. |     |    | Carse Barley. Dryfield Do. |     |    | Oatmeal per Boll. |    |    |    |
|--------|--------|-----|----|----------------------------|-----|----|-------------------|----|----|----|
|        | L.     | s.  | d. | 6.                         | ci. | s. | d.                | L. | s. | d. |
| 1777 • | 1      | 0   | 0  | 0                          | 14  | 0  | 13                | 6  | 12 | 9  |
| 1778   | J      | 19  | 0  | )                          | 14  | 0  | 13                | 6  | 12 | 6  |
| 1779   | 1      | 13  | 9  | J                          | 12  | 6  | 12                | 0  | 11 | 0  |
| 1780 ; | >      | 17  | 6  | J                          | 13  | 0  | 12                | 6  | >  | 13 |
| 1731   | )      | 19  | 0  | >                          | 13  | 0  | 13                | 0  | i  | if |
| 1782   | 1      | 4   | 0  | 1                          | 2   | a  | 1                 | 0  | 0  | iy |
| 1753   | 0      | 19  | 0  | 1                          | 16  | 0  | it;               | 0  | 0  | 15 |
| 1784   | 1      | 0   | 0  | I                          | 19  | 0  | )                 | 18 | 0  | p  |
| 1785   | 0      | 14  | 0  | 1                          | 15  | ti | 0                 | 13 | 4  | 0  |
| 1786   | 0      | iy  | 0  | )                          | 16  | 6  | 15                | ts | 1  | 15 |
| 1787   | j      | →,* | 6  | 0                          | 17  | 0  | 16                | 0  | 0  | 14 |
| 1788   | 1      | 0   | 6  | 1                          | 14  | 0  | )                 | 13 | 4  | >  |
| 1789   | 1      | 2   | 6  | j                          | 16  | 0  | )                 | 15 | 0' | 0  |
| 1790   | t      | 2   | 0  | u                          | 16  | 0  | )                 | 15 | 0  | 0  |
| 1791   | 1      | 0   | 0  | 1                          | 19  | 0  | 0                 | 18 | 0  | D  |
| 1792   | i      | 0   | 6  | (                          | 0   | 0  | 1                 | 19 | 0  | 0  |
| 1793   | 1      | 2   | 0  | 1)                         | 1(1 | 0  | )                 | 17 | 0  | 0  |
| 1794   | 1      | 3   | 6  | I                          | 2   | 0  | I                 | 1  | 6  | u  |
| 1795   | 2      | 2   | 0  | i                          | 3   | 0  | I                 | 1  | 0  | 1  |
| 1796   | 1      | 6   | 6  | 1                          | 3   | 0  | 1                 | 2  | 0  | 0  |

Medium price") 1 1 1C 0 17 2\* 0 16 SIT a 14 77

lot 20 years. J

\*\*\*&>> \*of Stirlingshire from 1797 to 1808 Inclusive.

Second Series.

|                 | 1797. |    |    | 1798. |    |    | 1799. |    |    | 1800. |    |    | 1801. |    |    | 1802. |    |    | 1803. |    |    | 1804. |    |    | 1805. |    |    | 1806. |    |    | 1807. |    |    | 1808. |    |    |    |    |    |
|-----------------|-------|----|----|-------|----|----|-------|----|----|-------|----|----|-------|----|----|-------|----|----|-------|----|----|-------|----|----|-------|----|----|-------|----|----|-------|----|----|-------|----|----|----|----|----|
|                 | L.    | s. | d. | L.    | s. | d. | L.    | s. | d. | L.    | s. | d. | L.    | s. | d. | L.    | s. | d. | L.    | s. | d. | L.    | s. | d. | L.    | s. | d. | L.    | s. | d. | L.    | s. | d. | L.    | s. | d. | L. | s. | d. |
| Oatmeal -       | 0     | 16 | 00 | 0     | 16 | 00 | 0     | 10 | 02 | 0     | 5  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Wheat -         | 1     | 0  | 01 | 1     | 1  | 02 | 0     | 2  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Common malt     | 1     | 0  | 01 | 1     | 1  | 01 | 0     | 10 | 02 | 0     | 8  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Kerse l'ar —    | 0     | 18 | 00 | 0     | 17 | 01 | 0     | 7  | 02 | 0     | 4  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| DryfkJd bear    | 0     | 17 | 00 | 0     | 16 | 01 | 0     | 7  | 02 | 0     | 2  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Muirland bear   | 0     | 15 | 00 | 0     | 14 | 01 | 0     | 0  | 01 | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Peas and beans  | 0     | 15 | 00 | 0     | 13 | 01 | 0     | 8  | 02 | 0     | 4  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Kersc oats -    | 0     | 14 | 00 | 0     | 15 | 01 | 0     | 4  | 01 | 0     | 14 | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Dryfield oats - | 0     | 13 | 00 | 0     | 14 | 01 | 0     | 3  | 01 | 0     | 13 | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Air seed oats - | 0     | 13 | 00 | 0     | 14 | 01 | 0     | 6  | 01 | 0     | 10 | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Kersc barley —  | 0     | 19 | 00 | 0     | 18 | 01 | 0     | 10 | 02 | 0     | 6  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Dryfield barley | 0     | 18 | 00 | 0     | 17 | 01 | 0     | 9  | 02 | 0     | 5  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Barley n^lt -   | 1     | 3  | 01 | 1     | 2  | 01 | 0     | 12 | 02 | 0     | 11 | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Bucked oaw -    | 0     | 12 | 00 | 0     | 12 | 00 | 0     | 12 | 02 | 0     | 11 | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |
| Grey oats -     | 0     | 7  | 00 | 0     | 7  | 00 | 0     | 6  | 00 | 0     | 11 | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  |

No such grain now sown in this county.

APPENDIX.

This may be the proper place to give a table of the average weight of barley for seven years, from the year 1791, as stated in an authentic document: The average is taken both from carse and dryfield grain raised in the vicinity of Falkirk. The boll in the Stirlingshire measure; the weight, Dutch or Troy, 16 lbs. to the stone

|            | Stones. | Lib.           |           |
|------------|---------|----------------|-----------|
| Crop 1791, | 18      | 2              | per bo{1- |
| 1792,      | 18      | 5              |           |
| 1798,      | 18      | 9½             |           |
| 1794, ^    | 18      | 6}             |           |
| 1795,      | 18      | 8              |           |
| 1796,      | 19      | 1 <sup>1</sup> |           |
| 1797,      | 17      | 8              |           |

### N<sup>o</sup> III

Mr Walker of Falkirk, to whose communications the Reporter is already so much indebted, having had the goodness to peruse this volume, after it had been printed of *zshr* as page 240, was pleased to add some corrections and observations on the margin. Though it was then too late to adopt these in their proper place in the body of the work, they are deemed of such importance as to merit preservation 1. this Appendix, with a reference to the passages to which they apply.

P. 49 —To the notice given of the collieries, Mr Walker adds, « That those upon the Kinnaird and Carron-h&U estates are now in the possession of the Carron Company, which sells the coals at 10s. per ton. The Dunmore pits are given up."

P. 60.1 5.—" The tack is ended ; the proprietor the Duke of Hamilton, has not yet got a tenant, and the work is silent "

P. 65.1. \*.—To the observation on the extent of landed estates in Stirlingshire, Mr Walker adds, « From L.2 to upwards of L.10\*000."

P. 87.—To the observation made towards the hot-torn, oil tile proper size of farms, Mr Walker adds, " No corn farm should be less than 200 acres, to make a thrashing machine necessary."

P. 88.1. 9. from the bottom,—Fdr «\* 35 acres," say € 50 \*

P. 98.—To the remarks on the livings of the clergy, Mr Walker adds, " That the way in which the stipends of many of the clergy in Scotland are paid is most degrading, and occasions many quarrels with the small heritors. How troublesome," says he, " must it be to a minister to be obliged to write out receipts for four pennies and, with a lippen measure in his hand, to receive the stipend paid in kind from the small tricky heritors, who are imposing upon him grain of the worst quality. The stipends of the clergy, whether grain, or the value of it\* should be collected by a person appointed for the purpose, at the expence of the heritors, and the whole paid k\* at once to the minister."

P. 113.—Mr Walker observes, "That the roller divided into two parts is the best, as-it does not rub

ground in taming, like the roller in one piece; but as the one end goes forward, the other goes back."

P. 117.—Mr Walker disapprovès of having the kiln and mill under one roof; as if the former takes fire, the latter is in danger also.

P. 130.—On the observation offered at line 9. with regard to the form of ridges, Mr Walker remarks, " That all land should get a single *tine* of harrowing across the ridges, to prevent the seed from falling between the furrows; in which case it drops down to *the* bottom, and never comes up; whereas the cross harrowing places the seed evenly, and lays it upon the middle of the furrow, where it has the best chance to grow, and none of it is too deep buried."

P. 133.—To the observations on weeding, Mr Walker adds, " That the surest way of extirpating weeds is to fallow upon all kinds of soils, even the lightest; the weeds, which were a curse to the soil, being tamed into manure, become a blessing to it. Weeds of all kinds, which grow upon the sides of roads, &c. should be carefully ciwtown when they are in flower/'

P. 141.—Towards the bottom, Mr Walker observes, « That in ploughing for summer fallowing in the carges, the furrow should be ten or twelve inches deep; the deeper it is, the plants have the greater scope to search for their food, and the soil is more able to imbibe moisture. The principal part of the fallowing process should be performed in the end of May, and in June, when the day is long and the sun hot; the oftener the ground is ploughed and harrc^d, and the deeper ploughed, the better. Fallowing should not be attempted while the ground is wet.

P. 143.

P. 145.—An error had been committed in stating Mr Walker's rotation of crops; it is as follows, viz.

1. Fallow with lime, providing that the ground has not been limed within 20 years before.
2. Wheat.
3. Drilled beans with dung.
4. Wheat.
5. Potatoe oats with three or four ploughings, and grass seeds.
6. Hay.
7. Oats.

P. 146.—To the observations on *seedy* Mr Walker adds, " That he has got his seed wheat from several parts of England, particularly from Essex and Kent, and also from several counties in the north of Scotland, particularly from Perth and Inverness; that he has sown the same kind of white wheat that he had from England, and the same kind of white wheat that he had from the north, on the same field, and on the same day; that that which he had from the north succeeded best; and that he continues to get his wheat seed for the most part from that quarter. He is of opinion that the air had an effect upon grain, as well as the soil upon which it grows."

P. 148.—On the time of sowing wheat, Mr Walker states, " That it is a much surer crop to sow in the beginning of March than in the beginning of December when sown late, the young plants are unable to stand the winter and spring frosts when the plants are thin, they keep *tillering* (or sending forth new shoots)

shoots) when they should be shot into seed; whereas vetches sown in the spring runs no such risk; and the plants being thick, ripen much sooner. Mr Walker has practised sowing the common wheat in March for many years with success."

P. 151.—"One great error in sowing turnips is to put the knot outwards, as it is the first to grow in wet weather; the root of the band should be plucked outwards."

P. 160.1. 5.—"Six furlots bean measure are given to the acre."

L. 3 from the bottom.—For « wheat 12 bolls," say, according to Mr Walker, « 8 bolls."

P. 161.—To Sect. X. Of Tares, *Ut* Walker adds, "A great many vetches or tares are annually sold in Falkirk market; they are very generally sown among beans, which prop them up; when thrashed, they are separated from the beam, and sold by themselves. They generally bring a much higher price than peas or beans,"

P. 167. i; '£—Of the drill plough, Mr Walker says, « Call it the drill barrow, some of these sow only one drill, and some more. If the barrow sows two or three drills at once, the roller affixed to the barrow is long enough to cover them all."

P. 163.—To the remarks made on the best soil for potatoes, Mr Walker adds, "No land produces more abundant crops of potatoes, or of a finer quality, than the best, but it must be well pulverized, ploughed and harrowed at least six times, if potatoes of fine quality be wanted, no dung should be applied."

P. ISO.-r^Of t<sup>h</sup>e annual and perennial rye-gr<sup>ass</sup> seeds, Mr Walker remarks, <sup>c</sup> That some are of opinion that they are the same, and that their standing or not standing is accidental; that if the grass which is thought to be the perennial be allowed to stand till the seed is ripe, and then cut off the ground, taking care that none of the seed shake off, there will be no rye-grass next year, as the root, say they, will not sprout again, more than die stubble of ripe oats/\*

## IV.

The Reporter having, by the kind office of a friend, obtained a correct list of the population of the parish of Falkirk, taken, under all the particulars that are interesting in a statistical view, since the 27th May 1811, it is hoped that the reader will be gratified by finding it subjoined.

*Statistical Table of the Population of falkirk, 1811*

|  |   |   |      |
|--|---|---|------|
| Number of families in the parish                       | - | - | 2393 |
| Do. of families employed in agriculture                | - |   | 171  |
| Do. employed in trade and manufactures                 |   | - | 835  |
| Do. employed in neither of the above                   |   | - | 1387 |
| Number of males, exclusive of local militia and seamen | - | - | 4541 |
| Do. of females'  | - | - | 5388 |
| Total population, with the above exceptions            |   |   | 9929 |



|   |   |   |   |   |      |
|---|---|---|---|---|------|
| Males in the town of Falkirk, with the above exceptions | - | - | - | - | 1870 |
| Do. Females   | . | . | . | . | 2506 |

Total population of the town of Falkirk 4376

The number of local militiamen in this parish is 246, and the average number of seamen is 220 in which, two numbers being added to 9929, makes the population of the whole parish of Falkirk \* - 10,395

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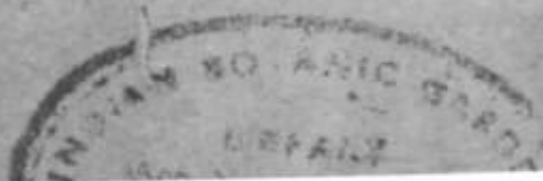
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POSTSCRIPT.





POSTSCRIPT.

THE Reporter is happy to have it in his state, upon unquestionable authority, that the rates of the good town of Stirling have this year (i *sold the* town dung or fuilzie for a sum nearly equal the premium *given* two years ago for removing it.

Juvat hæc opprobria—  
—potuisse refell

He regrets his being now under the necessity of requesting the reader's indulgence to a too copious list of errata which have crept into the preceding pages. He hopes that his great distance from the press will in some measure plead his excuse.

ERRATA.

## ERRATA.

- Page 2 line 9, *for* Almond, *read* Avon.  
 3 8, Beneloch is situated in Clackmammnshire.  
 8 1 from the bottom, *for* country, *read* county.  
 14 In Table I. Of the Winds, Thermometer, and  
**Weather**, Dr Macl'arlane suggests the follow-  
 ing **cotiactions**, viz.  
*for* 109 71 39 128 142 146 59  
*read* 115 75 43 132 148 152 6\*5  
 25 3 from \n- but torn,/ar park:., *read* park.  
 44 17, *for* Lycbris, *read* Lychnis;  
 ib. 7 from ihu bottom, *for* art-, *read* is.  
 53 4 from the bottom, *for* stratas, *read* strata-  
 73 S from the bottom, *for* necessary, *read* unne-  
 cessary.  
 80 7,/Jr in; *read* of.  
 105, and clsewlure, *fur* agriculturalists, *read* agricul-  
 turists.  
 33'2 10 from tin; bottom,/or souclms, jvWsondhus,  
 164 H,*for* do-, *read* **degree**.  
 182 2 from tlit\* bottom, fa\ pared, *read* prepared.  
 187 9\**f<sup>or</sup>* menyanthe, *read* **menyanthes**.  
 279 10 irtJin **the bottom**, *dele* upon.  
 551 G*ffor* come, *rcadc&x*.  
 >3Uii Mr Mackinlay's account of the revenue  
 nf Allan's hospital should be staled at  
 11.46\*8. 15s. 9d.  
 368 JO from the bottom, *for* ten, *read* eleven.

## F I N I S.

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*Alex, Smtllie, Printer.*

**GENERAL VIEW**  
OF THE  
**AGRICULTURE**  
OF THE  
**COUNTY OF SUTHERLAND,**  
WITH  
OBSERVATIONS ON THE MEANS OF ITS IMPROVEMENT.

DRAWN OF FOR THE CONSIDERATION OF  
***THE BOARD OF AGRICULTURE***  
AND INTERNAL IMPROVEMENT.

TO WHICH IS ANNEXED,  
A PARTICULAR ACCOUNT  
OF THE  
MORE RECENT IMPROVEMENTS IN THAT COUNTY.

BY  
**CAPT. JOHN HENDERSON.**

---

***LONDON:***

PRINTED BY B. MCMILLAN, BOW-3TBET, COVENT-GARDEN:  
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1812.

# ADVERTISEMENT.

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THE desire that has been generally expressed, to have the AGRICULTURAL SURVEYS of the KINGDOM reprinted; with the additional Communications which have been received since the ORIGINAL REPORTS were circulated, has induced the BOARD OF AGRICULTURE, to come to a resolution, to reprint such as appear on the whole fit for publication.

, It is proper at the same time to add, that the Board does not consider itself responsible for every statement contained in the Reports thus reprinted, and that it will thankfully acknowledge any additional information which may still be communicated.

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AGRICULTURAL SURVEY  
OF THE  
COUNTY OF SUTHERLAND.

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CHAP. I.

GEOGRAPHICAL STATE AND CIRCUMSTANCES.

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SECT. I.—SITUATION AND EXTENT.

SUTHERLAND is situated between  $57^{\circ} fg'$  and  $58^{\circ} 33''$  northern latitude, and between  $3^{\circ} 40''$  and  $5^{\circ} 13''$  west longitude from London. By the south-east coast, from the Ord of Caithness to the Point of Dornoch, bounded by the Murray Frith, to the Ferry of Tain, or Meikle Ferry, at south-west, is thirty-two miles and a half. From the Ferry Point of Dornoch, along the Kyle and river Oickel, which divide it from Ross on the south, across the mountains from Kenloch-ailsh by Auldna-kealgath to Loch-kerkag, on the West Sea, is fifty-two miles and a half. From Lock-kerkag to Cape Wrath, in the north-west, in a direct line along the Atlantic, is forty-two miles and a half. From Cape Wrath along the North Sea to the Myrc of Holastin (the boundary with Caithness on the east), it measures fifty miles; and from the sea shore where the Myre of Ho-

SUTHER.] *to* lastin

lastin joins the North Sea, to the-Ord of Caithness, on a south-east direction, it is thirty-seven miles and a half. The number of square miles is 2925 ; the square acres are 1,872,000, English measure, or 1,497,600 Scots acres. Of this measurement the salt-water Lochs of Caile Scow, Lax ford, Inchard; Durness-bay, Eribole, and Tongue, form forty-nine square miles, or 31,360 acres; and <sup>1</sup> the measure of the fresh-water Lochs is nearly as follows: viz. Loch-shin sixteen, Navcr four, Lyal three, Hope five, Loch-more four, and other small lakes; in all forty-seven square miles, or 36,080 square acres. The county of Sutherland contains about 18,000 acres of arable land, about 35,000 acres of green pasture, and the remainder consists of mountains, moors, or rivulets, which may be thus stated, as the result of the most accurate information that could be obtained by the Author.

|   | English Acres. | Scotch Acres. |
|---|----------------|---------------|
| 1. Arable land of various soils, . . . . .                                  | 18,125         | 14,600        |
| 2. Meadow and green pasture with }<br>some shrubbery, . . . . . }           | 43,750         | 35,000        |
| 3. Plantations for fir, &c. about . . . . .                                 | 1170           | 936           |
| 1. Mountains or moors, covered }<br>with heather, rocks, rivers, burns, S } | 1,571,409      | 1,257,127     |
| 5. Peat moss of sundry depths, . . . . .                                    | 176,106        | 140,835       |
| C Salt water Lochs, 49 square miles, or                                     | 31,360         | 25,088        |
| 7. Fresh water Lochs, 47 ditto, or . . . . .                                | 30,000         | 24,004        |
| Total, . . . . . — . . . . .  | 1,872,000      | 1,497,600     |

This in the proportion of four Scotch to five English acres.

## SECT. II.—DIVISIONS.

*Political.*—THE county of Sutherland is one sheriffdom ; the county town is D^rnoch, where the sheriff depute,

depute, or one of his substitutes, hold their court of justice: there is another sheriff-substitute for the Strathnaver district, and he holds his court at Tongue four times in the year. The district of Assynt bring their complaints before the sheriff-court at Dornoch, in such cases as are not decided by the justices of the peace through the county.

The county of Sutherland was long a part of the sheriffdom of Caithness, until within these few years, when it was separated from Caithness, and a distinct sheriff-depute was appointed.

*Ecclesiastical*— Sutherland, comprehending Assynt and Strathnaver, forms a part of the Synod of Sutherland and Caithness, and is divided into thirteen parishes, as follows:

viz\*

| Parishes.     | Patron.             | Presbytery. |
|---------------|---------------------|-------------|
| Assynt        | Marquis of Stafford | Dornoch     |
| Clyne         | Ditto               | Ditto       |
| Crtech        | Ditto               | Ditto       |
| Durness       | Crown               | Tongue      |
| Dornoch       | Marquis of Stafford | Dornoch     |
| Edderachyilis | Crown               | Tongue      |
| Facr          | Marquis of Stafford | Ditto       |
| Golspie       | Ditto               | Dornoch     |
| Kildona       | Ditto               | Ditto       |
| Lairg         | Ditto               | Ditto       |
| Loth          | Ditto               | Ditto       |
| Rogart        | Ditto               | Ditto       |
| Tongue        | Crown               | Tongue      |

### SECT\* III.—CLIMATE.

THOUGH the east coast of Sutherland is three degrees farther north than East Lothian, there is much less difference

rence between the two in regard to climate, than could well be imagined. The spring may be two weeks later, and the winter may commence two weeks earlier; but the summers are equally warm, if not warmer, and the winters not colder.

The south-east coast of Sutherland, from the Ord of Caithness to the Dornoch Ferry, and even up the country along the Ferry of Oickel, is well sheltered from the north and westerly storms, by a succession of mountains from three hundred to eight hundred feet above the level of the sea. The interior of the country, and the western and northern coasts, are exposed to frequent rains, and stormy weather from the Northern and Atlantic Ocean, which of course render the climate very wet and cold.

*Prevailing Winds.*—The winds blow from the west and north-west a great part of the year upon the western and northern coast of Sutherland, which generally bring rain; but upon the south-east coast, as above, the same winds bring dry weather; when the wind blows from the south-east, off the Murray Frith, it generally brings rain to the inhabitants of the east coast.

*Quantity of Rain that falls.*—In the course of my tour I did not meet any where with calculations of the quantities of rain which fall annually in this county, nor with any account of the number of wet and dry days. It is well known, that the western coast of Britain, bordering on the Atlantic Ocean, is more subject to frequent and heavy rains than the east coast, owing to the Atlantic being more extensive than the German Ocean: this cause holds good in the county of Sutherland. In Assynt, Edcjerachylis, and Durness, whenever the wind shifts to the west or north-west, which is very frequent,  
heavy



heavy rains ensue; indeed, it is supposed that there is no part of Scotland more subject to rain than Assynt and Edderachylis. During my stay there in June, 1807, I experienced only one dry day. The shores bordering the Atlantic are bold, with lofty and formidable mountains, divided near the shore by deep vallies, ravines, of lakes.

The west and north-west sides of the county of Sutherland are damp and mountainous, and the interior of the country, (chough in a less degree), is the same, in consequence of its high mountains, lakes, and swampy mosses; but on the south-east side, which is generally termed the coast side, they complain, that in the summer months in general, they experience too little rain. The soil, in that part of the county, is either sand or light black earth, with a loose gravel or pebbly bottom ; so that in a dry warm summer, which generally causes an abundant crop in the western part of the county, and, indeed, in most of the north of Scotland, the crops of corn on the coast-side of Sutherland are so stunted in their growth, as to be too short for the sickle. Small enclosures, with trees and hedges, would there be of the greatest service for preserving moisture.

---

#### S&CT. IV.—SOIL.

*i.* C&V-T-AS there is but little of what may be called low land, HI the county under review, there is not much clay in it: 1a part of the vale of Loth, the soil is a deep blueish clay. Prior to the sixteenth century, the river of Loth, as it emerged from the mountains, turned due north, running parallel to the sea, at the distance of about a quarter of a mile from it, through what is now called the vale of

Loth, and there formed a swamp or marsh, divided from the sea by high sandy banks, until an enterprising Countess of Sutherland caused a course to be cut for the river to the sea, through a rocky eminence; by which means about 100 acres of fine carse land have been recovered; it is tolerably drained by cross ditches, and yields good crops of corn and artificial grasses. There is some clay soil in the farm of Dunrobin; and in the vale from the village of Golspie towards the rock of Craigton; in many parts of Strath-fleet there is clay soil, covered with a foot deep of barren sand. At Morvich, two miles to the west of Craigton, there are about thirty acres of arable land, of a strong deep clay soil; along the north bank of the river Fleet, and contiguous to it on the same side of the river, there is a level haugh of peat-moss, where many roots and trunks of moss fir are dug up for fuel. The farm of Kinauld lies close to this moor, and has a similar soil with Morvich\* but with a greater mixture of white sand in the soil, which makes it less tenacious. The tides, flow into the river Fleet a quarter of a mile beyond Kinauld, to a place called Calintraid. The banks of the river are from six to twelve feet deep along Morvich and Kinauld. There is some clay soil at Pulrossie, below Skelbo, and between Ospidle and the Frith of Dornoch or Oickel, called Flod. In most places clay has been produced by the sediment of the finer particles of earth or mud, when the waters which had been almost stagnant, have deserted their original bed, or when the influx of the sea for a time deadens the current of rivers. This seems to be the immediate cause of all clay land near the level, and in the vicinity of the sea: at Loth, in the vale from the village of Golspie to Balintraid, and in Strath-fleet, which in many places is covered with a stratum of sand that has drifted after the water subsided) there are high sand banks on the sea shore\*. The same

same:apiJies to the Jow land on the north shore of the JSjle. of Dornoch or Oickel, at Pulrossieancl Flod, and atjheenxi of Loch-laxford. Holm,- or haugh, also, is undoubtedly a water-formed soil, and is uniformly found along the banks of rivers which have a smooth current; and in floods tjat overflow {heir boundaries at the i/flux^pf jsuch, rivers into other quiescent bodies of water, ihe fine haqghs are gene- rally formed ; suchjas in the valley of Loth, the low er end of Strath-tieet, where the land evidently was covered by the sea, to the foot of the mountains from the burn of Gol&pie to Kinauld, a tract of 712 acres arable, 146 acres moor, planted with fir, and 1245 acres of barren sandy moor, which might be improved by planting it with fir, or covering it with clay, a stratum of shells, of a foot thick, found in the sands of the Little Ferry contiguous to it, and sea-weed, which is frequently driven in near that place.

\* 2. *Loam*.—A constant course of tillage, and the application of fertilising manures, will convert any soil into loam, yet some think that loam is a primitive earth. Of thiš primitive earth there'is little to be seen in the county under review, if we except the farms of Dunrobin, Skelbo, and Skibo: that species of soil is more frequent in a level country.

3. *Sand*.—Widi^he exception of what has been already observed, the soil most generally found along the south-east coast, in the county of Sutherland, is sand with or without a mixture of pebbles, varying from the size of a pea to that of a turkey egg : that part of the soil is already arable, from the industry of man, by culture, and a mixture of sea-weed or ware, and peat earth, for manure; it lias a dark hue, which may be termed a haztl loam, which iu. a moist season yields abundant crops of bear, or bigg, oats, or pease; and as that narrow coast-side is sheltered from

the northern blast -hy a < ridge of mountains, as already  
 sutetJ^froflithe Or4 of Caithness to the vicinity of the  
 Little Ferry, or Strath-fleet, whose bold, heathy, and rocky  
 front affords shelter, and Yeflects the rays of the meridian,  
 sun upon the cultivated ground between them and the  
 Murray Frith. The average breadth of this coast-side is  
 from a" quarter to half a mile, but in some parts less, from  
 the base of the heathy mountain, to the shore of the Mur-  
 ray Frith, except at Clyue and the lower end of Strath-  
 fleet, where it is a-mile broad. The climate here is more  
 favourable than that of Morayshire, for bringing corn to  
 maturity\*; their bear and oats weigh two stone per ball  
 more than similar grain raised in Caithness, to the north-  
 east of it.

The interior of the county consists of the straths of the  
 rivers of Helmsdale, Brora, Fleet, and Oickcl, with their  
 tributary streams issuing from the adjoining mountains;  
 all these rivers bend their course toward the Murray  
 Frith. The strath of Helmsdale, which is denominated  
 the strath of Kildonan, until within two miles of the sea,  
 is in general narrow ; running from the north-west ob-  
 liquejy Co the southeast, rhe river .father rapid, upon a  
 pebbly bed, forming h\ its winding course alternate haughs  
 on each side, panly arable and partly meadow cr pasture ;  
 the mountains on each side rising at an angle of about  
 forty-five degrees to rhe height of live, six, or seven hun-  
 dred feet, all the way from Helmsdale to che town-land of  
 Kildonan, where the valley widens, and where some haughs  
 of good productive arable land are to be found, though  
 twelve miles frpm the sea, and surrounded by moors and

---

• \* A Gentleman from Morayshire asserts, that the climate on the east  
 coast of Sutherland, is warmer and drier, and the crops earlier, than  
 in Moray.

mountains. In general, the strath is from thirty to two hundred yards broad in the course of thirty miles from its various sources, from the Balloch, and Bein-griam mountains. The soil of the base of the mountains bounding the river contiguous to the haughs, is a mixture of argillaceous sandy gravel, with detached lumps of a granite rock or puddingstone, covered in many places with shrubbery of birch, willow, hazel, and even oak, and a barren sort of heather without ling, well adapted for planting oak and fir. The haughs most level, and of course the best soil, are occupied by a set of poor cottagers, who scourge it with repeated crops of oats and rye without manure, from an apprehension universally entertained, that the river, by its rapidity during a flood, would bear away the soil, if loosened by manure. Such banks as are cultivated above the haugh, consist of a reddish gritty sand, and peat earth. Ascending the stream beyond Kildonan, the haugh soil is pretty much the same, but the base of the hills abound more in till than any other soil.

The strath of Brora commences at the base of Ben-chlibrick, where it is very narrow, and the course of the river rather rapid, on a pebbly bed for fifteen miles down to Biaegrudy. At Grudy the bed of the river is rocky until it passes Shiberscross, where the mountain ground on each side begins to show a bolder face, with rocks. The valley is here a quarter of a mile broad, and the face of the hill on the north, is green pasture for two hundred yards back from the haughs, where it again runs through a valley of sand and pebbly stones, after the junction of the Strath-beg river, for two miles to Grenan, where it forms a lake. From Grenan to Killend the strath is level, and the river forms three successive lakes; the largest about a mile long, and a quarter of a mile broad, with

with rich hangh ground at each eiid, and on the north side, at Gordon-bush, an isthmus.

From the junction of the Strath-beg with the strath of Brora to Killend, the latter is about three quarters of a mile broad, bounded by rocky heath-covered mountains, whose base rise suddenly from the water-formed haugh; and in some parts good lodm, as at Aschoil-beg and Aschoil-more.

From Killend to the sea it is called Strath-steven, and flie river meanders through a reddish gravelly soil; or rather a mixture of round stones and red sand, covered with a barren heath, except so far as it is improved by trenching, &c.

The' Strath-beg, which is a branch of Strath-brora\* commences its course-at the south-east base of Bcin<sup>v</sup>adow and Bein-arinin, and is natrow among the mountains until its junction with Strath-skinsdale; from thence it runs on a sheWy rocky bed to Strath-brora. Upon the west side of this river, which is called the Black Water, near Colescastle, there are about a hundred acres of gieen pasture in the face of the mountains, with some patches of arable<sup>1</sup> rocky land, and remains of 'a shrubbery of birch, &c. Uniformly, where the soil near these rivers or burns is broken up by the plough or spade, for agricultural purposes, it seems to be a mixture of a granity sand and peat eanh. And with the exception of the level ground between Grenan and Killend, the haugh ground is of the same texture, with a considerable proportion of rough pebbly stone; the burns and rivets being too rapid to admit of \*iud subsiding to form soil that could be called a p<sup>ch</sup> haugh.

I have formerly remarked, that the soil in Strath-fleet, as far as Kinauld, and all the strath to the north-west from  
Kinauld,

Kkiauld, is the sources of the river Fleet in the mountains. At Ballinacher (or the town on the high land), the soil is very similar to what is described in Strath-Jbrora: the river is rather rapid on a pebbly bed, forming small haughs on each side, which are overflowed with floods, but yield in many places good meadow grass. Immediately above Kinauld, the valley or strath widens to about half a mile broad, and two miles long by Aoden to Rogie; but the haugh ground is but a small proportion of it, the cultivated ground rising up the face of the rocky mountains at an angle of about  $30^{\circ}$ ; the soil a granite sand and black earth, which may be called a hazel loam. Towards its source the strath narrows, and becomes more rocky and tilly-

At Balintraid the burn of Rogart joins the river Fleet from the north in a zig-zag course through rugged valldys ainpng 'he heathy mountains, in many places covered with a shrubbery of birch, aller, hazel, and willow, and in some eminences, small patches of arable land, of theumV form kind of soil already stated.

The kirk and manse of Rogart are on an eminence to the north-east of the burn, in a pretty romantic place, and half a mile to the west is a level valley lined with shrubbery of birch and willow, through which the burn runs, surrounded by high rugged mountains covered with heather. About two miles to the north of Rogarr\* through deep peat moor, there is a towo-Und occupied by thirty families. Between Bein-horn on the east, and Knockardintinail on the west, this valley contains about one hundred acres of arable and pasture ground, of hazel light loam. Ascending the hill, on either side of a small lake in the centre, the soil is peat earth with rock or till below it. A small deep rapid hum runs from this lake to the water of Brora, lined with shrubbery of birch and

and aller. To the westward of this, the country is either a deep peat moss, or rugged mountains.

The next strath worthy of notice is the burn of Torbol, running from Loch-bowie through a deep glen to Loch-fleet. It has small haughs and patches of ground on eminences, similar to Strath-fleet. At Toiboll the soil (a hazel loam) is very fertile, having the command of sea-weed for manure, and being well sheltered by the surrounding mountains.

The next place along Loch-fleet is Skelbo, a fine rich hazel loam soil, bounded on the west by Bein-Iarn, and on the east by the sandy hills of the Little Ferry, or *Ferry Unes*, and a moor between it and Embo. There are here about one hundred acres of excellent arable land; and, including that occupied by small tenants in Skelbo and Achavander, there may be in all about 284 Scotch acres of arable land, in the vicinity of the ruins of the ancient Castle of Skelbo. Embo is a sandy *seal*, with about one hundred acres of arable land, having the Murray Frith on the east, and a gravelly moor on the west; part of which was lately planted with larch and Scotch fir. The same soil continues almost to the town of Dornoch. Between Dornoch and the Mickle Ferry, or Portna-culter, is a mossy bog of 200 acres, bounded on the west by a high sandy bank, and similar banks between it and the sea, partly improved; of which more hereafter.

The sandy soil prevails to the rivulet, of Evelicks, which has its source from Loch-laggie, and divides the Sutherland estate from Skibo, a beautiful place, the property of Mr. Soper Dempster, which borders on the north side of the Mickle Ferry, to the westward by Pulrossie and Flod, towards Spinningdale. The tide ebbs and flows in various creeks surrounded by sandy hills\* either yielding fir, timber, or under culture. The ground



ground rises gradually from the ferry to the top of Bein-vracht, about seven hundred feet above the level of the sea. Skibo is well cultivated, enclosed with hedges of timber and clumps of hard wood; open to the meridian sun, and is a beautiful and romantic place. The estate extends to Portenlick, along the Mickle Ferry, or Frith of Dornoch, about fourteen miles, containing about 18,000 acres, principally moor, excepting about two hundred acres in the farm of Skibo, where the soil is a good strong loam. There are one hundred and twelve families on this estate: about twenty years ago there were only fifty families.

The next place, to the west of Skibo, is Hospidale, a wellwooded, sheltered place, having the same exposure with Skibo; the soil a sandy loam; about 150 acres, the property of Mr. Gilchrist. Between it and the Kyle\* is Flod\* a farm occupied by Mr. Davidson; the soil a sandy clay, with about twenty acres of fir planting to the west of it, along the Kyle or Frith.

I next proceeded to Spinningdale, over a steep moory bank along the Kyle, which, is here three miles broad. There was a cotton manufactory erected at Spinningdale by a Glasgow company some years ago, which employed one hundred hands; had thirty-six jennycs, with one hundred and thirty-six spindles in each. There were twenty houses built by the manufacturers, and some ground improved on the neighbouring banks. In 1806 the building was accidentally destroyed, by fire, and there seems no intention of renewing the undertaking.

From Spinningdale, along the steep-banks of the Kyle\* there is an oak wood about a mile long and a quarter of a mile broad, sixty acres of which was bought for 250/. for the sake of the bark. The wood was purchased by the country people, along the Kyle, towards Dornoch and Tain,

and

and the bark was sent to a tannery at Thurso: the soil here is a sandy gravel interspersed with rock. Two miles further up is Criech, a woody valley, paying 100/. per annum to Mr. Houston, the proprietor. Two miles farther, along a rugged heathy hill, intermixed with some patches of arable land and shrubbery, is the Bonar Ferry. The Kyle is here not above a hundred yards broad. Vessels of 30 ton burden come up here with the tide. From the Bonar to Portenlick is two miles. Here the hills on the north, or Sutherland side, are less bold and precipitous: on the banks of the river, which is deep, there are about one hundred acres of a red gritty sandy gravel, and peat earth, partly arable and partly pasture, covered with sorrel, which proves that the soil, naturally poor, is very ill managed. Near this place, through a barren gritty moor, is Portenlick, where droves pass to the Ross-shire side, on their way to Falkirk: it is deep, and about sixty yards broad. Here the roads from the west and east coast of Sutherland unite\* and it is intended, it is said, to make an iron bridge, which would be a great accommodation to travellers.

- A mile further is Invershin, where the river from Loch-shin discharges its current into the Kyle, or river Oickel: here the two rivers form a valley, containing about one hundred acres, partly arable and partly green pasture. To the foot of the receding mountains it is all of a sandy soil with peat earth. The river Shin runs from Loch-shin seven miles through rough rugged heath-covered banks, interspersed with small patches of arable land and green pasture. Loch-shin is eighteen miles long, and from a mile to three quarters of a mile broad, lined with shrubby banks, heath-covered hills, with small patches of arable land and green pasture, particularly adapted for sheep-farms, to which it is now applied. Fifty families have been removed out of the parish of Lairg, from Achindowich

dowich to Knock Shendan; but these people were, with very few exceptions, again accommodated on the Sutherland Estate.

From Invershin, along the north or Sutherland side of the river Oickel, is Inveran, Linside-beg, and Linside-more, the property of Mr. M'Leod of Cadboll, containing about seventy acres of arable land, the soil red sand and gravel, sloping in the face of the hill above the river. Along the river here, is some haugh ground, which it overflows occasionally with floods; about one hundred yards broad, swampy, with coarse grass, and interspersed with aller bushes and willow. Behind these, to the north, are steep hills covered with heath. These three places are occupied by twelve tenants, who pay the proprietor 166/ sterling, yearly rent. The river is one hundred and fifty yards broad here, and on the opposite bank, on the Ross-shire side, is Sir H. Monro's property.

The next places on the Sutherland side are Atlas-beg, Atlas-more, Knockintaul, and Invernauld, the Rose-hall property, stretching along the face of the hills: the arable land of the same sandy gritty texture, with a swampy leen or haugh below, of about fifty acres, partly covered with aller bushes.

About half a mile to the west of Invernauld, is Rose\* hall, the romantic well wooded summer residence, of Lord Ashburton. Here the river Caslie discharges itself into the Oickel. Opposite the angle of these two rivers the hills form an amphitheatre of haugh' and rising ground, well covered with fir, oak, and ash, with some natural wood on the banks of the rivers. The oak is all natural, except a few trees at most. There are about 100 planted trees of ash. The natural woods here consist chiefly of oak and birch, and in a subordinate degree of mountain ash,

ash, alder, willow, aspin poplar, and hazel. The planted wood (excepting two hundred trees perhaps of miscellaneous hard-wood, near the house of Rose-hall) is entirely Scotch fir; the oldest being planted in 1749 or 1750. There is no natural Scotch fir upon this estate, excepting a great deal of young natural fir, which has begun to spring up in the vicinity of the planted firs since they became old enough to produce seed. When Lord Ashburton purchased this estate, there was no fir of any other description, nor larch, upon any part of it. His Lordship has planted some larches, and has every year sown a quantity of acorns upon the hills, for the purpose of raising oak woods, without a nursery or transplantation. It is supposed that in this there is an additional advantage besides the saving of expence, viz. that the long perpendicular, tap-root of the oak, from which it derives its chief nourishment, is by this means never broken. The ground where this has been done, is now (1811) very full of young oaklings, the future success of which, time alone can tell, but they seem very thriving at present. The largest dimensions of the old trees here, are an oak *4* feet 4 inches in circumference, an aspin poplar 5 feet 1 inch, a planted Scotch fir 4 feet 7 inches, a birch 4 feet 6 inches. The gale of wind on the 25th December 1806, blew down 1500 Scotch firs (*some* of them, of a large size) upon the Rose-hall estate. The soil is here of the same gritty texture as before stated.

After crossing the river Caslic, the river Oickel is about twenty yards broad, and fordable in many places; there is a fine level strath by Tuteintarvach and Turnag, about three miles west to Ajnit, where the river *£* nag from the Ross-shire side joins the Oickel. In this strath there is excellent summer pasture for cattle, but the river divides the principal part of it to the Ross side, the property

perty of Sir Charles Ross, Eart. Thence the Oickel decreases in size, and its banks in value, to its source at Kenloch-ailsh, near Be in-more Assynt.

After crossing Dromcroy and Glen-muich by Auld-nakealagach, the first place in Assynt that presents itself is Lead-more ; to the south of which is Loch-borelan ; and a rivulet from it to Loch-kerkag at the West Sea, divides Assynt from Coigach, in Ross-shire. Assynt is the most mountainous and rugged part of the county of Sutherland. At Lead-more and Lead-beg, Mr. M'Kenzie (Ardloch), and Mr. John Mackenzie, have twelve sub-tenants, on about thirty acres of land ; and in the neighbouring hills, quarries of white and variegated marble are wrought by Mr. Jopling.

From this place I proceeded due north, through what he called the Valley or Glen of Assynt, by a road of twelve miles, made by Mr. Jopling to carry his marble to the sea port at Unabol. The first habitable place is Stroncroubie. Here Mr. M'Kenzie has eight sub-tenants on about forty acres of arable land; they have a corn mill, and pay  $\frac{1}{10}$  rent. Thence the road passes by the west front of rock Croubie, a bold perpendicular precipice about three hundred feet high. The strata in its face, as far as I could discern, is first whin, then freestone, then a thick stratum of blue limestone, then whin, &c. About a hundred feet above the base of this rock three springs of excellent water issue.

It is thence one mile to the kirk, inn, and school-house, at the end of Loch Assynt, and at the foot of Glasvejn, a stupendous craggy mountain to the east. Beyond an isthmus in the lake, a little to the north of the kirk, is the ruins of M'Kenzie's castle : it appears to have been a handsome building, of modern architecture. A quarter of a mile from thence are also the ruins of Castle  
SUTHER.]
tadvrnek,

^rdvraçk, built by Donald-Mac Neal Vain M'Leod, i»t  
 ?595\* ^ was \*on & tne head quarters of the M'Leods of  
 Assynt, until the Mackenzie^ obtained a letter of fire and  
 sword, and took it by treachery, for payment of a portion •  
 promised by M'Leod with his daughter to M'Kenzie,  
 These ruins are fatuous for being the place where the cele-  
 brated Marquis pf JVJoptrose was £\*ken, by treachery, in  
 violation of the laws of hospitality. This castle was four  
 stories hi^h, all vaulted, and was destroyed by a thunder  
 stoim, except the south gable, .about 1795.

Cbsh-more, the residence of Kenneth Scobie^Esq\* is on  
 an eminence above the Jake. To Mr- Scobie I feel much  
 obliged for his useful informatiop, as well as hospitality.  
 A quarter, of a mile to t^e east of ClasJwnore, at the foot  
 Qf GUs-chean./ayeiry high precipitous rocky mountain,  
 at least 2000 feet above the level of the sea), there is a very  
 string spring, from which, coq&tautly rushes a current of  
 four cubic feet, of liaipid pure water, and it never freezes\*  
 ^bput tjjj<er>d pf.dje Jake nbereflje about ihirty-five acres  
 of arable land. The rocks .about tve east end of the lake  
 are all grey^j^Tiejt;one, of uiã^gu^j: seams and excellent  
 quality. / \_

From Clash-more to Assynt-beg is six miles: this i?  
 a s^rn^Tfepdep^e: ^f, lyir. M'JCenzie, of Lea<l-beg.  
 Here the river issues frotrt the lake, and discharges itself  
 in^och-inve:r, ai saltwater Jake of the Atlantic.

Mr. M'Doald, at Coulag\*, ha&ji feu pf two a^res' ancj  
 a half, where he has erected a store, and red-herring house,  
 and employs fishermen along the coast by contract,-on each  
 side of Rou-stoir (the promontory of Assynt); from Lock\*  
 lferkag and Coulag he hires fifteen families and five boat\*;  
 from Ach-melyeet, twenty families; from Clash-toul, twen-  
 ty-five families; from Store and Balchladich, twenty-four  
 families; from Clash-more, twenty families; from Culkein,  
 fifteen

fifteert families; from Achachallin, sixteen families; and from Clash-kenessie, twenty-four families. The arable land in all these places does not exceed an acre for each family.

The next is Mrs. M'Kay's, at Auldaliy, who has six families of fishers. Mr. Clafk, at Culkein Drampaig, has twenty acres: Drumpaig contributes fifteen families and four boats; Ned, fifteen families; Glenlerajj, twenty-four families; at Ardvaar, Captain ScoWe has six families, all fishermen, and about fifteen acres; Rcantragaid, on the north Kyle's Cow border, five acres; Unabo! thirty families, and about forty acres; rent *jof*. Balnacaul and Glendow are at the head of Kyle's Cow, off the narrow Kyle. Upon the whole, there are in Assynt about three hundred families, and if I except forty families, the rest are fishermen on the coast of the Atlantic. They have not among them above three hundred acres of arable land, which is all laboured with the *cascrom*, of which more hereafter. The arable soil is the same with the land in Sirath-fleet, viz. a mixture of granity sand and peat earth, except about twenty acres at Clash-more, which is a red clay, of an ochrey colour, and unproductive. In the bay of Kyle's Cow there are twenty-four small islands or holms of green pasture for sheep.

Edderachylis parish is on the north side of Kyle's Cow, bounded on the east by the *Dirt McanacJi*, or Pilid Forest, as rugged and mountainous as Assynt; all its inhabitants reside in a small valley near the sea, and consist of 120 families.

„ The inhabitants of eleven places, amounting to fifty families, were removed, and their places occupied by sheep. The proportion of land to each family, with the exception of Scourie (which has, 150 acres for twenty-six families), is from one to two acres each family; and

the arable soil is sand, and black earth, or light hazel loam.

*Durness Parish.*—The forest of the Parv, or Cape Wrath, along the west shore, now under sheep, consisting of the following places, was formerly inhabited, viz. Achamore, Auld Coirfrugal, Auldany, Grudy, Acharn, Kervag, Garaw, Sirsriel, Achnahovid, Keoldale, &c. in each of which places resided a few families of hardy Highlanders.

I come now to the water of Dinart, and Kyle of Durness, a sandy shore. Here the weary traveller is agreeably surprised to find a tract of fertile lawns covered with the finest verdure, land well cultivated, and abundance of excellent limestone.

At Balnakeil, once a highland residence of the Bishops of Caithness, there are sixty acres of fine land, sandy soil, with abundance of water from Loch-borvie. Between it and Keoldale, on the east shore of Durness-bay, is a deep lake, in which there are marl and limestone. At Keoldale there are about eighty acres of land either in corn, or artificial grass, or turnips: the soil in this promontory of Durness and Far-out-head is sandy, with limestone rock below of excellent quality, and the quantity inexhaustible. Mr. Dunlop has the farm of Balnakeil, and an immense tract of the *Diri Mon*, or the Great Forest, south from it, along the water of Dinart; and Mr. Clarke's farm of Keoldale, under sheep, with the Parv Forest, lies on the west of the bay. The pasture in both moor and dale, is the very best in the county of\* Sutherland.

After partaking of Mr. Clarke of Keoldale's hospitality and information, of both of which he was liberal, I proceeded



ceeded towards Rispond. At Sandgoe, about a mile from the manse of Durness, is the famous cavern called the *Smoyi*; of which more in another section. There is a moor of about forty acres near Sandgoe, subdivided into twenty lots, by order of Lord Reay, to be given to colonists who are willing to improve.

Within the last two years six persons in its vicinity have improved fourteen acres of peat moss, upon which they have a good crop of bear or bigg, and a luxuriant appearance of potatoes; and if they were to avail themselves of the limestone which is in their neighbourhood, it would much increase the fertility of their new improvements.

The next place is Rispond, a well-sheltered creek on the west side of the head of Loch-eribole, where Mr. Anderson, the tacksman, has built a good dwelling house, a salmon boiling-house, a shed for casks, & c, and made a pier to accommodate two or three vessels of sixty or seventy tons burden, on the site of rocks which he has blown up. Round him he has placed fourteen families of fishermen, who have cultivated with the *caschrom* all the hollows between the rugged rocks in their vicinity, to the quantity of about six acres, which yield good crops. The soil is small fragments of the granite rock and peat earth, which they manure with sea-weed. The country bounding the shore consists of bold, rugged mountains, covered with a little stunted heath; Loch-eribole is three miles across from Rispond to the east coast, called the *Mohi* with several islands or holms<sup>1</sup> in the entrance of it. Opposite to Eribole is Island Chorie, a limestone rock surrounded by deep wafer, so that a vessel may lie alongside the rock. There is very little arable land on the east side of Loch-eribole, at Eribole, Hope, or Bragisgree, and that little is sandy and peat earth.

After leaving the banks of Eribole, and Losh-hope, I



SOIL.

crossed a deep extensive pear-moss, seven miles to Melness. Here Captain Scobie's farm lies upon the declivity of the hill bordering the west bank of the Kyle of Tongue, a shallow sandy bay, from the Rabbit Island to the foot of Bein-hope, about seven miles long by one mile broad. At Melness there are about forty acres of arable land, of a similar soil to what has been already described ; and the Rabbit Island, a rocky shore and sandy soil, abounding with rabbits.

I crossed the Kye of Tofigfiscid: an isthmus where Lord Reay has erected a neat octagonal building; a quarter of a mile to the east of which, in a delightful well-wooded bank, bordering on the Kyle, is Lord Reay's castle, and gardens of Tongue, or in the Gaelic language, *Keantal Mhlckoay* (Mackay's chief residence). Here are about forty acres of arable land and plantation, and a neat small garden, with a freestottè pillar six feet high in the centre of it, upon which a great variety of sun-dials has been placed; it was made in Paris. Along the Kyle, and river of Kintail, is Kirciboll, the manse and kirk of Tongue, and Rihbigill, Major Forbes's farm, where the soil is hazel loam, or mixture of sand and peat earth. Turning to the left from Tongue, along the bay, is Rian Tongue, Colbackie, Sean-lany, Strath-shcray, and Skerray, Captain Mackay's farm, which has about forty acres of arable land. The three first mentioned places contain about twelve families, fishers, having about twenty acres of arable land. The mountain to the east of the house of Tongue, called Bein-freckttm (*the look-out mountain*) is very high. Behind it to the east is Strath-tongue, containing three families, who have about five acres of arable land, and sheep; and pay .14/. rent.

In the parish of Tongue there are about 714 acres  
arable,

arable! and the number of inhabitants being 1439\* hence there is only about half an acre to each inhabitant; and in Ourness and Edderachylk parishes the proportion is still less.

After passing four miles of moor, I came to Mr. John Mackay's, at Borgie, a farm on the west side of the river Toriesdale, containing about forty acres of arable land, partly haugh and partly upland. The haugh formed by a rapid rivulet of gravel and some sand, and the upland light black soil, granite sand, and black earth. Mr. Mackay has six sub-tenants, and possesses the strath of the river Toriesdale to near Loch-lyal, three miles long by one and a half broad, of moor, strath, and mountains; has two hundred sheep, and pays 90/. rent. The river Toriesdale divides Lord Reay's property from Strathnaver, the property of the Sutherland family.

. After crossing the river I travelled through a sandy shore at the foot of craggy mountains for two miles, to Invernaver, where the river Naver discharges itself into the North Sea. Upon the east of the river along the sea shore is Beauty-hill, Cleik-hill, and Fair, Sword ley, and Kertomy, containing forty-five families; their arable land eight-penny land, about forty-eight acres of old ex\*ient, and pay about 80/. rent. Captain Gordon of Clerk-hill, took the land of the small tenants into his own hands, and removed ten of them to a swallow moor in the vicinity; rent free for seven years. Their fifty years have expired, and they have improved near an acre and a half each, and now pay some personal services, but very little rent. The arable soil of Clerk-hill is sandy, as well as the other places mentioned above.

. The strath of the river Naver, from Kertomy to Mowdale, above Loch-naver, contains on the east side of the river about two hundred and twelve families, who occupy

about one thousand acres of arable land ; and upon its west banks there are about one hundred and twenty-eight families, haying about six hundred and twenty acres of arable land. The soil of the upland is a dark hazel loam, as before described, and a good proportion of haugh land and meadow on the winding banks of the river Naver, which seldom overflows. Of the above population, about seventy-seven families were removed from the upper part of the strath in 1806 to form a sheep farm. Such of these people as would accept of a portion of the land occupied by their more lowland neighbours, on parts of the strath nearer the ocean, were provided with a temporary residence, but many of them emigrated to America; and, melancholy to relate, 4\*9 ship and passengers, about one hundred and forty, were aB lost on the coast of Newfoundland, in a dreadful storm. This strath being the most populous of any in the county of Sutherland, I shall state the names of places', and the quantity of arable land in each place.

| <i>East side of the Rhtr<br/>Naver.</i> | <b>Isl</b> |     | <i>East Side ettinutd.</i> | <b>Yii</b> |     |
|---|------------|-----|----------------------------|------------|-----|
| Mowdate                                 | 10         | 48  | Brought forward            | 106        | 494 |
| Auldintarve                             | 2          | 12  | Rhephail                   | 1          | no  |
| Bagliardy                               | 2          | 8   | Garvie                     | ii         | 5   |
| Chlitrack                               | 12         | 50  | Ravcpil                    | 7          | 44  |
| Blairdow, or Salacfc                    | ^          | 8   | Dunvctlan                  | 1          | 40  |
| Rhehalavag*                             | 10         | 36  | Achabouy                   | 9          | 4   |
| Nibad                                   | 2          | 7   | Skelpich                   | 3          | 60  |
| Rbecopag                                | 1          | 4   | Uiilliadroit               | 9          | 7   |
| Ac ha coin                              | 3          | 30  | Rhenucy                    | 8          | 30  |
| Aeheue**                                | 11         | 80  | Achkenloch                 | 7          | 40  |
| AuJdanJeghiTt                           | 2          | 8   | Achhlnaborgy               | 4          | 36  |
| Auldanaba                               | 1          | 8   | Achaue                     | 4          | 16  |
| BadindHled                              | 1          | 4   | Dalcharn                   | 2          | M   |
| Cnriluiran                              | 4          | 30  | Bcaty-hill                 | 10         | 14  |
| Trudornag                               | 18         | 54  | New Lands of Fair          | 2          | 30  |
| Dalharnil                               | 4          | 20  | Achimore                   | 10         | ir; |
| Rose-hall                               | 13         | 50  | Farr                       | 9          | 36  |
| Achness                                 | 2          | 13  | Kertomy                    | 5          | 30  |
| Hftbisg                                 | 4          | 3D  | Swordley                   | 1          | 1G  |
| Jshlampy                                | 2          | 9   | CUrfc-luU                  | 1          | 3U  |
| Carry forward                           | 106        | 494 | East side tot;d            | 212        | 992 |

The first ten places are under sheep.

*West Side.*

|                  |    |     |                 |     |     |
|------------------|----|-----|-----------------|-----|-----|
| Jubeg Moutlale   | 4  | 30  | Brought forward | 75  | 340 |
| Knockdow         | 1  | 7   | Achnaclach      | 2   | IS  |
| Grubmore         | 14 | 50  | PoJrustemy      | 1   | 7   |
| Denachcory       | 3  | 16  | Skail           | 5   | 50  |
| Grub-beg         | 7  | 30  | Wood of Skail   | 8   | 8   |
| Kencail          | 5  | 16  | Carnuchy        | 19  | 66  |
| Kittary          | 2  | 8   | Dalhorikill     | 5   | 16  |
| Rliicork         | 1  | 3   | Adiaragary      | 4   | 16  |
| Syrc             | 14 | 65  | Dallinigarsh    | 3   | IS  |
| Langdale         | 18 | 70  | ApogilT         | 1   | 1G  |
| Achatraltyr      | 1  | 7   | Lechoairn       | 8   | 24  |
| jLaidstinachcory | 1  | 8   | Invernaver      | 10  | 40  |
| l>etter-beg      | 4  | 30  |                 |     |     |
| Carry forward    | 75 | 340 | Total           | 126 | €14 |

' I have thus given the names of all the town lands in Strath-naver, containing nbouC 338 families, which, at six

to

to a family, is equal to 2028 souls, occupying about 1600 acres of arable land from Newdale, at the head of the strath, to Kertomy along the North Sea coast. There is much meadow ground on the strath along the windings of the river, which is broad and deep, and seldom overflows its banks.

The land is ploughed, for oats with a Highland plough and four poneys a-breast, and they lay down their bear with manure, in general in lazy beds, from which they have ten or twelve returns. They sow near a boll of bear in about a Scotch acre. Their potatoes are planted in lazy beds. Some of their land is delved with the spade, called *cas ghiraehj*- or straight shaft, to distinguish it from the *cascrem*. From this cultivation I could obtain, it appears at an average each family have about twelve head of cattle, six small horses, fifteen or twenty sheep, and a few goats; say cattle in the whole 4080; horses 2040; and sheep 5000; the goats are kept only in the Highland part of the strath. The black cat is very highly valued at 3/. IOJ. at an average; the horses at 4/. each and the sheep at 10\*.

*Amadale*.—The farm of Armadale, the property of Lord Armadale of Strath, commences at the ham of Kertomy.

Mr. Reid, the present tacksman of Arradale, has much merit as a sheep farmer, as he has not diminished the number of inhabitants, but rather increased them, and encouraged them to improve, and he industrious seaman. He has about ninety acres of arable in his own hands, near a neat farm-house, and no less than fourteen tenants, who have a little old land, and are improving new. The farm extends from the burn of Kertomy on the west, to the wafcjof Stratly on the east, a distance of six miles  
along

along the sea-shore, and four miles up the mountain. The arable, and other land in the vicinity of the farm, is a sandy soil, but more of a sea-sand than granite, and a mixture of black earth and a hazel loam\* There are about fifty acres of green pasture and arable.

The farm of Armadale was taken in 1794 by a company of sheep-farmers in the south of Scotland (of whom Mr. Reid's father was one), as an experiment, to try if the Cheviot breed of sheep would thrive in so cold and northern a climate: a flock of the Cheviot was sent there under the care of Mr. Ker, a superintendent appointed by them. The flock did very well, and afterwards Mr. Reid, junior, purchased the whole, resides there, and it pays him well for his attention.

*Strathy.*—Upon the east side of the river of Strathy, is the old mansion-house, and offices, in a ruinous state. The mains contain about thirty-five acres; and various small patches of land along the river for five miles up, among the moory hills, are occupied by ten small tenants; the soil sandy for about two miles from the sea-shore, which is bold and rocky on each side the bay, and indeed all along the coast, with the exception of Naver-bay and Armadale. There are no fishermen at Strathy, or Ballgill; a place occupied by five tenants, a mile east of Strathy: they have about six acres of arable, gritty moorish ground.

*Strath-Hailadaie.*—Three miles from Strathy, through a barren moor, is Melvich, a public-house, which is the westernmost part of Strath-hailadale, the property of Mrs. M'Kay, of Bithousc. But I should first observe Portskerra, which is a fishing creek a mile along the shore, north-west from Melvich; it contains twenty-nine families,

lies, and about twenty-three acres of arable land, of a dark sandy soil, all laboured with the spade. There are also eleven families of new settlers on the moor, to the east of the old colony, who are improving the peat moss, and raising bear and potatoes. They have five boats for the cod and haddock fishing, and all make salt. This is the eastern boundary of the Strathy estate.

The following is the number of families resident upon both sides of the river of Halladale:

| <i>JVett Side.</i>         | <i>Families,</i> | <i>Eati Side.</i>        | <i>families.</i> |
|----------------------------|------------------|--------------------------|------------------|
| Melviclij . . . . .        | 22               | TraiHel-beg, • . . . .   | 4                |
| Kirk-town, . . . . .       | 4                | Croik, . . . . .         | 2                |
| Evag Chruai, . . . . .     | 2                | Dalhalvag, • . . . .     | 6                |
| Cowl, . . . . .            | 4                | Craigton, • - • . . . .  | 4                |
| Bighouse, . . . . .        | 8                | Auhl Smigile, . . . . .  | 2                |
| Auldiuljuim, . . . . .     | 2                | Achiunore, - • . . . .   | 3                |
| Caar, . . . . .            | 2                | Korgary-beg, . . . . .   | 1                |
| Trantel-more, • • • • • y< | 3                | CaoingUl/* — . . . . .   | 4                |
|                            |                  | Evng-mprc, • • . . . . . | 3                |
|                            |                  | Corkhutl, . . . . .      | 5                |
|                            |                  | Golvall, . . . . .       | 6                |
|                            | —                |                          | —                |
|                            | 52               |                          | 40               |
|                            |                  |                          | 52               |
|                            |                  | Total, . . . . .         | 92               |
|                            |                  |                          | —                |

The Tor of Bighouse is the family residence.

From the highland part of the Strath, there were eighteen families removed to make a sheep farm: they paid 18j/. sterling yearly reut, and the sheep farmer now pays 400/. sterling per annum for the same ground.

The arable soil at Tor and Melvicli, near the bay of Bighouse, is sandy; beyond that upon the strath there is some haugh ground, which of course is gravel and sand; and the land beyond the overflowing of the river is a light hazel soil, the same with the other soil in general through



the county. The extent of arable land on this strath is about 300 acres, and although it is a part of the county of Sutherland, in the ecclesiastical division, it is a part of the parish of Reay, in the county of Caithness.

I have been thus diffuse in describing the sandy soil or light hazel loams, being the predominant soil in the county.

*Chalk.*—There is no soil of that description in the county under review.

*Peat.*—The proportion of deep moss or peat, in the county, may be about 580 square miles, or 371,200 acres of peat earth, eighteen inches to ten feet deep. These are upon the levels and hollows of the mountains throughout the county, lie too high for any agricultural improvement, and are all covered with heath.

*Wastes.*—The mountains of this county may be considered as wastes. The tract of mountains bordering the south-east coast of Sutherland, from the Ord of Caithness to the vicinity of the Frith of Dornoch, on its southern boundary, and for ten miles into the interior, are covered with a stunted brown heath, with very little mixture of ling, or moss; indented with rocks, and the subsoil is till or schistus, and rock of the puddingstone kind, or a bastard kind of granite. The declivity of the mountains near the straths of the rivers, and in particular places along the coast, the subsoil is a sandy or a gravelly kind of clay, fit for planting. These mountains seem to be from 300 feet to 1400 feet above the level of the sea. The tracts of mountains and high hills that bound Strath Oickei, or the Frith of Dornoch, from  
the

the north of Skibo to Rose-hall, are of the same description with the above, for four miles into the interior of the country. The hill ground from Rose-hall to Loch ker-Icag, on the West Sea, with the exception of the upper part of the high mountains, has a considerable proportion of heath, ling, and moss among the heather, affording good pasture for cattle and sheep. The parish of Lairg, and all the interior of the county, come under the same description.

The Assynt mountains, viz. Bein-vör Assent, Glassbhein, Bein-canâp, Bein-chôinag, or the Sugar-loaf mountains, Bein-evie, Craig Rou, also the Bein-vör, and Stack-vein of Edderachylis, are altogether barren mountains of immense height, without a stalk of heath to be seen on their barren surface; even their bases, and the tract of country that borders the Atlantic, are so rugged and rocky, that no vegetation can be discovered, except some gloomy heath studded with piles of grey rocks; yet in the glens, ravines, and hollows, betwixt these mountains, the red deer, the goat, and even black cattle, formerly found good pasturage; now sheep occupy their place—\*the red deer have fled from the shepherd and his flock to the fastnesses of the mountains.

Lord Reay has allotted them a part of the *Dirt A4aref* or Great Forest, to the east of Bein-vör; Stack, and Archyle. The mountains of the Parv, or Cape Wrath Forest, are high, rugged, and gloomy, but less so than those of the Great Forest. The Durness mountains of Conval, Bein-shanew, Craignascol, and Bein-benr, are high and gloomy in appearance; as well as Bein-hope, Craig Kynasoch, and Xnock-frectan, in the parish of Tongue. Beia-âw, Bein-chlihrick, Bein-vadow, Bein-armin, and Bein-griam-more and Beiu-griam-bcg, in the interior of the county, are also bold formidable mountains, covered with heath,  
and

and studded with craggy rocks, bare near the summit. The great deer forest may be defined by a line from the end of Loch-eribole to Loch-medie, and from thence to the west end of Loch-shin. From that line to the West Sea, is a tract of about 300 square miles of high barren mountains, seemingly shattered by some great convulsion of nature, intersected by deep glens and ravines; with Loch-mercklan, Loch-more, Looli-stack, and Loch-garbadach, four fresh-water lakes, in an oblique direction through the centre of it, formerly the residence of the red deer, but now partly occupied by more\* useful animals, the black faced and Cheviot sheep. Each side of Loch\* more is covered with birch wood, and other shrubbery, which is really a wood t« a wilderness. Ail the other: mountains of the county of Sutherland, though high and extensive, are less craggy, and more covered with heath.

foam the most correct accounts that can be procured, the quantity of each kind of soil in the county, now in an arable state, may be calculated as follows:

|   | <i>Acres Scotch,</i> |
|---|----------------------|
| 1. Clay, - - - - -  | 190                  |
| 2. Sandy, - - - - -   | n 2 o                |
| 3. Peat moss, - - - - -   | TOO                  |
| 4- A mixture of sand, gravel, and blacky<br>earth, which may bj deemed a light<br>hazel loam, - - - - - | 13,090<br>3          |
| Total arable, .. r -  | <u>14.500</u>        |

## SfcCT. V.—^MINERALS,

~~COAL~~ At Brow .tod. Strath-stevea, ajnife to the southward of the water of Brora, several floaijpsiftij have b«cn made, and considerable quantities of coal, IQU ad, w-hicj\*, abounded sQ.rnuch .wijfi sulphur, that it could not be carried fy-sjea, and. |f was. dangerous -to ^ise it., jfc<sub>lm</sub> sak-work WAS ejected.«af firqra, whicji, was carried on at, the same time, but discontinued as unprofitable. During easterly storms, some pieces^^f cqal, ^r^, driven in on the Brora shpre. .

.|a|h ef rintei edjtion, o^^Sir Robert Gordon's account of Sutherland, p. 6, he makes, the following qb>crvatip,ns: " There is good sea-coal some half mile between the river of Brora, wherewith I have seen salt made, which served Sijtherlaiid and the^djape^t j>r.Qyinoes# aod v&p<ajso<rans» ported ta England, 4ind othër kingdoms, the year of God 1598., The -coai4ieugh was found beside Brora; and some-sajt-pans were erected a little be-west the entry of that çiver-, by Jane.Countess of Sutherland, unto whom heiji.Qn, Earl John, had, committed the government of his-affairs during his absence in France. There was good salt made' then, at Brora, which served not only Sutherland and .the neighbouring provinces, but also was transported intp England and elsewhere. After some years interruption, that,coal-heugh was again repaired, and set up by the,Qai4 John Earl of Sutherland, and a greater number of pans erected there the year 1614. This coal-heugh was, frudad by John (the .fifth of that name) Earl of Su«therland; but he being taken away, and prevented by sudden death, had no leisure or time to enterprise that work." .

J have not heard of any mines of copper, lead, tin, or  
iron,

iron\* having been discovered in this county. There is a vein of manganese in a state of black oxide, at Rose-hall.

*Marble.*—At Lead-more and Lead-beg, in Assynt, the estate of Sutherland, Mr. Jopling, a gentleman from Newcastle, discovered, and continues to work quarries of excellent marble. One quarry of it is white, and pure as alibaster, and another of variegated colour, veined grey, blue, and red, which bears a very good polish. An account of it will be given in the Appendix, No. VI.

Some black marble with yellow veins, of good quality, has been discovered on Lord Reay\*s property, in Edderaclylis, but owing to some misunderstanding as to terms, it has not been as yet wrought\*

*Limestone.*—\*There is limestone at the shore of Helmsdale, at Dunrobin, at Kenloch-aihh, and in the vale of Assynt, at the east end of the lake. The quality is good, and the quantity very great, but in such a district of country it, cannot be turned to much account. At D urn ess there *h* great abundance of excellent light grey limestone; its veins or seams being triangular, ic is easily wrought: the quality is good, and the quantity inexhaustible, and near water carriage. Limestone of the same quality is also found at Corie Island, opposite to Eribóle: a vessel might lie in deep water-close by the limestone rocks of the island, and either unload culm, or load II mesh ells, to be conveyed by sea to the harbours of Caithness, or the neighbouring counties, where it is much wanted for manure and building. If Lord Rcay, or any person of capital, wiith his Lordship's approbation, established a couple of draw-kilns upon the island, a profitable lime trade might be carried on io that district, as one cargo

-of culm from Sunderland would burn ten cargoes of  
-slacked lime.

At Strath-steven, near Dunrobin, there is excellent  
white or light grey freestone\*



#### SECT. VI.—WATER.

*STREAMS and RIVERS.*—The rivers and streams of the  
county of Sutherland, as may be supposed in so moun-  
tainous a country, are numerous. The most considerable  
of the rivers is the Oickel, or Frith of Dornoch, which  
is the southern boundary of the county from the Gizzing  
Briggs of the Murray Frith to Kenloch-ailsh, near Bein-  
vôr Assynt: it is navigable for vessels of fifty tons to the  
Bonar, about twelve miles, and for boats to Rose-hali,  
eight miles further; above Rose-hallit divides into narrow  
and rapid branches.

The second river in importance is the water of Fleet, or  
Strath-fleet; as before noticed, the tide flows into it as  
far up as Balintraid; but it is only navigable for boats six  
miles, when it becomes narrow and rapid, dividing into  
several branches.

The third is the water of Brora, with its branches  
of Strath-beg, and Skinsdale, which spring from the  
south-east sides of Bein-chlibrick, Bein-vadon, and  
Bein-armin mountains, in the interior of the county,  
taking their course in a south-easterly oblique direction,  
until lost in the Murray Frith at Brora. The water  
of Brora and its branches are narrow and rapid, over  
either a pebbly or rocky bed, until it arrives at Gri-  
nan> a beautiful summer residence farmed by Mr. Ross,  
minister

minister of the parish of Clync, and from thence by Gordon-bush to Killend, **within** three miles of the sea. The river runs through a level plain, and **WEB** three lakes; the upper lake about a mile long and half a mile broad, the others of less extent; the water seems deep and black, **from the dark shade of the** *on the* from the mountains, and rock of Carrol, a bold precipice upon the southern border of the lake, at least six hundred feet high. The scenery at Gordon-bush is very romantic and beautiful. From Killend the river runs rather rapid over a pebbly bed for three miles through Strath-Steven to Brora, whence it is rocky to the sea. In this river the pearl mussel is found, and pearls collected.

The fourth river is the Water of Helmsdale, the ancient name of which, even in the Roman maps, was *Ufie*, and hence the strath through which it passes was called Strath-die, *h* takes its source from Loch-coyn, and several other lakes about the bases of Bein-griam-more and Bein-griam-beg, and from springs in Knockfin, bordering on Strath-halladale and Strath-ilonan, with its several tributary streams; until it passes the kirk of Kiklonan, twelve miles from Helmsdale, and from thence it is called the water of Helmsdale until it runs into the Murray Frith at Helmsdale. The tide flows up half a mile, above which it is rather a rapid shallow river (except with floods), running in general over a pebbly or gravelly bed. All these, besides the water of Loth (a small rivulet stream), the burn of Golspic, and several minor streams, discharge themselves into the Murray Frith upon the southern coast of Sutherland.

The rivers Oickei, Brora, Flear, and **Helm** *si.*, *vc* good salmon fisheries.

Upon the northern and western coasts of the **county** there are,

1st, The water of Halladale, which takes its source from spring\* about the north base of the Bein-griam mountains, and runs a course of twenty miles due north, to Bighouse-bay, at the Tor of Bighouse. It is rather a rapid stream, receiving many tributary rivulets from the chasms of the mountains on each side to Gplval, whence it flows through level ground to the sea. The tide flows about two miles up the river, but it is only navigable by boats.

2d, The water of Strathy, which runs almost parallel to Halladale, about four miles to the west of it. Its source is LQch-stmthy, within four\* miles of the source of the Helmsdale water, and runs, due north for fifteen miles, receiving some streams from the adjacent hills until it loses itself in the North Sea at Strathy, a sandy open bay, not fit for navigable vessels.

3d, Ten miles west from Strathy is the water of Naver, which takes its source from Loch-medie, in the centre of the county, and from thence runs due east, by Moudalf to Loch-naver, and thence its course is nearly north zig-zag through the vale or strath of Naver, for twenty miles to the Northern Ocean, at Torsdale, which is a sandy shallow bay, open to the north. The tide flows for two miles up the river, which is only navigable for boats. Beyond this the river is rather rapid on a pebbly bed, receiving many tributary streams in its course from the mountains on each side from Loch-medie to the sea.

There is a good salmon fishing at the entrance of this river, and the inhabitants frequently find the pearl muscle in many parts of it\* from which they collect pearls, which they dispose of for six shillings each, according to their size and beauty.

*If any person bathes in the water of Naver, he is afterwards considered as of the clan of Mackay.*

4th\* The westward of Naver' is the water of Kenlech,



loch, issuing from springs; it falls into Loch-lyal, and passing through it, enters Loch-craggie; from thence through a narrow vale, by Borgie, to Torsdale-bay, about a mile and a half to the west of the river Naver; the tides bow up about half a mile in this river, and it is the boundary, (as before observed), of L'jrd Reay's property to the east. There are fourteen feet wafer at spring tides in ^his river, near the sea.

Proceeding from Torsdale for six miles through heathy hills, you arrive at the K\le of Tongue, into which the water of Kintail discharges itself, after a course of nine miles from springs in the vicinity of Loch-medié.

5th, The next, westward, is the river Hope, which has its source from Lbchin Dállag, at *Bealach naMearlach* fihe Thieves' Glen). It receives many tributary streams in Us course for eleven miles to the south end of Loch-hopc, and thence one mile to the sea on the east side of Loch-cribole. There it a good salmon fishing here.

The sixth and last river between Eribole and the west coast; beyond Cape Wrath, is the water of Di'nart, which takes its origin from Loch dowlas, a small lake in *Bca-läck ná'Fèy* (the Deers' Glen) in the *Dlri More*, or Great Forest, and after a northerly course of fifteen miles along the craggy and steep nase of the Conval and Tonvarn mountains, over a rocky and pebbly bed, it falls into Durness-bay, between the Far-out-head and the Parv> or Cape Wrath mountains. There is also a salmon fishing in this river.

*Lakes.*—The principal lake in the county of Sutherland is Loch-shin. It stretches twerity miles from north-west to south-east, and te about one mile broad. From its situation between very high hills, its depth must be consi-

derable, but TcouH procure no accouff bTiti soundings. It abounds with salmon and trout.

The second is Loch-assynt, situated between the bases of the Glas-vein, Coinack, and Canasp, three very high and rugged mountains. \* Its depth must of course be very great, but there are no accounts of its having been sounded. Its length is six miles, and about a mile and a quarter broad.

The third is Loch-naver; the fourth Loch-hope; the fifth Lach-lyal; and the sixth Loch-more. These are the principal lakes in the county as to extent of surface, and they all abound with trout. There are besides many small lakes, the most remarkable of which is Loch-monar, on the east side of the water of Naver, near Achfinlan. Tradition hands down to posterity an account of one of the clan of Mackay, who was possessed of some pieces of *it one*, or *nuts*, sanctified by some ancient saint, the virtues of which were so great, that the water in which they were immersed would cure all diseases. This man being much importuned to give these sanctified relicks to some of his clan, he fled with them to Loch-monar, where he deposited them; from that time the people of Sutherland, and many in Caithness, when conceiving themselves labouring under diseases, make a pilgrimage to Loch-monar, and by the dawn of day, on the first Monday of August, men and women promiscuously plunge three times into the waters of this sanctified lake; and after walking thrice round the lake, they return to their homes, as they imagine, perfectly restored.

There is another remarkable subterranean lake at Smow, 3 cave in a rock on the sea-shore to the east of Bain a keel of Durness. This cave is in a limestone rock, about thirty-two yards broad and twenty yards high at the entrance,

trance, and extends a considerable distance under ground. To the westward of its entrance is a small cavern, with an aperture about six feet diameter, and within is a pond or piece of water, which runs over a small fall at this entrance to the sea. This cavern is very dark, and tradition says, that the ghost of Donald du Mackay, of Strath-na-ver, is at times seen here ; that he had attempted to explore this subterranean lake, in a boat, but that he never returned. So far tradition goes. About an hundred yards from the bank head, a small burn from the neighbouring mountains enters this lake through a gloomy crevice in the rock. Caverns of this kind are frequently seen in similar limestone rocks in Ireland.

*Springs.*—The most remarkable spring that I saw in **the** course of this survey is at Achamore, at the base of the south side of the mountain called Glas-vein, on the north side of Loch-assynt, but at least five hundred feet above the level of the lake. The current from it was rapid, three feet broad, and fifteen inches deep, in the month of June: it never freezes, and the quantity it discharges is nearly the same in summer and winter.

Throughout the whole of this rocky county there are a great variety of springs, all pure healthy limpid water. In Strath-na-ver they ascribe medical virtues to several of their springs; but I saw none of them that **seemed** much impregnated with any mineral quality\*

## CHAP. II.

### STATE OF PROPERTY.

#### SECT. I,—ESTATES, AND THEIR MANAGEMENT.

THE following table of the valued rent of the estates in the county, will give an idea of the state of property, and of the scale of the landed proprietors in respect of fortune, viz,

|   | Scots Money. |    |                 |
|---|--------------|----|-----------------|
| 1. The estate or lordship of Sutherland, £. | 16,554       | C  | 1               |
| 2. <i>lfit</i> Ilcny's estate,              | 3647         | 13 | 4               |
| 3. The estate of Skibo,                     | 1974         | U  | 6 ditto.        |
| 4. The estate of Bighouse,                  | yoo          | 0  | 0               |
| 5. The estate of Stretby,                   | 564          | 0  | 0               |
| 6. Rose-hall,                               | 400          | 0  | <b>0 ditto.</b> |
| 7. <b>Part of the Pointzfield estate,</b>   | 46ti         | 13 | 4 ditto.        |
| 8. Part of the Balnagawn estate,            | 431          | 18 | 0 ditto.        |
| 9. Part of the estate of Cadboll,           | 354          | 0  | 0 ditto.        |
| 10. The estate of Emho,                     | 3it>         | 0  | <b>8 dun</b>    |
| 11. Ospidale and Ardeane, -r                | 2y3          | 6  | <b>8</b>        |
| 12. CricU, - -                              | 200          | 0  | 0               |
| 13. Acbanj> - -                             | 100          | n  | 0               |
| Total valuation in Scots money, £.          | 26,181       | 9  | 7               |

which in sterling money is 2182?. 15s. 9<sup>rd</sup>.

From the above state of the valued rent of the several estates in the county of Sutherland, it will appear, that numbers 6, 7, 8, 9, and 10, are estates belonging to gentlemen who reside on their property in Ross-shire, &c.; and

and the only proprietors who constantly reside in the county, are those of numbers 11, 12, and 13.

The Marquis and Marchioness of Stafford, to whom the estate and lordship of Sutherland belong, and Lord Reay, occasionally reside in the summer season at Dunrobin castle, and at Tongue.

The estate of the ancient Earls of Sutherland, commonly called the lordship of Sutherland, is managed by a factor (land steward) appointed by the noble Proprietor who not only collects the rents annually from the tenants, but with the proprietor's consent grants leases and removes tenants; he holds Baron-Baillie Courts to settle petty disputes between the tenantry; he is Vicar-lieu-tenant of the county, and is a leading man at all county meetings.

There are several small wadsets upon this property: the holders of these farms advanced a certain sum of money to the proprietor, the interest of which is five per cent., pays the stipulated rent for a certain number of years, say from one to two nineteens; and as the respective terms expire, the proprietor redeems the wadset by payment of the money, and they or their posterity become tenants on the estate;

At the commencement of the various wars in which Great Britain has been engaged from the year 1762 to the year 1802, the Earls of Sutherland raised a fencible corps, in this county, consisting of one thousand rank and file; and such was the esteem and veneration of the people of Sutherland for their Chief, as well as loyalty to their King and country, that the Earl had only to call parochial meetings of the inhabitants, where all the males were formed in regular companies, when the Chieftain, or some respectable individual acting for him, with a large snuff-box in his hand, and an attendant with a bottle

of

of whisky; went along, the ranks; and to every young man whom he wished to enter the corps, he offered snuff: the signal was perfectly understood—the young man stepped out, took his snuff and dram, and the clerk recorded his name and attestation. Thus, in the course of a few days,\*the Sutherland Fencibles were completed: they were then collected, and the King's bounty paid to them. Thus, in ancient days, the brave and hardy Highlanders of Sutherland would fly with alacrity to 'attend the call of their revered Chieftain, and their deeds were well known at' the battle of Flouden, as well as many other more successful conflicts. But in modern times, to preserve the military spirit of the Highlanders, has become less an object of public or private attention.

Besides the factor, there are Baron-Baillies in the several districts or parishes, as well as ground-officers, to summon the people for payment of their rents, &c.

The estate of Skibo is principally managed by Mr. Soper Dempster, its present proprietor, aided by a factor; as are the properties of the landed gentlemen from Ross-shire within the limits of this county.

Both the clergy and laity declined giving me an account of the present rent of the estates in this county, but it is supposed to be from £6,000/. to £17,000/. sterling.

The authority- of the sheriff-depute and his substitute is often interposed in adjusting disputes, not only between the tenants, but also between the proprietors and them, where the subject becomes too intricate for the decision of a justice of peace or of the factor.

## SECT. II.—TENURES.

THERE are three\* kinds of tenures within this county.

The lordship of Sutherland is held of the Crown, and acknowledges no other superior ; so is Skibo, Embo, and Rose-hall.

The second is the baronial right, which the Earls of Sutherland held over lands of which they transferred the *utī possedetis* to another, and these are the Reay, the Bighouse, and the Strathy estates.

The third is wadsets, already mentioned. It is a poll\* tical circumstance peculiar to the county of Sutherland, that 200/. of valued rent constitutes a vote for a Member of Parliament,\* whereas, in all the other counties of Scotland, no\* less a sum than 400/. entitles the proprietor to vote for, or be-elected.' This induces some of the proprietors to avail themselves of this privilege, by creating a number of voters over their properties\*; and in this county those proprietors who hold their lands of the Earls of Sutherland, by a particular statute, have a right *to vole* for, or be elected Members of Parliament.

There are some croft lands contiguous to the town of Dornoch, which hold of the Crown, it be in 2 a roval burgh.

The Bishop lands of Sutherland were all alienated before the termination of episcopacy in Scotland.

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\* The wadsetters on the Sutherland estate, who have advanced their money, and draw the real rent of their lands, enjoying the *iominum vitile* of an extent equal to 200/. Scots of valued rent, cannot, with any degree of propriety, be called Fictitious Voters.

## CHAP. III.

### BUILDINGS.

#### SECT. J. OTTIOUS & S OF PROPRIETORS.

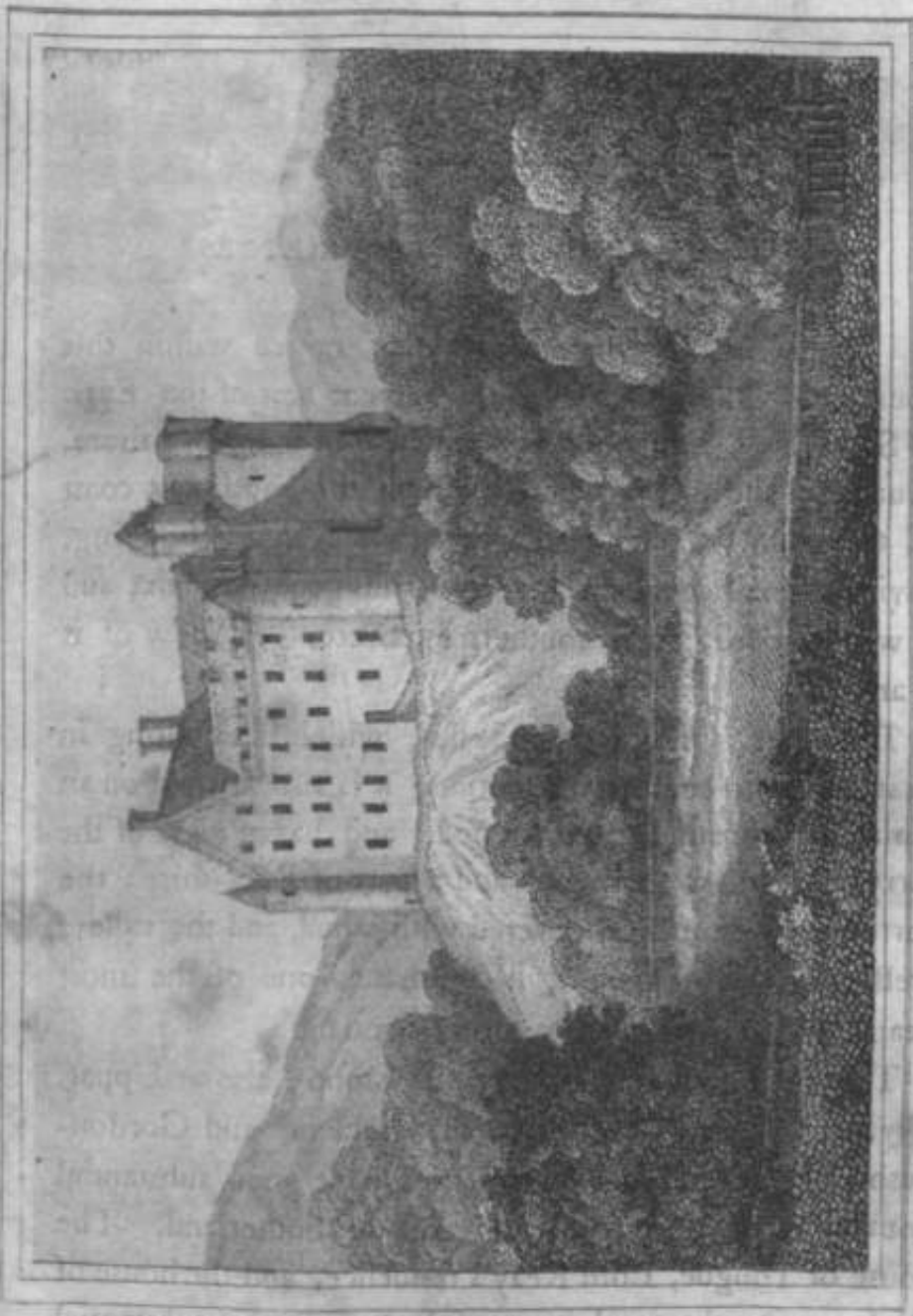
THE first of these worthy of notice within this county, is Dunrobin castle, the ancient seat of the Earl of Sutherland, built upon an eminence near the sea shore, situated in the parish of Golspie, on the south-east coast of the county. It is a well constructed square building, having a small court in the centre ; has good gardens; and is well wooded, on a southern exposure. A View of it is annexed.

The next is the house of Skibo; which has nothing in its structure to command attention : it is also situated on an eminence surrounded with wood ; and has a view of the ferry or Frith of Dornoch, and a part of Ross-shire: the surrounding eminences covered with wood, and the valleys well cultivated; in short, it commands one of the most beautiful prospects in the north of Scotland.

There is a good modern house at Embo ; also at Uppat, Clyne, JCentradwell, Cyder-hall, Crackan, and Gordon-bash ; and several of the wadsetters have good substantial houses, along the south-east coast of Sutherland. The house of Tongue, Lord Reay's residence, and the house of Fiighouse, on the north coast of the county, are substantial and well-built houses. All these are slated with Easjale or grey slate.

There are ruins of castles at Skelbo, at Helmsdalr, and





DUNROBIN CASTLE.

*Scottish and English Reports p. 44.*

at the east end of the Loch of Assynt. The most remarkable of these ruins is Macleod's castle of Ardvrack, already noticed. Mr. Macleod of Geaijies is descended from this family ; and some years ago, when he went to Assynt "to recruit for his son, Major M'Leod, of the seventy-eighth, who was killed in Egypt, an old woman of the Clan saluted him on his arrival among them: he of course took her by the hand, and she instantly made a vow that she would never give that hand to another, after such respect being paid her by the descendant of her Chief.

The houses of the proprietors, wadsetters, and principal tenants, are well planned and commodious, for country gentlemen of moderate fortune.



## SECT. II.—FARM-HOUSES AND OFFICES,

THE wealthy farmers and wadsetters have their offices proportionally commodious ; but in general the houses of the smaller tenantry, which they and their cattle inhabit together, are very mean and wretched. The walls are of mud (provincially, /WJ, and the roof made water-tight with divots, or thin sods, supported by couples and side timber of birch or fir, made in the form of a semicircle, having a few holes on the top of the roof to let out the smoke from a fire upon a hearth in the middle of the building, surrounded by the tenant, his wife, and children. As the smoke diffuses through the whole of the building, the cattle, who are tied by bindings made of birch wythes to stakes in the walls at one end of the house, reap the benefit of the warmth. In some cases the walls are built with a tier of stone betwixt each tier of feal, and in some the first three feet high of the walls and gables are built with stone, and the remainder with feal or sods.

In

In the Highland straths towards Assynt, they build their barns thus: the walls and gabies are raised five to six feet high with stone without mortar, with some tiers of feal, and the gable tops are wattled in the form of basket-work, with the twigs of birch, willow, &c. so as to throw off the rain, and admit a thorough draught of wind. As soon as their small crop of corn is cut, it is put into the barn to preserve it. This class of the inhabitants, though the most numerous, are too poor to build better houses, and they seldom get any aid, beyond a few birch or fir sticks, to assist in forming the roof. When a tenant removes, the timber of the possession is valued; if the value is more than the price of the timber originally furnished by the laird, the incoming tenant pays the difference to the outgoing one; but if deteriorated, the outgoing tenant pays the difference to the proprietor. The walls and gables are never considered of any value in these cases; and the outgoing tenant has a right to carry off the doors, not being fixtures. The only windows in such houses are holes in the roof, near the top of the walls, to admit light with good weather, and when the wind blows on them they are shut with a bunch of straw or a sod.

There is too great a distinction between the higher and the lower order of tenantry in this county: the former are comfortable in all their accommodations; intelligent, polite in their manners, and hospitable in their houses: the latter are deprived of these comforts, but are naturally sagacious, and acute in their feelings, and have an understanding and intelligence beyond the same class of society in the southern parts of Scotland.

*Repairs.*—In some cases the farmer, on taking a lease, agrees to build, and improve his farm house, for a stipulated sum

sum to be paid him at the end of his lease. In other cases he has an allowance out of the first rents, for buildings, or repairs, dec.; in the former case, should the tenant expend on buildings and improvement? treble the allowed sums, he will only receive the sum stipulated, or the value of his meliorations, if less than that sum.

*Price of Building Materials.*—The mason work is done at from 361. to 56\*. per rood of thirty-six square yards, according to the height of the work, provided the materials are laid within three yards of the building. Quarrying the stone at from 15s. to 21s. per rood, and carriage in proportion to the distance, and other local circumstances; and in cases where the mason undertakes to furnish the materials, as well as build with stone and mortar, the charge is from four guineas to six guineas per rood linai measure. Freestone for doors and windows furnished at from *gel.* to *is.* per square foot; lime imported from Sunder land at about *xod.* per barrel of thirty-two gallons slacked. Fir timber, when imported coast ways from the southern counties of Ross and Inverness, costs on the south-east coast of Sutherland about *is. 4d.* per solid foot, but if carried to the north coast of Sutherland by the Fentland Frith, from 15. *Sd.* to *is.* per solid foot, and freight. Foreign fir at from 2s. 6d. to *y.* per solid foot. Iron costs now from 4*S.* to 5*s.* per stone, of 161b\* avoirdupois, in the hnr.

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SECT. II.—VILLAGES AND COTTAGES.

PREVIOUS to mentioning these, it is proper to take notice of the royal burgh of Dornoch, the only town in the county, containing about five hundred inhabitants.

Here

Here are the ruins of the Bishop's palace and cathedral: a part of the latter is still entire, and is occupied as the parish church. An Engraving of it is annexed. This town has very little trade, or resources to recommend it of notice, though upon the shore of the Murray Frith. It has no harbour; and the sandy shore is quick and shallow.

The situation of Dornoch is thus celebrated by Sir Robert Gordon, anno 1630: "About the town along the sea-coast there are the fairest and largest links, or green fields, of any part of Scotland, fit for archery, golfing, and all other exercise. They do surpass the fields of Montrose or St. Andrews."

The only village in the county is that of Golspie, *i.* fishing village near Dunrobin. It consists of only a few thatched huts, partly under ground, occupied by fishermen, with three slated houses inhabited by shopkeepers.

The cottages, or houses occupied by cottars or mechanics throughout this county, are, with the exception of those built at Spinningdale, very mean and dirty, being built and thatched with mud and sods, seldom water-light, and always smoaky.

*Bridges.*—The bridge on the water of Brora, is the only one that formerly existed on the numerous rivers and burns within this county; but the great Hue of road from Ross-shire through the east coast of Sutherland, has commenced, at the mutual expense of the public and the county, and bridges are now erecting on the rivers and burns in its line, to the Ord of Caithness; a measure very much wanted.

## CHAP. IV.

### MODE OF OCCUPATION!

#### SECT. I.— SIZE OF FARMS.

UPON the Sutherland estate on the south-east coast of the county, the wadsetters prevail; these took an extent of ground equal to 200/ of valued rent, and generally occupied a part of it themselves, say from thirty to fifty acres, or bolls sowing, and the remainder was occupied by their sub-tenants, in farms of from 3A to 5/ rent, besides services,\* in some cases unlimited. In all cases where the wadsets are redeemed by the proprietor, the former is continued in what he has in his own possession, and the proprietor settles with the small tenants, and makes them independent of the farmer.

The various estates in the county have not been measured, and of course the rule of letting land by the acre is not general: the only data by which the extent of the arable is known, is by the quantity of bear sown (a boll of bear generally sows about an acre) ; land therefore is let by the boll sowing, and the rent of pasture by the number of cattle it will maintain in the summer months. The arable land is reckoned<sup>1</sup> in penny-land, fsrthing, and octos; the penny-land is generally allowed to contain eight acres; an octo, of course, is one acre, or a boll sowing ; but this varies in proportion to the quality of the land: \* hen of a superior quality, the quantity is less, and *vice*

*versa.* The arable land on the various straths in the interior of the county, as well as the western and northern coasts, are occupied, generally, in small lots of from thirty to one acre. Every occupier has, in his district, a proportion of *in-town* pasture, and the mountains and moory hills are pastured in common by the cattle of the nearest tenants.

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SECT. II. FARMERS.

THE character of the farmers in the county of Sutherland is as diversified as the size of their farms; and much more so than in counties in the southern parts of Scotland. There are none of them bred in a regular manner, *JrpfQ* their youth to the business of husbandry.

The more opulent class are gentlemen who have been in the army, navy, or some respectable line abroad; of no landed property, who have wadsets, and who farm partly for pleasure and convenience, but derive their profit from what they subset to the lower class of cotters, or small tenants.

By far the most numerous class are those whose fathers and grandfathers for many generations followed the plough, or the black cattle, and goats, in the mountains; who never think of changing or improving their condition, and whose means and professional knowledge are too confined to admit of change or amendment: the nature of the soil, climate, and short leases from their landlords, or tacksmen, discourage them; and indeed, until the sheep-farming circumscribed the extent of their hill pasture, their chief dependence was upon the rearing of black cattle, by which they made a bare subsistence with little labour, in conformity to the customs and prejudices of their

their predecessors. This class are frugal and temperate in their habits: in spring and harvest (hey labour hard; and the summer and winter months are passed in ease, poverty, and contentment. This attachment to idleness, induces them to listen to the delusive tales of *crimps*, who go about the country, recruiting for families to embark for America; a land, by their tales, flowing with *milk* and *honey*. By these nefarious practices, many a deluded Highlander has been driven to slavery and misery in that remote country, where they have none to assist or protect them.

I must remark, to the credit of the inhabitants of the county of Sutherland, that none of the various sectaries of religious enthusiasm have been able to mislead them, or to gain any footing in their land\*. They are all presbyterians, and devout in their attendance on divine service, and the other exercises of religion.

The crimes of rapine, murder, and plunder, not unusual in this county during the feuds and conflicts of the Clans, were put an end to about die year 1640. Domestic and social virtues are now cultivated, and revered by all ranks of people.

Big Sam, the Prince of Wales's late porter, was a native of Sutherland: he was above seven feet high, yet his father and mother were of the ordinary size. The inhabitants of this county are in general well limbed, from five feet three inches to five feet eight inches, a few from that to six feet, and very few above six feet high.

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\* Now (anno 1811) some Sectaries have made proselytes in the parish of Assynt. This parish is very extensive, and the Minister of it being far advanced in years, an assistant is become absolutely necessary. Where schism prevails, there is commonly some deficiency in the duties of the Established Church,



## SECT. III.—RENT.

IN former times, when friendship and dependence subsisted betwixt the Chieftain and his Clan, a stranger seldom offered to take a farm from the Chief of any clan, well knowing that he would be held in disrepute for so doing ; of course there were few leases of any duration, and but few removed from their possessions.

The rent of land has had a progressive rise over Sutherland, in proportion as the produce of the soil, either in corn or black cattle, increased in value, or rather as the value of money decreased, principally owing to the great quantity of paper money in circulation, from the variety of banking companies now established in Scotland.

Within these few years past, the rise of rent has been considerable, owing perhaps in some measure to the introduction of sheep-farming into the western and interior parts of the county, which of course increases the demand for farms, from the number removed to accommodate the sheep-farmer and his flock.

Along the south-cast coast of the 'county the rent is paid partly in money and partly in *victual*, (oatmeal and bear), in equal proportions; besides which, the smaller tenants pay services, customs, and casualties to the tacksmen or landlord. The rent of the arable land in this district is from 15*l.* to 21*s.* per boll sowing (or acre) ; the pasturage, taken as an appendage or accommodation along with the arable land, in some cases is charged at the rate of from 30\* to 35\*. Upon the straths distant from the sea, and in the western and northern coasts, the rent of arable land cannot well be ascertained, because the tenants pay in proportion to the number of black cattle they can rear and maintain upon the farm;

farm; the arable land being but a very small proportion of it.

The entry to farms is at Whitsunday, and in general the first rent is payable at the first Martinmas after entry; commonly called a *tre-harid* rent, / . <? the money rent at Martinmas and the farm at the *m\* Candlemas after entry. Where the farm is partly arable and part grass, this mode of payment is not inconvenient, because the benefit from the grass will enable the tenant to pay the first year's rent before he has raised a crop. On a farm entirely arable, the rent should not be payable until twelve months after entry\*.

*Grassums*, (or fines, as they are sometimes called), were formerly taken by the proprietor, at the end of the lease of seven years, in place of a rise of rent. This custom was inimical to the Improvement of the soil, although it might relieve the needy proprietor in the mean time : the tenant being compelled to part with a portion of his capital to pay the grassum, it crippled his exertions to carry on improvements; and the practice is now in general exploded.

#### SECTS. IV. AND V.—POOR-RATES AND TITHES.

THERE are no poor-rates or tithes paid in this part of the kingdom, and the funds for the maintenance of the poor, consists of the charitable collections of the parishioners every Sunday at church, some petty fines for breaches of

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• Afore-hand rent enables the Proprietor to hypothecate the tenant's subjects for two rents, *i. e.* he can seize the crop for the rent payable the Martinmas of the preceding year, and his stocking for the rent payable the current Martinmas.

decorum, pious donations by benevolent persons, certain fees for the proclamation of banns, and the use of the raort-cloth (*pall*) at funerals. The fund is managed by the ministers and elders (church-wardens), under the controul of the heritors of the parish, who have access to examine the parochial accompts.

In addition to these provisions, the poor generally solicit charity through the several parishes; but among them are some, who, though reduced to want, have an honest pride which blushes at the idea of becoming a beggar; these often suffer the most excruciating misery, even to the verge of starvation, rather than go a-begging; and are often relieved by private donations from the humane and wealthy. There are no sturdy beggars or gypsies in this county.

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#### SECT. VI.—LEASES.

WADSET leases in this county have been in some cases two nineteens, but as before stated, they are now but rare.

The leases between the proprietor and principal tacksmen are generally nineteen or twenty-one years; but the tacksman seldom gives a lease to his sub-tenants or cottars, and when he does, it is generally for three, five, or seven years. This is done with a view of making them more submissive in performing personal services, &c.

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#### SECT. VII.—EXPENSE AND PROFIT.

THIS is a subject upon which I could obtain no particular information, as it immediately affected the individual interest;

interest; nor could I find a case where the farmers paid due attention to their expenses and profits. It is allowed, that on farms lately taken at rack rent, after paying the present high wages to servants, and the expense, and increased price of all implements used in husbandry; with the rent to the proprietor, the farmer has little left for his trouble. Upon grass farms the price of black cattle is so fluctuating, that in no two succeeding years can the value of the produce of the farm be expected the same; and the Sutherland grass farmers complain of the want of regular markets or trysts within the county, for the sale of their stock, at which drovers from the south of Scotland might, if established, attend\*.

There is a sheep farm on the Balnagown estate in Sutherland, of 37,000. acres of mountains and valley or strath ground, stocked with black-faced sheep; and from the demand for similar ground for sheep-farming, it is presumed that the profit of sheep-farming is greater than that of any farmer either of arable or pasture land. From that, and several other smaller farms, the over-stock of wethers and draught ewes are annually driven to the south of Scotland, where they are sold at from *i*\$. to 30*r.* per head, and the wool is also shipped for the English markets, there being no woollen manufactory of any importance in the North.

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\* Regarding the newly established fairs, see the Report of 1811.

## CHAP. V.

## IMPLEMENTS.



THE progress of civilization and agriculture go hand in hand in every country, and the progressive degree of improvement, is pretty well to be ascertained, by the kind of farming implements used in any district.

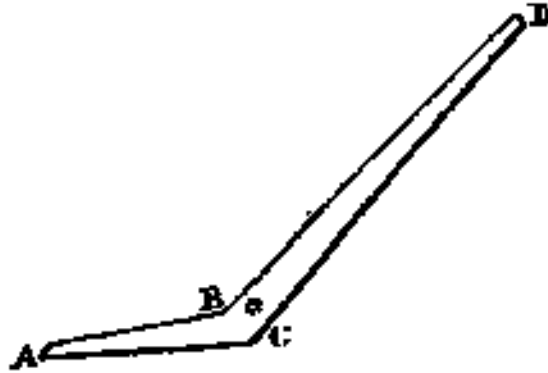


## SECT. I.—THE PLOUGH.

THE more opulent farmers, as well as the proprietors, along the south-east coast, and some other parts of Sutherland, use the modern English and Scotch ploughs, with the metal breast or mould-board head, &c.: the price of such a plough is generally 3/. or guineas, or 4/. ior. complete. The small tenants use the old Scotch plough, made of birch or aller, with the head and mould-board of the same materials, having a thin plate of hammered iron on the bottom, and the land side of the head. This plough, exclusive of the ploughshare and sock and plates, costs from 55. to 155. and is often made by the tenant who uses it. About 2*s.* will purchase the plough, amel, swingle trees, side ropes (of hair), &c. fit for work.

In the parishes of Assynt, Edderachylis, Durness, and Tongue, the *cascròm* is in general use. This is a kind of spade, a figure of which is annexed. It forms an obtuse angle

angle from the angular point to the end where the iron embraces it:



From A to B the head\* about two feet long; from B to D the Shaft, about five feet long from the angular point; C a piece of wood about eight inches long, projecting to the right side, which serves as a step for the right foot to push the instrument diagonally into the soil; the person holding the handle near the upper end, gives it a jerk on the angular point, which at the same time raises the lower part of it with the soil, and throws it to the right side. In this manner the labourer proceeds, and is enabled to turn up a considerable extent of soil in a day. The iron on the lower end is the shape of a narrow Irish spade, about five inches broad, having a socket which embraces the wooden handle, something like the sock of a small Scotch plough. With this instrument, the inhabitants of the above parishes work their scanty portions of arable land: and in Assynt in particular, there are not above six ploughs, or any other instrument for cultivating the soil, than the *casróm*. In the parish of Farr, or Strath-na-ver, much of their land is turned up with the spade with a straight handle (or *cat ghirach*)<sup>o</sup> with which they make the land for bear into lazy beds, and plough the land for oats with the old fashioned plough used by their ancestors, as before described. No trenching, draining, or road ploughs, are used in this district.

## SECT. II.—HARROWS.

THOSE farmers who have the modern improved Scotch ploughs, use harrows with iron teeth, both the break and the common; but the common rank of tenantry use only harrows of their own construction, with wood' n teeth, all made upon the construction of harrows wuh iron teeth, but with much less effect in reducing the soil; yet their land being, as before described, a friable black loam, these harrows answer the purpose, and in the district where the *cascròm* is the plough, there is only one harrow used, which is dragged along by a man, instead of a horse or ox. This kind of harrow may be valued at 2s. the pair.

## SECT. III.—ROLLERS.

AT Dunrobin, Skibo, and among some of the most opulent farmers, there are rollers of free-stone, five feet long, thirteen inches diameter, and some of wood fifteen inches diameter. There are none of any other kind, because a regular rotation of crops, or raising artificial grasses, is by no means general in this county\*.

## SECT. IV.—HORSE-HOES.

THE only horse-hoe in this county, is a small plough used for horse-hoeing turnips and potatoes, and sometimes even the common plough is used for that purpose.

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\* See additional Report of 1811.

## SECT. V.—HORSE-CARTS.

ON the farms of the proprietors and principal farmers, there are good double horse carts,' and carts for two oxen, which cost from 12/. to 16/. sterling. But among the smaller tenantry, there is a small kind of cart all made of wood, the wheels are made of ash plank, about two feet and a half diameter, and three inches thick ; the axle and wheels move round together, and the traces are attached to the axle by a semicircle, or hoop of birch, which embraces the axle, and both ends of it fixed in the train on each side; and finally, betwixt the bars of the trams, a conical basket is set, which serves as a box to carry the load either of manure or fuel. A small poney is yoked to drag this load to the field, and the driver, to unload the car, overturns the basket, and then replaces it on the car: its contents may be half a cubic yard. This cart usually costs from 20s. to 25 J.; but timber becoming scarce, its price is now advanced.

Another kind of baskets used by the\*smaller tenants in this county, for carrying manure, is made semicircular, of willow twigs ; thus, the diameter or flat side is eighteen inches long, the depths of the basket is about sixteen inches; it is open at both ends; a flat semicircular piece of basket work is made to fit one of the ends ; this piece as a bottom is attached to the edge of the flat side by two twigs of birch, as a pair of hinges, upon which this bottom moves either to shut or open the basket. A small stick of three-fourths of an inch diameter is fitted to the breadth of the basket, a few inches longer than its breadth ; this stick is fixed to one of the semicircular sides of the basket with a hinge of birch twigs, and to the other  
side



side a hinge or noose is fixed to receive the other end of this stick under the bottom of the basket; and lastly, a short rope of the birch twigs or hair, is fixed in the flat side of the basket, as *nfettle*, to fix the basket in the clubbar on the horse's back; the horse being equipped with a fleat and clubbar on his back, the former a web made of straw, weaved with small ropes made of rushes, three feet by two feet and a half, and three quarters of an inch thick, and the latter made of crooked wood, like a saddle, to fit the horse's back above the straw mat, and secured by a rush or hair rope under the horse's belly. This clubbar or saddle has a deep notch in the top of it to receive the fittles or bands of two of the said baskets, one resting on each side of the horse; then the bottoms of the baskets are shut as above, and either men or women proceed to fill them with manure. Three or four horses thus loaded, being fixed by their halters or bridles to the tail of those in front, they are led to the field by one person, who leads the foremost horse, and the rest follow in files: on the field, the leader pulls the noose off the sticks, the bottoms of the baskets open, and down falls the manure. They, then proceed back to the dunghill to reload.

This mode of carrying manure is very ancient, simple, and expeditious, in a district so rugged, that no wheel carriages can be used. Each basket holds about two cubic feet, *\*. e.* four cubic feet in a horse, or rather small poney's load; six of them will of course carry twenty-four cubic feet, or even a cubic yaid, or small cart-load. The manure, thus laid on the field is sooner and more equally spread than in cart-loads.

**SECT. VI.—WINNOWER MACHINES.**

THERE are a few fanners of the common construction among the principal farmers on the south-east coast of this county. In general, the women winnow or clean the corn with a sheep skin freed from the hair, and stretched on a hoop eighteen inches diameter, called a *weight*\*.

There is a small thrashing-mill worked with water, at Mid Garty, but it is not much used\*.

There are no scarifiers, chaff-cutters, bruisers, waggons, tumbrils, borers, draining-tools, sowing troughs, or weighing machines, in this county\*.

Those inhabiting the sea shore, have what they call a shore crook, for dragging together the driven ware, in order to carry it to the land for manure.

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\* See additional Report of 1611.

## CHAP. VI.

### ENCLOSING.

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THERE are no cases in which enclosures, **in this** county, have been done by act of parliament.

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#### S&CT. I.—FENCES.

OVER all the Highlands, as well as in this county, the practice of building what are called head-dykes, is of very remote antiquity, so much so, that there is no record to ascertain the era in which they were begun to be erected. These enclosures generally, exhibit evident marks of great antiquity. This head-dyke was drawn along the head of a farm or town-land, where nature had marked the boundary betwixt the green pasture and the more barren ground, totally or partially covered with, heath. It is formed partly of sods and partly of round stones, where they abound. Within this fence the farmer had his arable, meadow, and pasture land, and beyond it the young cattle, horses, sheep, and goats, of the different tenants, fed in common. The milk cows are fed on the *in-town* pasture, until the farmer removes them, by the end of June, to distant shealings, or hill pasture, where they remain for two months. After the harvest is gathered in, both the *in-town* and the out-field become a common pasturage to the tenants of the town land, and even parish, until the end of **March;**

March ; after which each tenant preserves the grass of his own farm.

Upon the farm of Dunrobin, and several other parts of the county, the land is divided into regular fields of from ten to twenty acres, enclosed, and subdivided with walls built with stone without mortar or lime, about four feet and a half high. Such dykes are built at *4J.* per running yard, and the price of the materials must depend upon the facility of quarrying, carriage, &c. in some cases, where the ground is wet, there are sunk fences, made with hedges of hawthorn ; the ditch is made at from *2<sup>^</sup>.* to *34/.* per cubic yard, and the stone facing raised at about *2.d.* per yard. In some instances, whins or furze is sown on the ditch, which in a few years make a good fence. The stone walls, when properly built, are the most durable ; they will last a century with little repair. Where the enclosures are made with proper modern fences, the gates are also substantially made with circular stone pillars, having four or five barred gates of fir to it ; but these are not common in the county.

## CHAP. VII.

## ARABLE LAND.



## SECT. I.—TILLAGE.

FROM what has been already stated, the reader will easily infer, that the tillage in this county is much diversified. Wherever the surface is uneven, or so infested with rocks, or brush-wood, as hardly to admit the plough, and where the climate is so rainy and damp as to render the corn crops precarious; or where the farmer depends for his profit more upon cattle than upon arable land, it would be in vain to expect that agriculture should be carried on, as we meet with it in districts more favourable for the operations of the plough.

Along the coasi-side of Sutherland, the more opulent farmers plough their Kind with a pair of horses, without a driver, and in some cases with four oxen a-breast, with a driver. The smaller tenants, both along the east coast and in the interior of the county, use four small *garrons* a-breast in their light plough; or perhaps two small poneys and two cows, all a-breast, with a driver; and in cases where their lots are small, two of them join and furnish two poneys each, and plough their land jointly, the one holding and the other driving the plough\*. These people have their land all in crooked ridges, broad in the middle,

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\* In all these cases the animal pulls by the shoulder, by means of straw collars and hems, &c.

and narrow at each end, in the shape of an S, and a green bank, or cairn of stones, between every two or three ridges. The improvements carried on at Dunrobin Castle, the seat of the family of Sutherland, merit more particular attention; the following is the system adopted :— After the land is brought into good order by draining, all the wet ground, removing rocks, leveling &c. a crop of turnips is taken in drills four or five feet asunder, in order to clean the ground completely ; here or barley, with grass-seeds, is the next crop ; the third hay, and the fourth posture, continued for some years.

In the western district of Assynt, Edderachylis, &c, the land is turned over with the *casgrim*. The gentlemen farmers have their land in straight ridges of about fifteen feet broad, and the depth of the furrows depends upon the depth of vegetative earth and quality of the subsoil. Along the south-east coast of Sutherland, as has been already observed, the subsoil is sand, or an open gravel\*

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#### SECT. II.—FALLOWING\*

SUMMER fallowing is not practised in this county, the soil in general being a friable black mould with a proportion of sand; the only fallowing, therefore, is carried on by means of green crops of pease and potatoes; the turnip husbandry being limited to a very few farms.

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#### SECT. III.—COURSE OF CROPS\*

**The** most general course of crops, in the south-east, or arable part of the county, is, 1st, pease, or potatoes; 2d, bear, or big, manured with ware, or sea-weed, or yard dung; 3d, oats, then pease, &c. again. ^ In the interior

SUTHER.] terior

terior and western districts of the county, the general rotation is bear and oats alternately \*, and in some instances two crops of oats for one of bear or big. The bear is kid down in lazy-beds, with abundance of manure, and they have generally from ten to fourteen returns. Along with the second crop of oafs, some sow rye, and they are reaped and manufactured together, into a kind of coarse meal: this is done upon land that is so scourged that they expect little return of oats.

Some of the arable land along the shore on the south-east coast, is almost covered with shore stones, from the size of a turkey egg to eight pounds weight. Several experiments have been made to collect these off the land, expecting a better crop, but in every case the land proved less productive by removing them, and on some small spots of land it was so evident, that they were spread on the land again, to insure their usual crop of bear, oats, or pease. It has been observed in some parts of England, when fields near the turnpike roads had been deprived of the stones, for making the road, that such fields were much less productive than formerly; and accurate experiments had been made to ascertain the fact. Should not this consideration prevent farmers from collecting much of the small stones off their land, when laid down with grass-seeds, as is now in general the case?

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#### SECT. IV.—WHEAT.

VERY few experiments have been made to raise this grain. On the farm of Dunrobin, and at Skibo, the returns were said to be good, from eight to ten bolls per acre, from three firlots seed ; but owing to distance from markets, variable climate, and want of manure, the cul-  
ture

ture of it was given up; at the same time there is reason to believe, that with good management, it would thrive on the east coast of Sutherland, as well as in any part of Scotland.

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SECT. V.—RYE.

VERY little of this grain is cultivated in Sutherland, except by the lower class of tenants, as already stated, as a mixture with grey oats on land so scoured, or naturally barren, that small returns, even of oats, are expected.

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SECT. VI. — BARLEY, AND BEAR, OR BIG.

THIS is found the most profitable grain in this county, particularly the latter. They find that bear is an earlier and more productive grain than barley; it is therefore in more general cultivation.

*Tillage.*—The land for bear is generally ploughed in February or March, and as sea-weed can be had along the coast, it is spread on the soil, sometimes before the first ploughing, and sometimes afterwards. In the course of the month of May the land is harrowed, and ploughed a second time, when the seed is immediately sown (about one boll, or six Winchester bushels per acre), and well harrowed in. Where the land is not within the reach of sea-weed, the cattle dung, mixed with earth, by way of compost, is spread on it, previous to the second or seed ploughing; and frequently the bear-seed sowing is not over until the 22d of June; whilst the bear harvest,



in a warm season, commences the beginning of August\* though in a cold season not till the end of September. The returns are from four to seven bolls per acre, according to the soil, and quantity of manure applied. It is all sown broad-cast, and only rolled when grass-seeds are sown with it, which is rarely done in this county. Bear weighs from sixteen to eighteen stones per boll, of about six Winchester bushels, and whatever portion the coast-side farmer has for sale of this grain, is purchased by the Highlanders from the interior of the county, of which they make whisky, or grind it into meal for food 5 the produce of their own small portions of land not being sufficient to maintain them above half the year.

The mode of making bear meal is, 1st, the bear is kiln-dried, then shelled and dressed at the mill, and afterwards ground into meal, which is baked into thin cakes called bear-bread, palatable, but not so nourishing, as oat bread. • The price of this grain varies from 16s. to SOJ. per boll, according as the seasons are plentiful or Scanty.



#### SECT, VII.—OAT\*.

ALONG the south-east coast of Sutherland,-the Idhd of oats most generally sown, is the Blainsley white oat \ and among the small tenants, a small grey or black oat. Both kinds are sown with one ploughing, broad-cast, si the rate of five firlots of the white oats, or two bolls of the black, per acre. The time of sowing is from the end of February to the end of April, as the season permits, and the ground is then harrowed; In the course of the summer, before the crop acquires its full length,

farm-

farm-servants or day-labourers are employed to pull the weeds, such as thistle, mug wort, and dock; in doing which some of the corn is unavoidably trampled down and injured. The time of harvest is, from the beginning of September to the end of October, as the seasons are dry or rainy.

The produce, by the best information I could collect, is on an average about five bolls per acre. This corn is thrashed down through the winter, as the cattle require the straw } it is manufactured into oatmeal, and sold to the Highlanders in the interior of the county, at from 16s. to 30J. per boll of eight stone and a half Dutch, according to the demand\*. Of this oatmeal the natives make a hasty-pudding called pottage, on which they breakfast, with milk •, they make oat-cakes of it for dinner, without any process of fermentation.

In the best season the produce of grain in this county does not subsist the inhabitants } of course some cargoes are imported to the south-east coast from the southern counties, and distributed among the Highlanders » and the county of Caithness serves the wants of the inhabitant's of the northern and western coasts of this county.

The red oat has been tried in the sandy soil of the south-east coast of Sutherland, but discontinued, as the farmers considered it too early a grain for their warm soil. The returns of what had been tried proved scanty, both in corn and straw. This grain does better in a deep damp soil. Let the Sutherland farmer lay a good coat of peat on his light land, and it will yield red oats\*.

In the Strath-naver and the western districts, where the land is laboured with the *cascr6m*, it is very productive, owing to the great quantity of cattle-dung and sea-weed they have for manuring their small lots of arable land.

## SECT. VIII.—FEASE.

THE most general kind of pease sown on the coast-side of Sutherland, is a small dwarfish grey pea, called the Sutherland pea, sown there for time immemorial; they ripen early, and yield good returns, five to six bolls per acre.

The land gets one ploughing about the beginning of April, and the pease are immediately sown broad-cast, and harrowed ; this is all that is done to them until ready to be reaped, generally in September. In the parish of Loth, and at Dunrobin Castle, where the soil is of a clayey nature, beans are *sown* broad-cast with the pease; but the meal of the pease, without the beans, is sweeter, and better than with it, and since the potatoe crop is become general, beans are exploded.

The average return of pease from each boll sowing, or acre, is about five bolls. The pease crop is purchased from the coast-side farmers by the Highlanders, of which they make meal, and use it both in bread and puddings, with milk. The price generally the same as that of bear ; the boll of pease is four Winchester bushels. The pease straw is given to their horses in spring. The pease stubble is ploughed soon after the crop is off, and prepared for bear the ensuing spring; pease stubble being the only winter ploughing practised in Sutherland. It is only along the sea-coast, or within three miles of it, on the South-east coast of Sutherland, that pease are raised as a crop, the climate in the other divisions of the county being too wet and late for that species of pulse.

## SECT. IX.—BEANS.

BEANS are not now sown in this county, except, as already stated, with pease in clayey ground. Some time ago they were raised to great advantage, and the natives found them, ground into meal, a wholesome and substantial food. There was only one kind used here, of a small size. A mixture of bean and barley-meal used to be a favourite food in the southern part of Scotland.

## SECT. X.—TARES.

NONE sown in this county, unless it be a few bushels on gentlemen's farms, as food for their horses in July.

## SECT. XI.—TURNIPS.

THE turnip husbandry is in its infant state in this county: even the proprietors, or gentlemen farmers, raise very little of this valuable root. The little that is raised, is of the white and red-topt kind, but upon so small a scale, that little can be said of its effect; only that so far as experiments have been made, the crops appeared abundant. The soil, and even the damp climate of the interior straths in this county, would answer well for turnips, but their arable land being of small extent, and not enclosed, is a sufficient reipen to prevent them from raising a root that might be the means of saving their cattle in a bad spring, by which they often lose a considerable number. In spring 1807, no less than 500

head of black, cattle, and more than two hundred of their small horses, died from want, in the parish of Kildonan alone."

SECT. XII.—COLE, pa JtA?E-SEED.

NONE sown in this county.

SECT. XIII.—CABBAGES.

THERE are none planted in the field. Some years ago the tenantry and cottagers usually had good cabbage-gardens, but the potatoe crop has superseded the use of cabbage in their gardens, with few exceptions. Along the coast-side-they raise Dthrh cabbage\*planrs, which are sold to the Highlanders of the interior at from *Id.* to *8c/*. £er 100 plants." The nursery for this plant is generally a small spot of new ground, enclosed with a feal dyke, over which', after being trenched, they spread peat-ashes, and a *iftU Stbhgs* They sow *the tnh]* ;e seed about the end of July, and the plants are ready for the market about the cna of AJarch following.

*Grub:*—The country people generally plant their cabbage gardens early in April, and as the weather is generally cold during the month of May, the grub frequently etits'many of the plains about the v <rs, and of course the plant decays. To remedy *ihbj* the farmers frequently dip the ro^ts of the. plants in retain pulp of lime, or soot and water, immediately befbft planting, which they find preserves the plants from the depredations of that insect.

There

There are no ruta бага or Swedes, turnip cabbages, or kohlrabi, sown in the fields in this county; nor are there parsnips or carrots, except what are sown in the kitchen\* gardens.

SECT. XIV,—POTATOES.

THIS useful root is extensively cultivated, and the management in it well understood by all the inhabitants of this county; their soil is in general a light free mould; and when properly attended to in the weeding season, it is allowed to make the more ample return. Upon the coast-side of Sutherland, the mode of planting potatoes is with the plough\* in land after a crop of oats: the land is twice, ploughed) and the predominant weed, called quitkens, or quick grass,\* is diligently gathered and burnt on the ground; then the potatoes are planted after the plough\* in a narrow furrow where it is intended to be hand-hoed only. The ground is not manured, because in every experiment that has been made, the potatoes, when the land is manured for this crop, are found to be watery and Uprous, or full of small excretions.

In most cases, the land is manured and sown with bear after potatoes; but often sown with white oats, without manure, and it yields an abundant crop of good grain and strong stubble.

In the Highlands, and interior of the county, the potatoe is planted with the spade<sup>3</sup> in lazy-beds in new ground, or dibbled in stubble land and «P both cases well manured with cattle dung\* and on the west coast of Assynt, &c. with ware or sea-weed.

The potatoes on the south-east coast of Sutherland are more farinaceous than in any other part of the county.

Every

Every householder, from the highest to the lowest, has potatoes for his family, and when they are taken out of the ground in October they are preserved in pits dug for that purpose, covered with divots (sods), and about eighteen inches of earth well packed above them, which preserves them in good condition for the spring, *u e.* such as can be spared till that season.

The curl is a disease rarely known in this county among the potatoe crops.

There are various kinds of eating potatoes cultivated in this county, but the most prevalent is the kidney kind ; also the<sup>1</sup> round pink-eyed. - But from want of attention the seed potatoe is much mixed with round red, pink-eyed, and kidney kinds, and all answer well. The kidney is esteemed more farinaceous than any other, except the early *round red*. The returns are not so abundant as in counties where the land is manured for that crop. The most authentic information I could obtain, stated the returns at from sixteen to twenty bolls from a boll planted. They find great benefit from change of seed from one district to another.

The early frosts in the Highland part of this county, frequently injure the potatoe crop, and even the corn crops in this high latitude and rainy climate, which are also liable to mildews. The night hoar frost, frequent in the month of August in the Highlands, affects the haulm of this plant, so that, as soon as the rays of the sun reflect upon them for a few hours on the succeeding morning, the haulm will have the appearance of being parboiled, and decay, which injures the roots, and no remedy has been discovered for this evil.

The inhabitants of this county, near the sea coast, where the potatoe crop is less liable to injury from the mildew, &c. have them generally as a part of their food, even

even to the end of May. They use no other preparation of this root than boiling them in the common mode. Some persons make starch from them, by the following process: the potatoes are grated down in a tub, with a grater made of tin, allowed to remain there for a night, when the water is drawn off, and fresh water poured on the mass; after which, the mass is sythed through a coarse cloth, and fresh water poured on the pulp which has passed through the cloth; which watering is repeated once a day for a week, pouring off the stale and putting fresh water on the farinaceous sediment, until the water is as clear when poured off as when applied. This sediment is then allowed to dry in the sun until it assumes the consistence of starch. In the last water a little Prussian blue is mixed, to give the starch a pale colour. Families calculate, that by this process they have starch at about 4s per pound, valuing the potatoes at the current price of the county, viz. from 8s to 10s per boll of 24 stone. In these cases they reckon their labour as nothing.

From the experience of an abundant crop of oats after a potatoe crop, and both without manure, the opinion is, that a potatoe crop rather improves the soil. Potatoes are considered as too much an article of human food, to bestow any of them upon their cattle. A few gentlemen farmers, however, who raise a considerable quantity of this valuable root, give a part of them in the spring to their horses and cows.

Salt being a scarce commodity in this county, the lower class of people, within a reasonable distance of the sea, use an equal quantity of salt and fresh water in boiling their potatoes, and they find it answer well. They even allege, that potatoes thus boiled, eat better, and seem more mealy, than if boiled in freshwater. Some

families



fenifics-bpil and mash the potatoes, lay them by to coof<sub>5</sub> and\* next morning slice clown the mass, which is toasted, and-q«ed as a'subjstituteforbreacj, to breakfast.

#### SECT. XV.—CLOVER AND RYE-GRASS.

4. ~~The only artificial grasses~~ cultivated in this county are clover and rye-grass, and those even on a limited scale, by a few of the proprietors and gentlemen farmers: thesp seeds are sown with bear about the latter end of J4ay; the soij beiiig jtvice ploughed ami manured. The q^aqtity of see^ to.tke.acra.fe ^o^ ^w^ t0 ^ e e bushels of rye-grass, aq4 from ten to sixteen of red clover, or ten,popads of rjst an4 five pounds of white clover seed. Th^qrQp is.gen^raHy preserved foy lmy, which is cut ajbvt t\lc iir^r\*yec)5^of^v^ly, an^the foggugc is used for stall-rfeeding th^ farm^hprs^s in September.

In general,, ttjere are two hay crops taken off theknd tli^s so,w^ .^pfo^^he^Jcy, is broken up for oats: Tlie rotation jof^tjii^rqfop is not regular, nor the clover and rye-grass,crops xp,general., as to warrant any opinion of its effect upon the soil, although that is experienced in coun- ties wl^ere tjie land, has undergoue repeated rotations of cloyfr crops.

#### SECT. XVI.—FLAX.

THE tenants in the vicinity of the town of Dornoch each sow small quantities of flax-seed. The land is twice ploughed, but not manured, experience having proved to them, that manure makes the flax grow reedy and coarse.

It

It is sown the latter end of April, or beginning of May; weeded through the summer, pulled about the end of August, and watered in September\* in pools of stagnant Xwater. When thoroughly saturated, it is taken out, spread upon bare grass ground, and turned to the sun for some time; then bound in small bunches of a handful each, and dried upon ropes in their dwelling-houses. When dry, it is broke, scutched, heckled, and spun by the females of the family, there being no flax-mills in the county.

If the farmers of this county were to keep their flax until the succeeding June, before it was watered, It would benefit them much. In June they would aiwayj have as warm weather for watering their flax as the Irish have in September ; and when their flax is fully watered, they might spread it thin on the longest foggage they can command, in place of bare pasture ground, and they need not turn it, as is done on bare ground; the grasses issuing from the strong vegetation of their foggage land, i\* beneficial to the preparation of flax in this process.

Flax is supposed to be a scourging crop, and therefor--not repeated in the same spot. Dutch flax-seed should be sown in haugh or clayey soil, and American seed in the upland or light soil.

There is n\> hemp sown in this county, nor any other species of crop, except what has been already described.

## CHAP. VIII

## GRASS LAND.



THIS county, like all the other Highland counties of Scotland, has no other meadows than the levels formed by the meandering course of their rivers and burns, and the borders about the lower end of arable land: these are preserved from cattle, from the end of April until the last week of July, when the hay-harvest generally commences. The bog, or meadow hay, is commonly mowed by the tenants and their family, except in cases where the extent of the farm gives such a quantity of this haugh meadow, that a greater number of hands are necessary, when the farmer hires perhaps a dozen hands *in*, a day, who are paid from *1s.* to *1s. 6d.* and two meals; and the farm-servants, are busy at the same time, carrying off the hay cut down, to an eminence above the overflowing of the rivers or burns, which often happen in the month of August in that mountainous region.

The hay thus collected is put in small coles, and shaken once or twice a day (if the weather be fair) for a week, when it is ready to be packed into small shocks (provincially called *screws* *J*, secured with ropes made of heather; where it remains until the corn harvest is over, and is then carried into the corn-yard, and rebuilt into stacks or screws for the winter. This practice prevails along the several straths of the rivers in the county.

Upon the sea-coast on the south-east, western, or northern

«rn sides of the county, there is very little of this kind of meadow, from the rapidity of the streams. The straths in general are narrow, and of course, the extent of this liaugh ground not great on any one farm.

I did not find that any experiment had been made to ascertain the quantity of natural hay which an acre of this kind of meadow wduld yield; but from its appearance, it may vary frompO to 150 stone per acre, according to the quality of the haugh soil.

Soon after the hay is carried off, these meadows are depastured by cattle and horses promiscuously, until *the* following May. The only manure this ground receives is the overflowing of the rivers, which is sufficient where the current is not rapid.

It does not appear that embankments would be of much benefit in these straths, where the mountain floods come occasionally so rapid, that they carry all artificial banks before them ; and in the interior of the country, the climate, is too moist, to admit of such attempts for the purposes of agriculture. Indeed the Highland parrs of these straths are now, or will soon be occupied by *the* shepherd and his flock, who will consider this meadow of great advantage, for hay to his flock in a severe spring.

The pastures on the sides of rivers, and where the soil does not yield vegetation fit for hay, are generally the summer food for their milk cows.

As these meadows and pastures are parts of the same farm, the rent of either is not ascertained in this county: an acre of flat meadow may be considered equal in value to an acre of arable land, as its produce is procured at little expense-

*Dairy Ground.*—Before the introduction of sheep-farming

farming into this county, the tenants of the<sup>1</sup> Straths had their grazings, called *skealingS*) in the remote parts, near the sources of the rivers and brooks : every town-land\* *davoch* (ten-penny land), and even each farm, had their distinct shealings (called in Gaelic, *atie*). About the beginning of April a keeper f called a *psindler*) was hired to preserve the grass of these shealingSi and drive off or pound any stragging cattle that^might trespass on the preserved grounds. About the middle of June, when the crop was sown, and the peats cut for winter fuel, a part of the family removed with the milk cows and goats to the shcaling, an old hut being previously repaired, or a new one constructed, having an apartment fur the people to eat and sleep in, and another for the milki each, of the apartments are about twelve feet square. Perhaps there may be another room, or small fold, for the calves, to keep tht;m from the cows until milking time. Here they lived in great simplicity, on the produce of the dairy, an<l some oatmeal^ content, healthy, **athletic**, and cheerful: this is the season foV singing and dancing on the green: the women, while milking the cows, sing a certain plaintive *air* (of which the cows seem very fond), similar to the *Ran de Vaeht* sung in Switzerland. The men occasionally return to the homestead to collect their peats, weed their potatoes, &c. and to see that the pasture is well preserved for the return of the mistress of the house with her cows from the shcaling. They return about the beginning of August, leaving their horses and yell cattle to pasture on fhe shealing during the remainder of the season, even till Christmas\* or until the stormy snow drive them to the homestead ing, where they barely subsist on a little straw or bay until the ensuing summer.

## CHAP. IX.

## GARDENS AND ORCHARDS.

IN ancient times the "Romish clergy introduced the art of horticulture into Scotland, and so far as their own exertions went, choice gardens and orchards were found in various parts; but in those days' the natives of Scotland were of a restless, warlike turn, and their holdings in general depended on the will of the Chief; that refineaient in agriculture and horticulture therefore was despised by them, and its progress was very slow. In the county under review, there are a few instances of what can be accomplished by art and industry, even in this northern climate. Skibo, situated on the northern banks oi the Frith of Dornoch, and afc>ut three miles from that town, was, in the time of episcopacy, the summer residence of the Bishop of Caithness and Sutherland (both counties composed only one bishoprick). Here the Bishop had excellent gardens and orchards, which arc still kept in good order by the present proprietor. *In* these gardens the peach ami apricot thrive; and in summer 17^4-, walnuts ripened in the gardens of Skibo.

At Dunrobin Castle there is an excellent garden and orchard; both there and at Skibo, apples, pears, and cherries, thrive well i they are both sheltered from uie norti: -ad west, with a fine south easterly exposure. In the gardens of several of the gentlemen farmers and .wadietters on the south-east coast of Sutherland, apple trees seem to have done better some years ago than now, a\* there arc

several large old apple trees in many of them which still bear fruit, and by a little more attention would thrive, and produce abundant crops. In all of them, small fruit, such as black, white, and red currants, gooseberries, raspberries, &c. bear a plentiful crop.

About twenty-six years ago, each garden in this part of the county had a few bee-hives, which prospered, and yielded plenty of line honey ; but of late years, the seasons have been so cold, and perhaps the necessary attention not paid to them, that they are now almost totally given up. Every kind of roots used in the kitchen, are raised in these gardens. At Tongue, the residence of Lord Reay, there is a neat garden, with apple and pear trees, and abundance of small fruit.

The cottagers' gardens, as before observed, contain only some cabbages and potatoes.

*Destruction of Insects and thub.*—The caterpillar is the most troublesome to the small fruit, particularly the gooseberries. Various plans have been tried to destroy, or check the progress of this destructive insect, such as tobacco juice, lime, soot and water; the latter seems more effective than any other remedy. \* The only orchards in this county are those above mentioned, and of course none are rented. The plants were brought from the south of Scotland, after they were grafted, but those grafted in the county thrive better. In the garden of Morvich, at the end of Loch-fleet, there are two very large pear trees which bear plentiful crops. This place is well sheltered from the north-west winds by bold high rocks and mountains.

## CHAP- X.

## WOODS AND PLANTATIONS.



THERE are about 150 acres of oak copse at Criech, on the north bank of the Frith of Dornoch, the joint property of Mr. Dempster and Mr. Houston : at the age of fifteen years it is cut, principally for the bark. Mr. Sinclair from Argyleshire purchased sixty acres of it for 250/. and he cut the wood, which was purchased partly by the country people to repair the roofs of their\* cottages, and for implements of husbandry, 2nd partly for charcoal. The oak bark sold at 15/. per ton, on the ground, close by the place of shipping it to market: I could not obtain any correct information of its value per acre. Birch bark is reckoned worth 7/. per ton.

There are some remains of a shirubbery of birch, hazel, aller, willow, and some oak bushes, in the straths of the several rivers and burns in the county, particularly on the banks of Loch-shin, and Strath-oickel, Strath-more, and Strath-naver, where there are birch and aller of considerable size, fit for agricultural and building purposes; such as ploghs, harrows, and roofs of houses for the country people, but not of so great extent as formerly, and is rapidly decaying in some places. The remains of some oak bushes among the birch and aller, in the straths of Helmsdale, Brora, &c. shew that it once flourished in these straths ; but from the constant browsing of black cattle, it is not surprising that the oak is nearly gone. (See Appendix, No. II.) In some instance?, where the



merer, industrious inhabitants of these straths grub up sonreof.tbis shrubbery to increase their small portion of arable land, -the succeeding crops of bear or oats abundantly repay them for their labour.

There is no natural growing fir or beech in this county; yet many of the low peat-mosses in the interior abound with mo?s fir. In th« course of my survey, I saw very large roots of the pine fir dug ugkput of a flat moss on, Strath-fleet, the top of which had tne appearance of having been burnt, and measured sixteen inches diameter. The country people have a tradition, that a witch from Denmark burnt all the wood in this country. This fir is dug up by the country people for candle-wood, and they call it, *giusepuil* (bog fir), which they split and dry, and it is the only candle li^ht the cottagers h^ve-during their long winter nights. A gentleman of my acquaintance informed me, that about twenty, years agQ, as Ije and another gentleman were grouse-shaofcing on the high ground between the upper branch of Kildonan and HaJ-ladale rivers\* they saw some Highlanders busy sawing a fir tree they had dug out of the peatf̄moss there \ the tree measured 72 feet in length\ the y had crosscut it into fog? cuts, of about eighteen feet long each, ' aii4 were- \$aw tog one of them into planks,; which measured sixteen iflchef broad, the *tree* being sixteen inches in the skle, after it was squared. Ar the root\_endt ^nd about from ten to twelve inches at the other end\* (*ihk* ibtirtli pjeç^c-or top of the tree), there were about two-, /eet. of ,peat earth above it, its root being close by the l6w6r end of the *tree*\* The root of - thp tree had about an inch thick'/of charcoal, *un* it\* 'which, evidently shewed that the *tree* was burnt.dawn. , .Its; smaller benches had all decayed. . Tho; found a great number of smaller trees near it, the centre of them all decayed,

as

as if bored' for pumps: this shews, that though the old timber, abounding with rosin, is preserved in peat earth, that young timber, void of that gum, does not. In the same moor, some years before that period, about thirty square logs of fir were discovered, all set close together in a double tier upon tier, under two feet of peat earth and as the source of Hall and ale rivers within half a mile, it is supposed that formerly timber was cut down in that forest, and floated down the river to the sea at Tor, or Bighouse-bay, and thence exported, or carried coastways. This timber was found on the declivity of the mountain, and not on a flat bog, which account\* for the little depth of peat earth over it, as that substance is formed by a very slow process on such declivity, and of course of a more coaly and firm\* black consistence than such earth in flat "bogs, where the floods accumulate it from the declivities, and decayed Wood, and other vegetables, in these flat; 'swamps, or low ground.

*Plantations.*—At Dunrobin there are about three hundred acres of Scotch fir planted on the face of the mountains, In a thriving condition, in the garden in the low ground, there' is a considerable extent of thriving timber, ash, beech, elm, and larch, some of the trees of a large size. There are two ash trees near the stable, at Don robin, each of which measure twelve feet in circumference at eight feet from the ground; two oaks in the Ladies' Walk, measure six feet circumference at six feet from the ground; and many from two to three feet. At Uppercroft there is a plantation of fir. At Gordon-bush, on Strath-bracken there are about forty acres of larch and Scotch fir on a declivity, of the hill, in a thriving condition; and near the handsome

dwelling-house of Gordon-bush, is some large timber of ash and oak.

Two oak trees on the west side of the garden, at four feet above the root, measured four feet and a half in circumference. Mr. Gordon planted a few acres of Scotch fir on his wadset at Ken trad well, near the sea-shore, about forty years ago, and it now yields planks seven inches broad. At Balvair, at OflBr-hall, near Dornoch, at Skibo, Pulrossie, Ospidale, and Rose-hall, on the Dornoch Frith, there are several hundred acres of planted Scots firs, all in a thriving state; size from five to nine inches diameter, on an average. The soil in which they were planted was a mixture of sand and pebbly gravel. Upon the 25th December, 1806, during a severe gale of wind, there were two hundred and fifty fir trees blown down at Balvair, and many at Cyder-hall and Rose-hall.

At Tongue, Lord Reay's domain, there is a plantation of Scotch fir, and ash, elm, and beech, of considerable size: the side of the plantation next the Kyle, or bay of Tongue, owing to the blast from the Northern Ocean, seems much stunted in its growth, the branches taking a horizontal direction from the south side of the stock.

At Shyberscross, or Strath-brora, a pretty romantic place, abounding with shrubbery of birch, alder, and hazel, there are two large trees of Egyptian *thorn*, one of which was injured by the gale on the 25th December, 1806. They were both covered with white blossom in the month of June, when I saw them; there are none else of that species in this county; and as the remains of a Catholic chapel are in the vicinity, it is probable that these two trees might have been planted by the priest of that parish.

The natural woods on the several straths in this county, to the southern, western, and northern coasts, are decay-  
ing.

ing fast, owing, as naturalists aver, to the severe frosts in the winter and spring seasons for many years past; and it is a well known fact, that in the straths where these woods have already decayed, the ground does not yield a quarter of the grass it did when the wood covered and sheltered it. Of course the inhabitants cannot rear the usual number of cattle, as they must now house them early in winter wintoflhnd *feed*, or rather keep them just alive, on straw <sup>j^P</sup>reas in former times their cattle remained *in* the woods all winter, in good condition, and were ready for the market early in summer. This accounts for the number of cattle which die from starvation\* *pn.* these straths, whenever the spring continues more severe than usual; *and this is one argument in favour of sheep-farming in this county\**—See Mr. Sage's Letter in the Appendix, No, IIL

OXH

## CHAP, xr

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## WASTES.

## MOOJiM

IN the parishes of Clyne, Golspie, and Dornoch, OH the east coast of Sutherland, there is a considerable extent of low barren ground covered with a little stunted heath. The soil is a red gritty gravel and sand, covered with a thin stratum of moss produced by the annual falling of the leaves of the heather, and the occasional decay of the other parts of that sterile plant. Their present annual value cannot be reckoned above 0</. per acre : this kind of moor is the most barren of all soils ; the littler heath it yields is dwarfish, and very short. It is in a sfate of common, where sheep with difficulty pick a little food in the winter months. In many cases it is too stony to admit the operation of the plough, but where cottagers have trenched small spots of it for a cabbage or potatoe garden, the iarger stones taken out, and the ground manured, it yields a potatoe crop, and afterwards a tolerable crop of oats or bear.

As these moors are within a moderate distance of the sea shore, they should be divided into lots of four acres each, and let to cottagers for fourteen years ; the first veil years rent free: the proprietor to give the cottager wood to build his cottage, a pick and spade gratis; and when he brought the first acre of his lot to a state of yielding a turnip crop (which should be the fir« crop in such

such, a dry sterile soil), the proprietor to give him a premium of 20J., or such other sum as might be agreed upon, and so for each of the four acres of his lot. Thus, at the end of seven years the cottager would have his four acres in a state of yielding a crop to support his family; and for the next seven years the rent should be very moderate, if he shewed industry, with a proviso in the lease\* that if he neglected his little farm, and became indolent, the rent was to be doubled at the ensuing Martinmas, and the lease void and null at the ensuing Whitsunday.

Such, of these cottagers as became fishermen should have similar encouragement, in procuring boats, &c; for themselves, with a reasonable credit for the repayment. By following this plan in the district, the proprietor would, at the expense of about 3/. per acre, have a tract of barren comury brought, in the course of fifteen years, to yield a rent of at least 1s. per acre, besides the advantage to the state of such an increase of population and the inhabitants of the west coast of this county, who have been removed, and are annually removing, to make way for sheep farming; might therefore be provided for in their native country, and the bad consequence\* of emigration prevented. If the people on the west coast are fishermen, such a situation as above described would be eligible for them. No doubt for the first two years they would require some aid in meal and boar, to maintain them, which they would be able to receive from their industry as fishermen, day-labourers, &c. &c. A great objection to the execution of this plan, is, 'the great distance at which they are from the coast; but as the proprietor benefits by removing these people for sheep farming, he should sacrifice something to accommodate them, *i.e.* he should import coal, and retail it to them at prime cost and charges only.

In addition to this plan, the proprietor should improve thirty or forty acres of this moor, in their vicinity, to convince them that industry will make even that soil productive. This is to be done by trenching the ground where the plough could not operate; collecting sea-weed and shells, ashes, dung, &c. and laying down the first crop of turnips, which is more likely to succeed than potatoes, as their tap-roots go farther down for moisture.

#### *MARSHES OR BOGS.*

Near, and to the south-west of the town of Dornoch, there is a peat-bog of 220 acres, separated from the sea shore by a sand bank, and similar ridges of sandy hills on the land side of it. The depth of the peat-moss in this bog is about four feet, and the subsoil sand or clay. It is the property of the Marchioness of Stafford. There are about 100 acres of it improved by individuals in the town. The mode of improvement was thus : first, it was subdivided into small fields by ditches, which carried off the superfluous moisture, then pared and burnt, the ashes spread on the surface, and sown with bear or big: their returns were from four to five bolls per acre. Some plant their lots with potatoes, in lazy-beds, well dunged, which yield a good crop, and afterwards with oats or bear, and grass-seeds, say rye-grass. In all cases where they spread dung with the ashes, the various-crops were much better than that with the ashes alone. Though contiguous to the sea, they have no driven ware or sea-weed, the coast being sandy for a considerable distance in the Murray Frith. They cut the first crop of rye-grass, and pasture the succeeding crops until they find it convenient to break it up for oats ; then potatoes or turnips, &c. Pasture grass being much wanted in the vicinity

riity of the town, induces these improvers to pasture their lots for several years before breaking it up for corn. The rent is from 4/. to 15/. per acre.

#### *fORZSTS-*

The Rca forest\* as formerly described, is about 300 square miles of high raggy mountains covered with heath and ling, with wlubbery about their base. This tract has hitherto been occupied by the red deer, some Highland bbck cattle, and goats, but now principally pastured by the black-faced and Cheviot sheep, the only mode of improvement of which this tract of country is capable\*.

#### *HEATHS AND DOWNS.*

. There are several detached small tracts of heath on the several straths of this county, oSvery little value in their present state; and the only way by which they can best be improved, is by giving them out in lots of three to four acres to cottagers, under proper regulations and restrictions as to progressive improvementa.

There are no grounds in this county that deserve the Rescript ion of downs, except the Far-out-Head at Durness; being sandy bills of no great extent: subsoil a limestone rock.

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\* See additional Ueuort of 1811.



## CHAP..XII

### IMPROVEMENTS-

#### SECT. I.—DRAINING.

THERE is very little done in the county by this mode of improvement: the only instance of it is by drains filled with stone, and covered. The soil in general is too dry, to require this mode of proceeding, in the parts principally capable of agricultural improvement\*.

#### SECT, II.—TARING AND BURNING,

THIS is very little practised in Sutherland. One instance worthy of notice is at Clyne. In May 1806, Major Houston, tenant of Clyne, enclosed, by a deep ditch, four acres of peat bog; he then pared, and collected all the heath, and other surface articles, to a gravel-pit near the bog, twelve feet long by eight feet broad: having then ploughed the bog, and burnt the pared surface in the pit, in order to preserve the ashes more effectually, he carried sea-sand mixed with shells, which he mixed with the ashes : he then spread this compost on the ploughed ground, and immediately sowed it with bear, and rye-grass, and white clover seed. He had a tolerable crop

\* See additional Report of 1811.

of bear, and in June 1807 a good crop of rye-grass and white clover.

The bog was from two to four feet deep of peat earth. Betwixt it and an adjoining gravelly hill, he made a drain to divert the surface-water, and he conducted the water of a contiguous spring over a p̄ar); of the bog after the bear crop had been cut down; so far as this spring water extended, the gra<sup>^</sup>s was very luxuriant, and much superior tp the remainder, which he thought had too little moisture.

In a corner of this lot he planted potatoes in the lazy-bed manner, manured with ashes: the crop was abundant, and in 1807 he had a good crop of bear with grassy seeds, on the potatoe ground.

Major Houston has enclosed about 200 acres of gravelly moor close by this bog, by a stone dyke four feet high, the stones for which Jie-cGlected off the surface of the moor, a part of which he has planted with Scotch fir and larch, whith seem to do well j. another part he trenched, from a foot to 18 inches deep, at the expense of an halfpenny per Square yard ; artd- after removing the stores' t&H\* ti#ried-Ap,-\*tME\* gremftd .-%\*a^ £Bmfed -with potatoes, manured with stable dung ; - the secorttJ crop turnips, with compost; and the third, bear with grst&\* seeds; -all which proved tolerable good crops.

The, Rev. Mr. Walter Ross, Mmistev of Clyne, improved an acre of the same bog, upon Mr. Smyth'S system, thus: first, raising the peat earth into high-lazy\* beds, with deep trenches between each bed, and planted iWmh potatoes dinged; the second crtfp, 62tts\*, and the third, bear with grassseeds. He sowed IS peclcs of bedr\* and had a return of 16 bolls.

Captain Sutherland, in Brora, near Clyne, enclosed a-- tract of moorjr, gravelly ground, by a stone, dyke upon  
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the same plant as Major Houston's. The part of k bounding the sea shore was sandy links, and in order to prevent the dyke being choked up' with the driven sand, he made a number of holes in the dyke near the foundation, 15 inches by a foot, at the distance of every four yards, which has answered his expectation ; when the wind blows from the east or the sea, the sand is driven through these holes, and fort<sup>n</sup> little oblong mounds inside the park; and whenever the wind blows from the west, or land-side, these mounds of sand are driven back towards the sea through the holes ; which keeps his fences from being choked with sand. He trenched four acres of this enclosed moor, and after collecting the large stones, he manured it with <sup>^</sup>sea-weed or ware, and sowed it with bear; but the returns did not answer his expectation, or refund his expenses-, however he perseveres, and he has great merit in improving a soil, which in a state of nature, was not worth one penny per acre.

Mr. M'Pherson, in that vicinity, has enclosed about-SO acres of a similar moor, and by m<sup>i</sup>nistry will make it productive\*

Captain Munro of UppatJ has commenced the trenching system, upon a tract of similar st<sup>b</sup>riy, gravelly, moor, and though the trenching will cost him at the rate of 10/, per acre, as a sheep farmer it will be an object to him, because in a severe winter, a few acres of such soil near the sea, under a good sward of grass, may save his flock when on the point of starvation on tie show-covered mountains, in the interior of the country-''

## SECT. III.—MANURING.

*MARL*\*—At Rhieves, near Dunrobin, I found red clay marl of good quality in a limestone quarry, *i. e.* the limestone is in detached blocks among the calcareous clay, and both of good quality. The lime is commonly burnt, and used for building, &c; but the clay was supposed of no value until I shewed its quality to Mr. Falconer, the Marquis of Stafford's factor.

I have not observed any real shell marl in the county, except in a lake at Durness, on the farm of Keoldale.

*Chalk*.—*Jone* in this county. There is excellent limestone at Kenloch-ailsh, the source of the river Oickel, in the interior of the county near Assynt, in the middle of a sheep farm of 30,000 acres. The limestone might be used to very great advantage for the sheep farmer, by draining, and turning off the surface-water of the contiguous parts of the moors, and then spreading the slacked lime on the surface, to promote the growth of rich natural grass, and destroy the heath.

The manure used along the sea coast, is ware or seaweed, driven on the shore by storms, and carried to the Jand on horses' backs in creels or crubans, (a triangular machine made of wood for that purpose) \ the ware is occasionally spread fresh on the surface of the land, and ploughed in; sometimes it is allowed to wither on the surface, and at other seasons mixed up with earth, by way of compost, and spread on the land at seed-time. By these different modes, they have equally good crops of bear; but the oat crop is not so good as after a manuring  
of

of house and stable dung compost\*. In the inland part of the country, as the tenants have a considerable proportion of cattle for their small portion of arable land, they manure the land for bear with stable dung, which yields a productive crop, and afterwards two of oats, when it escapes mildews or frost in August.

There is no mode of preparing manure in this county, that is worthy of particular notice, either by composts or otherwise.

SECT. IV.—[IRRIGATION.]

THIS mode of Improvement has not been attempted in this county, beyond what nature effects by the occasional overflowing of the rivers, with the exception of what I have already stated as done by Major Houston, by the water from a small spring upon a part of his improved bog.

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• " From the experience of a very intelligent farmer, Joseph Gordou, Esq. of Navdale, it appears that fields manured plentifully with seaweed in winter, or a less quantity of it in spring- (sometimes it is put on after the bear is sown), yields JS plentiful a return, and grain of as good quality, as when manured **with** d\* vj;., and next year produces at good crops of beans and pease, but not of oats. Seaweed put upon land sown with oats, produces from seven to eight returns, but when tried with pease, the straw was found too rank, which perhaps might partly be owing to the wetness of the season when this experiment was tried. Compost dunghills, when mixed with seaweed, produces plentiful crop of bear, and is fit in producing a good crop of oats the year after."—Sir John Storie's *Receipts for the Improvement of the Soil*, 179J, pp. 142.

**CHAP. XIII.**

**EMBANKMENTS.**

AN Embankment is in contemplation in the county, (an account of which will afterwards be given\*); which will do credit to the North. The first object is, to secure a safe conveyance across the Little Ferry; but there can hardly be a doubt, that it will ultimately be the means of acquiring a considerable tract of most -valuable land, probably equal in fertility to the Carse of Gowrie, or Falkirk.

\* See tht Report of the Surrey of 1811.

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**CHAP. XIV;**

LIVE STOCK.

SECT. I.—CATTLE.

*SREED.*—At Dunrobin Cnstle, the Argyle breed of cattle thrive remarkably well, so much so, that in 1807, the stock on that farm was valued and sold at high prices, viz. 80 milch cows at 18/. each, and the stots and heifers from two to five years old, at an average of 15/. each— This stock had in' summer and winter a great command of artificial and natural pasture; of course butter and cheese were made, and good calves were reared, and the sale stock annually sold to the South Country drovers.

In the other parts of the county, the Skyc and Assyntf" breed of black cattle prevail; they are well shaped, short legged, and hardy, the colour in general black, with some exceptions. From the Argyle and Skye bulls\*at Dunrobin and Skibo, &c. the cross between them and the native cattle is very much improved -in shape and quality, in roundness of carcass and pile of hair. The four-year old stots at Dunrobin farm, might weigh from 5 to 6 cwt. the four-quarters, or carcass ; and the cattle of the country tenants, about from 'J40 to <KK) 1b. avoirdupois the four quarters.

*Food.*—At Dunrobin, cattle are pastured summer and winter, but they get some hay or straw, and turnips, in set ere weather. Throughout the county in genera^ however,

ever, the Cattle are fed with straw in the cow-house at night, and out in the fields through the day, during the winter season. Upon the *few* farms where turnips are raised, they occasionally give them that root, also bear on the straw, boiled, for cows after dropping their calves. In summer they feed on natural pasture grass, in the fields or shealings.

*Managem<sup>t</sup>?*—*Hono.* fattened for the market, because there are no markets near them.

*Dairy.*—It is the general practice to make butter and cheese, and to rear a calf betwixt every two cows. The produce in butter and cheese is various, according to the size of the cow, and quality of the pasture: from a stone of 2 $\frac{1}{2}$  lb. of butter and two stones of cheese, to 2 stone of each per cow, and besides a calf reared by every two cows. The Highland breed are not great milchers\*.

*Distempers.*—The most common distemper among the black cattle in this county is the *black quarter*, which proves fatal to many of their year and two-year olds. This complaint is known by feeling the animal's skin when any symptom of sickness appears; the quarter that is diseased sounds as if there was chaff\* under the skin. The animal dies in the course of a day, or even a few hours. When the skin is taken off the diseased part it is quite livid, as if the blood was mixed in the flesh. A gentleman in Assynt informed me, that upon a farm of his,

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\* Some housewives along the coast-side of Sutherland, in order to have fresh butter for breakfast in winter, mix salt butter and sweet milk together, in the proportion of 1 lb. of butter for every choptn (two pints,) of milk they can command; put the mixture in a small churn, and churn it, in the *arae* manner as cream is done. The butter thus produced will be quite fresh, and the buttermilk *alt.*



where he had many cattle, he generally lost half of his young stock, until a few years ago, he was -advised *to* rear swine with his cattle, which he did, and that he lost none since by the *black quai isr*. Others say that bleeding the calves in August prevents) this disease.

Hydrocephalus (water in the head), provincially culled *sturdy*) is a disease to which the young cattle are also liable. Beasts are cured of this complain:: by trepaning, or cutting out the bag of water formed, before it gets to a great size. Cures have been effected by putting a drain or seton in the back of the neck.

Wien cattle are changed from one kind of pasture to another, some of them are seized with a complaint called *blood-grass* (bloody urine). In the Highlands they pretend to cure it by putting a *live trout* down the throat of the beast.

Another disease is termed<sup>1</sup> *elf-shot* by the country people: the animal feels very uneasy, breathes hard, and refusei food: upon, observing the cattle thus affected, the u-omjn search the animal's hide, and they pretend to find holes, *mt* in the skin, but in the menbraoe under it: these they rub with salt, and they dissolve salt in water wherein silver is dipped; this draught being poured down the animal's throat, and some of it thrown on its ears, and the supposed holes being well rubbeJ, the animal breathes easier, and in the course of an hour, will eat, and recover. Such as die of this disease have mortified spots in the parts where the holes were found. I should suppose that bleeding copiously on the first symptoms of the distemper, and giving uecoction oi tnrk (oak) might be the best cure.

The disease called murrain, *or'&f&fty*, prevailed among, • he black cattle of this county when the valleys were covered with wood j since these woods have decayed, this distemper

distemper is little known.—*Symptoms*: the animal was suddenly seized, swelled much, breathed hard, and water run from the eyes : in the course of a few hours it died,, and dogs that ate of the carcass were poisoned by it, I have seen instances of cure, thus: some pieces of sooty sods taken from a thatched house, put into a pot or pan, with a coal in the centre of it which instantly caused a strong sooty smoke; the diseased animal's tongue was drawn out with the hand, and the mouth thus open, held over the smoke for a quarter of an hour, which caused much salivation; then a pint of strong ale, with an equal quantity of the decoction of common field plantain wanted, was poured down the animal's throat, which generally proved a successful cure-

The Irish call a distemper very like the murrain, by the name of *blisters*. I once saw a cow, (the property of a farmer in the county of Corty, fall down, swelled, breathing hard, and the eyes running down with water. He instantly sent for a cow doctor, who, when he saw the animal, said it was the blisters : he ordered two men to hold the cow, and draw out her tongue, and under it he shewed me two blobs or blisters, of the size of a walnut, which he pierced with a large needle, and cut with his knife, then rubbed some salt on it -, immediately the cow breathed freely, the great swelling *or* expansion of her stomach subsided; she soon got up and ate some hay given her, and recovered. This man told me, that these blisters prevented the cow's breathing which would cause her death in a few hours.

*Working Oxen*.—Oxen are wrought in carts along the coast-side of Sutherland, and on some farms four oxen are used in the plough with a driver; but I know comparative

statement of their labour to that of horses has been made. There is no doubt, that where four oxen and a driver are employed to one plough, but it is more expensive than horses. Their food is generally straw, some hay in the spring; and perhaps turnip, when that root is raised. There are no oxen shod in the county.

The following is the account given of the Sutherland cattle, in the original Survey of the County.

" Sutherland is celebrated for its breed of cattle, which are of two sorts, the coast-side breed, and the native highlanders, the former weighings from 4 to 4½ cwt. and the latter from 3 to 3½ cwt. Of the real highlanders the Asynt breed are reckoned the best, but, by attention and good management, they might still be improved, more especially if no more were reared than could well be supplied with food both summer and winter. It is recommended that the bull should be well shaped and hardy, so as to be able to stand all weathers, with good hair, fine horns, sparkling large eyes, &c.

" The mode of keeping, particularly in the winter season, is absurd in the extreme. Almost all the cattle are housed, commonly under the same roof with their master, where they enjoy the fire smoke in common with the family. This, added to their own warmth, is but ill suited to animals that ought to be barely ; for after being kept all night in the house, they are often put out in cold frosty or wet mornings, thus#uffering a sudden transition, which it is hardly possible to withstand,

•<sup>c</sup> A variety of breeds, besides the native ones, has been tried at Dunrobin, as the Galloway, the Fife, the Bakewell, and the Isle of Skye, but on the whole, the native stock of the county, with judicious crossing, and attention to the shape of the individual, seem to answer best\* The mode of rearing is, to allow the calves to suck their  
their

their mothers, as much as to, keep them in good condition; the remainder of the milk is applied to the dairy\*

<sup>c</sup> The calves are kept in an enclosure by themselves, separate from their mothers, except when milking. By this means, however, the cows will not give their milk without the calves, which is a bad practice to accustom them to, and makes them sooner to lose their milk entirely. The calves, however, being kept in an enclosure by themselves, they soon learn to cat grass, which facilitates their weaning. After weaning they are allowed to run out in the fields all winter, where there is a shed to shelter them, in which there are racks for hay, when they may lodge and feed at pleasure. By this treatment they thrive, become very hardy, and are in condition to be sent to the grazings in the Highlands, along with the two and three year old stock. They return to the coast-side about the middle of November, and have the run of the fields promiscuously with the other cattle.

" In extreme bad weather, or during great falls of snow, the cattle have some straw given to them, but are kept out night and day. Thus they are treated till they are fit for sale, which makes them very hardy. They are in general sold at from three to five years old. The cows commonly calve about the middle of April, and are kept out all the winter, as well as the other cattle."

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## SECT. II.—SHEEP.

*BREED.*—Until the year 1806, the native breed of sheep was general among the tenantry of this county: each had from a dozen to 100 head of them; they were a small kind of sheep, with good wool; some  
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horned,

horned, others poled, some black, but the greater number white, and some of a grey colour. The tenants' wives made blankets, and tartan plaids, of the white and black wool," as well as other clothing, for themselves and families; and of the grey wool, stockings and mits (a kind of gloves) were made for the *gudeman*. From the Strath-naver and Durness district a proportion of the young lambs were annually drove to Caithness, and sold at from is. 6d. to 5s. each to the Caithness farmers, to supply their stock; and the three and four year old wedders were annually sold to Caithness butchers. •

In the winter of 1806 and spring of 1807, this breed of sheep almost all died of the *rot* and *scab*. The introduction of sheep-farming upon a large scale in this county, has compelled many of the tenantry to emigrate, and those who remain are so circumscribed as to pasturage, that they cannot think of renewing their former flocks of the aborigines. These sheep weighed from 28 to 36 lb. the carcass, or four Quarters; the wool of from nine to twelve of them, made a stone of 24 lb.; they were collected in cots at night in the winter time, but seldom got any food except what they picked for themselves, even during a storm of snow. One cart-load of their dung was reckoned equal to three of cattle or horse-dung, for manure.

A few years ago some flocks of the black-faced sheep were introduced into this county, which answered very well; and in 1806, Messrs. Atcheson and Co. took a very extensive sheep-walk of the Marquis of Stafford, in the parish of Lairg, and part of Strath-naver, and they sent 5000 of the Cheviot breed from the borders to commence their stock in that extensive walk<sup>a</sup>, and though the ensuing winter was very stormy, the flock did well, sustaining no greater loss than is common on a sheep farm,

farm, even though this pasture is in the interior of the county, 15 to 20 miles from the sea.

Mr. Dunlop has for some years had a sheep-walk of considerable extent from Lord Reay, in Durness, which he stocked with the Cheviot breed, and they are doing very well-

Several sheep farmers in Assynt, Edderachylis, and Sutherland, have had large flocks of the black-faced breed for these six years past, but they find from experience, that the Cheviot breed is equally hardy with the black-faced, except in the lambing season, when a little more care and attention to the lambs are necessary; that the same extent and quality of pasture will feed an equal number of either breed; that the Cheviot is 4 more *docik*, and less wandering animal, than the black-faced; that the weight of carcass is nearly equal, *Le.* the Cheviot sheep will fatten to the same weight as the black-faced, for the market; and lastly, that a stone weight of the Cheviot wool, will sell for 28/. when the stone of the black-faced wool will only bring from 1s, 10/6 at market; and that, at an average, seven fleeces of either will make a stone of wool. All these considerations induce the sheep farmers in this country to get rid of the black-faced sheep as soon as they can, and stock their grounds with the Cheviot?

*Food.*—The only food provided for them in this county as yet, is some natural meadow hay, cut in season, and preserved for the flock, in case of a deep fall of snow; they allow lib. of hay for a sheep in the 24 hours.

*Folding.*—No experiments have as yet been made in this county, of folding or feeding sheep for the market; for this good reason, that there are no markets or consumption.

sumption for them within the county; the over-stock of vedders, &c. for sale, are drove to the southern markets annually in August or September, where the prices vary according to the season and demand, from 18/. to 25s. per head.

*Distempers.*—The principal disease to which the Cheviot breed is liable, is the *braxy*, which is more severe in some seasons than in others, especially if the month of August be rainy. Feeding the sheep early in November with turnip, is reckoned a specific for the braxy.

On the mountain and heathy sheep-walks, the proportion of the flock to the extent of pastures will not on an average exceed a sheep to three acres 3 rent about 3/. per head\*

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### SECT, III.—GOATS.

THE Highlands of Sutherland were formerly famous for flocks of goats j every farmer had from 20 to 80 of them wandering in the mountains, (they defend themselves from the fox, so destructive to sheep) 5 their flesh served the family for meat; during the summer months they made cheese of their milk, or mixed it with cow-milk, while at their shealings, for the same purpose j their skins sold to pedlars at *Is.* each, for the southern markets. The spring of 1807 almost annihilated this species in the Highlands of Sutherland j their Hocks of goats were infected with the scab and rot, and as no means were used to cure them, very few survived the disease. The red deer pasture with goats, but they cannot bear \$heep,

## SECT. IV.—HORSES, &amp;c.

*BREED.*—Upon the extensive farms of the east coast of Sutherland there are large horses kept for the plough and cart, but in the other parts of the district, the native breed of *garrons* are used for the plough, four a-breast, and in some cases three a-breast, with a driver: four of these garrons are generally kept to plough from eight to ten acres of arable land, and where lots are smaller, two tenants join in the ploughing, each providing two garrons. Their food is the pasture of the fields and moors, summer and winter, except that in severe weather they are kept in stables or sheds, where they are fed with straw; and during the spring labour they get some meadow hay. Their price is from four to ten guineas, according to size, and quality; they are from 44 to 52 inches high, their colour black, brown, or grey. In the middle and western districts their expense is very trifling, as they feed in the mountains and glens almost nil the year; and in those districts the farmers used to keep numbers of brood mares, and in general their colts were sold when they were about 14 months old, to horse-dealers, who drove them to the Orkney isles, and sold them to advantage, generally by bartering them for five and six year olds, of the same species, which they brought to the Caithness markets in August, and September, and had their profit in return. But the extension of sheep-farming has almost put an end to that traffick, as the Cheviot sheep now occupy the former habitation of the hardy Highlander and his horses. These horses were never shod; they travelled over the flinty rocks without any, inconvenience.

*Harness;*



*Harness*.—The Sutherland tenant prepares his own harness; he makes ropes of the tails and manes of his garrotis, brakings and collars of straw, and his plough timber of the wood in his glens; he weaves straw for a cover under the clubbar (saddle), malyss sacks for his victual, of the skins of either hbrses' or cattle who d?e by accident, and his pony will carry a boll of meal, or its weight of grain, in these sacks, one on each side fixed by a rope in the clubbar, or saddle, for many miles over the most rugged paths.

*Distempers*.—The distempers incident to these hardy animals are few. In cases of ill usage, or over-work % they are liable to the glanders, and sometimes to the strangles or cold, even the scab; but where they are properly used, old age or accident is generally their termination. The glanders is cured by cutting away the diseased glands from the inside of the jawbone, and repeatedly washing the wound with sour urine until i^ \$shows a disposition to heal.

*Asses*.—There are a few asses kept by the tenantry on the east coast of Sutherland; they are small, and used for carrying' their victual to and from the mills, and carrying sea-weed from the shore to the land; they live to a great age, and their food is generally picked up in the fields and moors, of course is of little value.

*Mules*.—A few of these animals are in Sutherland, but of too small a breed to be of much benefit; a larger breed of them would be of great convenience to the farmer, as they are hardy, strong, live to a great age, and are not expensive in food, or liable to distempers.

## SECT. \—HOGS-

**BREED.**—There is a small native breed of hogs kept *hj* the tenants in Sutherland, but often half-starved ; when fed with corn, in March, (the time they generally kill them for food), they fatten to about SOlb. the carcass, or four quarters ; but along ths coast-side district, they have a larger breed of hogs, (the lon<sup>^</sup>-earcd kind), generally of a light colour; they feed them on the pasture ground in summer, and in harvest and winter give them some corn, potatoes, and pease, upon which\* they fatten them for sale, and when killed, they will wei<sup>^</sup>h from 112 to ISOib. the carcass. When either kind is intended to be fattened, they arc confined to the house, fed with oat\* steeped in cold water, potatoes, &c. an'd for the last week before they are slaughtered, arc *kd* on pease, which it is supposed hardens their flesh and fat. As there are, comparatively, but few of this species in the county, there is no regular system of breeding or feeding them: those reared *on* farms where small distilleries are worked, an? commonly *fed* on the grains and wash. They are very subject to leprosy, unless sulphur is frequently given them in their food ; and this is tLe only disease to which their are subject.



## SECT- VI.—BABBITS.

**BREED:**—There arc raV>its of the common kind and silver hair, in the sandy links at the Little Ferry, near JDunrobin, and near Dornoch : these links an\*. kept by a person

person employed by the Sutherland family, and not let for rent, or otherways; there is no other food for them but the little bent grass on these links, and of course their numbers do not increase so rapidly as if they were properly fed. There are rabbits in the Rabbit Isle in Tongue-Bay, and in Durness, but they are little attended to.

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SECT. VII.—POULTRY, &c.

*SORTS.*—The more opulent farmers in the south-east district of Sutherland rear fine flocks of turkies for their own use, at no great trouble, as the climate of that district is much more mild than the other parts of the county.

Geese can be reared only where there are tracts of common downs, or green pasture, and as there is but little extent of this soil in Sutherland, the farmers find it cheaper to purchase them from Caithness than to rear them at home. They formerly purchased them in August at *9d.*, now at *2s.* each.

Every farmer and cottager's wife, has a flock of common poultry; and where they have the convenience of water ponds near their houses, ducks are also reared in this district, all for family use, as there is no market for them in the county.

*Pigeons.*—There are pigeon-houses at Dunrobin, Ken-tradwell, Brora, and on several other gentlemen's farms. The houses are commonly built with stone, and the pigeons reared merely for the family use, and not as an article of profit.

**SECT. VIII.—BEES.**

ABOUT 20 years ago, almost every farmer on the south-east coast of Sutherland had one, two, or three bee-hives, which generally answered very well, but of late years they have not thriven, and many have given them up, as they say that the seasons have been for many years so very indifferent, that bees will not prosper in this district. Captain Baigray at Mid-Garty, perseveres in managing his hives, and collecting his wax and honey, but not so successfully as formerly; he makes it a rule, in warm days to point out the *drones* among the working bees, and has them destroyed, which saves their industrious neighbours that trouble, and preserves his stock of honey.

## CtIAP. XV.

## RURAL ECONOMY.

SOME year£ ago a male servant had 30/. of wage's > **Iwth** three bolls of cost, half oat-meal half bear-meal, and food for a cow, in" the half year ; the 3ame summer and winter, with ground sufficient to plant two or three pecks of potatoes; and the women servants had from 12/. to 16/., with two bolls of meal in the half year. This was the wages df the best farm servants, and others in proportion, according to their skill and abilities. The same servants have now *Gf.* per annum and six bolls of cost, with food for a cow, and some potatoc ground to the male servants; and the female servants 40/. to 48/. and four bolls of cost in the 12 months; little difference in their cost or wages summer or winter. In harvest, women are hired for the sickle, for which they receive about three firlots of victual, in lieu of cost and wages, until the corn is ingatiered and the potatoes dug out of the ground, and **pitted\*** &c.

About 50 years ago a male servant's wages was 30/. per ann. and the female servant's 13/. ^d. At that time a day labourer had 6/. per day, and one meal; about VI years ago 1/. and one meal; and *now* no less than 7s. 6d. in summer, and nearly so in winter, and in order to have them at that hire, a meal is given them as a retaining fee. Women who hire by the day, have half of the men's wages. The time of labour for hirers by the day, is from six in the morning to six at night in summer \ and from eight to foijr in winter.

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When piece-work is done, such as ditches, dykes, or trenching ground, it is generally undertaken by the cubic or square yard. A cubic yard of ditch is done from 2*d.* to 3*d.* as the ground is difficult or otherwise; a square yard of dry stone dyke is built at from 3*d.* to 4*d.*

When cottagers are attached to farms, they generally pay a stipulated number of days' labour in spring and harvest, with a trifle of money-rent per annum, for their lot of land. The price of labour is so high, in consequence of the pressure of the war and taxes, that the expense of cost and wages to servants, &c. fit to labour a farm, is at an average equal to one-fourth of the rent paid to the proprietor, a rent, considering soil and climate, much greater than what is paid in England.

*Provisions.*—Oatmeal, beat, and pease, varied in price for the last six years, from 15*s.* to 21*s.* per boll; little can be said as to the price of meat, as there are no markets to regulate them; so that the laird, farmer, and mechanic, furnish their own in the cheapest manner they can. In the town of Dornoch, beef and mutton sell at from W. to 6*d.* per lb.

*Fuel.*—The principal fuel in this county is peats, which are in general of good quality, and (the south-east coast excepted) easy of access. Along that coast, the gentlemen join for a cargo of coals from Sunderland, or the Frith of Forth, which they can have at from 18*s.* to 24*s.* per ton, delivered on the shore. The mode of cutting and preparing their peats, has nothing singular in it worthy of notice; it is similar to the practice in all highland districts.

**CHAP. XVI.**  
**POLITICAL ECONOMY;**  
**CIRCUMSTANCES DEPENDING ON LEGISLATIVE**  
**AUTHORITY.**

**SECT. I.—ROADS\***

**THERE** are no turnpike-roads in this county. About twenty years ago some of the roads were lined out, and formed along the south-east coast of Sutherland, from the Mickle Ferry on the south, to the Ord of Caithness, and for 15 miles up along the strath of Oic-  
 kel, on the Sutherland side of the Kyle, to the Borian  
 This was accomplished by statute labour; but as the several rivers and rapid burns issuing from the mountains to the sea along the coast, were without bridges, (except the river Brora), the communication might be said to be stopt with floods of rain. By the late Act of Parliament for making roads and bridges in the Highlands of Scotland, aid is allowed by Government, and this county has availed itself of that act. The money payable by the county, has been deposited, and the turnpike-road along the south-east coast of Sutherland, from Portenlick to the Ord of Caithness, has been commenced, and bridges will soon be erected over the rivers and burns in that line, which will prove of great convenience to travellers, as well as to that district of the country. Similar lines of road are intended to be made from Portenlick through the interior

rior of the county to Tongue, the residence of Lord Reay, on the north coast of the county, and along the north coast, from Tongue to the boundary of Caithness.

The materials for the road along the south-east coast is sandy gravel and rock, contiguous to every part of it. The road through *the* interior will be carried *in* part through rocky moors, and partly through deep moss, but generally through ground where stony materials are at hand, and the same along the north coast, to Caithness\* The expense is from 2J. to 3s. per yard. All the roads hitherto formed in this county are convex, and from 18 to 24 *feet* broad: water is not applied to cleanse them, nor is there any railways or canals in the county.

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## SECT. II.—FAIRS.

\* THERE are fairs held at Dornoch, one in February, one in March, one in July, one in November, and one in December, and also a small fair at Torsdale in July, annually. At these fairs the country people sell or barter their commodities and simple fabrics of woollen stuff, yarn, &c. The Bars-fair held at Dornoch in November, is principally a cattle tryst, the only regular one held within the county\*.

The population of Dornoch is so small, that a regular weekly market can hardly be expected. "(For the ancient fairs, see Appendix, No. II.)

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\* See Report in 1811, for the newly established cattle fun.



## SECT. III.—WEIGHTS AND MEASURES,

LAND is measured in acres, roods and faels, by the Scotch chain of 100 links, or 25 yards long, say 24 ells.

Corn is measured by the firloot, four of which make a boll, equal to 6 bushels and 12 quarts "Winchester measure. In the sale of Blainsley oats, it is customary among the farmers on the south coast, (the grain district), to give five firlots to the boll, which in that case is in value equal to a boll of bear of four firlots; their pease measure is four Winchester bushels; potatoes are sold by the peck of 28 lb. Dutch, 16 pecks to the boll. Liquids are measured by the Scotch pint, which is equal to four English pints; wood by the solid foot of 1728 solid inches; wool by the stone of 24 lb. English weight; butter and cheese by the stone of 21 lb. Dutch weight.

*Price of Products compared with Expense\**—In a district where there are no regular accounts kept of the various expenditure on a farm throughout the year, it is not easy to give, with any degree of accuracy, a comparative view between the expense and returns. The small tenants generally work their farms by their own labour and that of their children, by which they save servants' wages; but the gentleman farmer has all the labour done by hired servants, the expense of which is in many cases more than the rent payable to the landlord; added to which, the tear and wear of utensils, and farm stock, when timber, iron, and ropes are so high priced, leave his profits from agriculture but very little. The Highland farmer, on the other hand, whose staple commodity is cattle and sheep, and of course little outlay on servants

or

or utensils, would have greater profit?, were it not for the uncertainty of markets, and the fluctuation of prices, and his frequent losses by keeping an over-stock, which must starve the whole, when the spring is more severe than the averagi run of seasons. This risk, as observed in a former part of this Report, they do not sufficiently consider. Regular trysts or markets for black cattle, are much wanted in this county.



#### SECT. IV.—MANUFACTURES AND COMMERCE.

THE only manufacture established in this county was a cotton one at Spinningdale, two miles east of Criech, about 20 years ago, by a company of Glasgow gentlemen, with a capital, of 3000/. It consisted of 36 jennies, 136 spindles each, and employed 100 hands. For the first ten years it was not considered a profitable concern, as the company trusted to the natives for hands to Work the machinery, who were ignorant, and would not work at the Glasgow wages.

Afterwards another company from Glasgow purchased the machinery, and sent hands from Lanarkshire to work it: these shewed the natives how to earn a livelihood at the usual wages, and all were going <sup>^</sup>vell on, until the year 1806, when the whole establishment was burnt by accident, and the company gave up the concern. While it prospered, about twenty perpetual feus had been taken, and houses built thereon in the vicinity of the manufactory, and had it continued, a thriving village would have been soon erected, fuel being near, and being contiguous to the Kyle, or Frith of Dornoch, which is here three miles ~~£~~road, where salmcn, cuddings,

and flounders, are caught in abundance; and at the village of Spinningdale, vessels of 50 tons can land their cargoes. This Frith is navigable for seven miles, with vessels of considerable burden, such as can pass the bar called the Gizzing Briggs, on which are four fathom water at spring tides, and seven feet less with neap tides; and the Kyle is navigable by small craft for 15 miles farther, in all 22 miles.

When this manufactory was erected, Mr. Dempster, the proprietor of the adjoining estate, commuted the services of the tenants, and gave liberal encouragement to new settlers, to improve the waste moor in that neighbourhood. Improvements were going on rapidly, but the destruction of the manufactory put an end to all their prospects and exertions.

'There is no other manufacture carried on in this county, if we except the spinning of flax by the country women, furnished to them by the retail shop-keepers, who acted as agents for the Aberdeen merchants. A woman earned about *3d.* per day at spinning flax; many of the young women employed themselves thus through the winter months, and engaged in summer as farm servants. The shutting of the ports of the continent against our commerce, put an end to this business in Sutherland. Black cattle, salmon, and kelp\* sheep and wool, are the only articles of export from this district. All the corn for sale on the south-east coast is generally required and purchased by the Highlanders in the interior of the county, and those of the western and northern coasts are supplied with grain from the county of Caithness.

## SECT. V.—THE POOR.

THERE are no poors' rates.. A statement of the annual receipt and expenditure of the funds of the poor, arising from voluntary, subscriptions, will be found in the Appendix.

## SECT, VI.—POPULATION.

I COULD not procure tables of births, deaths, and burials, of the whole district under review. From what could be collected\* the population of the several parishes is according to the annexed statistical table. The decrease of population, is entirely owing to the progress of sheep farms in the county. Although the produce of this county did not maintain the inhabitants for time immemorial, yet as it is a Highland district, and their staple commodity being black cattle^, they at all times had the means of purchasing corn from the neighbouring county of Caithness j and as many of the young men went into the army, and the women occasionally, during the harvest, to the southern counties of Scotland, the county might be called a nursery of brave, hardy Highlanders, not over-peopled ; yet an agriculturist from the south of Scotland ,would be apt to conclude that there were more people in it, than could be well employed in Agriculture.

The climate is so healthy, that one medical man is all that can earn a livelihood from his profession in the whole county.

## SECT. VII.—FOOD, AND MODE OF LIVING.

THE inhabitants near the coast-side live principally upon fish, potatoes, milk, and oat, or barley-cakes. Those in the interior, or more Highland part, feed upon mutton, butter, cheese, milk, and cream, with oat or barley-meal cakes, during the summer months. They live well, and indolent, of course are robust and healthy. In winter the more opulent subsist upon potatoes, beef, mutton, and milk ; but the poorer class live upon potatoes and milk, and at times a little oat or barley cakes. In times of scarcity, in summer, they bleed their cattle, and after dividing it into square cakes, they boil it, and eat it with milk or whey, instead of bread.

## CHAP. XVU.

### OBSTACLES TO IMPROVEMENT.

*CAPITAL.*—The principal tacksmen in this county have capital, and hold their lands upon 19 to 21 years\* leases; but their sub-tenants, to whom they let the outskirts of their farms from year to year, at an agreed rent, anc\* personal services, having little capital and no leases, ca\* not be supposed to do any thing in the way of ?• cultural improvement. This has hitherto been the p fipal bar to those improvements, along the south-\* coast, the north coast, and for six or eight miles up several straths. In the interior of the county, wh cattle and mountain horses were the staple commodi. any attempt at agricultural improvement would L blasted, by the frequent hoar frosts, and mildews, i July md August.

The system of tacksmen having sub-tenants, is now neai done **away** on the Sutherland estate. Leases for 21 yeau are givtn along the south-east coast to intelligent farmers, of from 50 to i,50 acres of land, which they are bound to labour, occupy, and improve i and the small tenants who hitherto held these lands, became cottagers, and are employed by these tacksmen as day-labourers, at from *1s.* to *1/. 6d.* per day. In this manner, or as farm servants, at the present high wages, that class of society may be more comfortable and live better than they could h^ve done as tenants, labouring a small lot of larvd, and paying  
personal

personal services to their superiors. The present price of iron, timber, and labour of mechanics, are so high, that the necessary expenditure of the farmer, exclusive of the rent, makes his profits not equal to the interest of the capital requisite to stock the farm.

There are no agricultural libraries, or cheap publications circulated in this county, to disseminate knowledge among the country people, except the Farmer's Magazine, a periodical publication of much use.

*Enemies.*—The red or wire-worm, slug, or even the grub, are not much complained of in this county. Until the year 1798 no rats were known to live in the county of Sutherland; it was even maintained, that if Sutherland earth was carried to a house infested with rats in other districts, the rats would instantly quit their possession.

It is an old idea, that rats will not live in Sutherland. Sir Robert Gordon's printed edition, anno 1630, p. 7, says, "there is not a rat in Sutherland; and if any do come thither in ships from other parts (as often happeneth), they die presently as soon as they smell the air of the country, and which is strange, there are many of them in Caithness."^

In 1798 a vessel was stranded at Kentradwell, in the parish of Clyne, on the south-east coast of Sutherland, having no person on board: from this vessel a few rats took possession of a corn mill in the vicinity, where they increased in number, and spread through that part of the county, and were found very troublesome and destructive.

Sparrows are also destructive to the corn in harvest, and no means have been used to prevent them, except shooting them. In the plantations of Dunrobin, Balvair,

vlaire, and other parts of the coast, there are many flocks of rooks, which annoy the farmer in harvest time ; but <sup>1</sup> it is thought that the number of the grub, slug, and other vermin they pick up in the spring, more than compensates for' the damage done by them in harvest, and they are not much molested.

There are foxes, eagles, and hawks, who annoy the sheep farmer; and fox-hunters are employed with hounds and guns to destroy them : a certain sum is allowed the fox-hunter for every pair of fox's ears he produces, besides a stipulated yearly salary. It will take time, much labour, and expense, to destroy the foxes in this extensive and mountainous district. There are badgers in the bogs and rivers, some pole-cats in the rocky mountains, and weazels.

*Game.*—The species of game in this county are, red deer\* roe, hares, black cock and heath, hen, tarmakin, grouse, plover, and snipes. There are two kinds of wild ducks: the stock duck, or large kind, and the duckess, or small kind ; the thrush, lark and linnet, sparrow, red robin, and chaff-finch, &c. in the shrubbery. Wild pigeons and whuaps, or sea piats, at the sea shores ; also starlings, and the different kinds of sea gulls, &c. There are also partridges, woodcocks, teals, fieldfares, (here, by the country people, improperly called blackbird) and a kind of white mountain hare, different from the common hare\* In short, here are every kind of game found in Great Britain, excepting pheasants, which would certainly thrive in the neighbourhood of Dunrobin castle.\*



## CHAP. XVIII.

## MISCELLANEOUS PARTICULARS.



THERE are no Agricultural Societies established in this county; but as farming has taken a more improved turn on the coast of Sutherland bordering the Moray Frith, a Society along that coast, to have central meetings for the purpose of useful discussions, would materially promote the interests of agriculture in that district.

There is a packet established between the Little Ferry in Sutherland, and Burgh-head in Morayshire, to traffick in the commodities of these counties, which may become beneficial to both, in transporting corn, cattle, wool, fish, and coal; and if the seal-fishery commenced on the Little Ferry proves successful, seal oil may become an article of export. A muscle bank at the Little Ferry may also be made productive, by the sale of that shell-fish for bait to the fishermen on the sea coasts of Ross and Moray shires. Fat cattle may Be also transported from Sutherland to the Inverness market by that vessel.

## CONCLUSION.

MEANS OF IMPROVEMENT, AND THE *MKASURMa*  
CALCULATED FOR THAT PURPOSE.



ALONG the south-east coast, or arable district of Sutherland, the land in general is a warm, kindly soil, capable of raising excellent green crops as well as corn. From the quantity of sea-weed, shells, and calcareous sand, along the shore, compost dunghills could be formed sufficient to keep the arable land in good condition : the only plan wanted then, is to divide this tract of country into lots or farms from hill to sea: the proprietor to grant such leases as will induce men of capital to cultivate and improve the soil, enclose and subdivide their farms, and follow a rotation of crops according to the modern system of husbandry in the southern parts of Scotland. As the interior of the county *is* already partly depopulated for sheep-farms, these speculators in sheep-farming would find it their interest to have lots or farms on the coast side, where they could have turnip, hay, and even reserved pasturage, near the sea shore, to drive their flocks to, in a severe season, to save them from disease and starvation, and more particularly so, as turnips are considered as the only specific *hitherto known* against the *braxy*.

To prevent emigration, the Noble Proprietor should give liberal encouragement for forming villages and fishing stations at Golspie, Kilgower, and Helmsdale; but the distance to which<sup>1</sup> they must go for fuel, with ,  
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the badness of the road, would be a great objection to this laudable undertaking\*; and their general poverty and want of resources, would not admit of their paying for coal, which, including the necessary freight and duties, would cost at least a guinea per ton.

The advantage of encouraging the fisheries, is already experienced upon the western coast of this county, as stated in p. 18.

At Scoury, and the end of Loch-laxford, in the parish of Edderachylis, fishing stations might be established; Loch-laxford has good anchorage, and shelter for ships of any burden, in from ten to six fathom water. The herring frequents this loch in the season; and all the way from Cape Wrath to Rou-stoire in Assynt, there are abundance of cod and ling to be had at no great distance from the shore. In the event of a gale of wind, the boats have ready access and shelter in Loch-laxford, or Loch-inchard, to the north of it. A moderate expense would recover about twenty acres of strong blue clayey soil from the upper end of Loch-laxford, by stemming the tide between an island and the shore, which might be converted to arable land.

In the valley from Golspie to Kinauld, in Strathfleet, much might be done by draining and embanking a tract containing now about 700 acres of arable land; and by draining the low ground between Culmalie and Drumay, a considerable tract might be made arable. The neighbouring sands of the Little Ferry, or river Fleet, abounds with cockle and other sea shells, for manure, as before stated in this Report.

At Morvich, a tract of strong blue clay might be re-

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\* The people of Helmsdale might easily be supplied with peat from the neighbouring estate of Langwell, in Caithness.

covered from the tides by embankment, in addition to a tract of strong coarse land already bordering on the river; an equal tract of deep peat-moss, with roots of moss fir, might be converted to arable land by spreading the blue clay on the surface of the moss, previously reduced by burning, &c.

As the soil in almost all this county is a light loam of black earth, with a mixture of sand or pebbles, it wants tenacity, and of course does not retain moisture; in every case, therefore, where *clay* could be had at a moderate expense, a top-dressing of it, on the arable land, would be of much benefit, as it would tend to make the soil fitter to retain moisture, and would exclude the bad effects of scorching winds, &c. in a dry season, which inconvenience is much felt on the south-east coast of Sutherland.

The Cove of Cork, in the south of Ireland, abounds with a muddy sand and clay, similar to what is found in the river Fleet, in the county under review; and the writer hereof, has seen the Irish tenantry carry that muddy stuff, from the Cove, for ten miles up the country, as a top-dressing to their arable land, which consists of the same kind of black loam as the soil in this county. Experience taught them that the produce paid well for this extra labour.

While the present system prevails, of black cattle being the staple commodity of the county, regular annual fairs or trysts for the sale of cattle, ought to be established in various parts of the county, that cattle-dealers from the south of Scotland might be induced to attend them with ready money. Hitherto the farmers are under the necessity of selling their cattle to adventurers, who take them on credit, and if they succeed in disposing of them at the southern markets to advantage, they return  
and

and pay the people: if otherwise, they demand so much per head, as discount, which is generally given.<sup>1</sup> An instance of this happened a few years ago, when the drover returned, and told a doleful story of losses : at a general meeting of his creditors it was agreed to give a discount of 20s. per head, though the original price would not probably exceed 45s. each.

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ADDITIONAL REPORT  
OF THE  
MORE RECENT IMPROVEMENTS  
IN THE  
**COUNTY OF SUTHERLAND,**

MAWJf fP IN CONSEQUENCE OF

A NEW SURVEY

*BY* CAPTAIN JOHN HENDERSON,

IN AUGUST, 1811.

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# ADDITIONAL REPORT-

&c. &c.

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AT the desire of the President of the Board of Agriculture, the Reporter went to Sutherland in August 1811, in order to examine what improvements were going forward in the county in general, but more especially on the extensive estate of Sutherland, since the year 1807, when his original Survey had taken place; and he was much gratified to find, that within the last two years, a general reform had begun in the management of land on the Eastern Coast of the county, and that several farms were getting under the most approved rotation, in so far as the occupiers, (intelligent farmers from Morayshire), believed the soil and local situation would admit of it: and perhaps better Farm Offices are not to be found in Scotland, at least Mr. John Shirreff, late of Captainhead, so much approved of them, that he applied for a plan, that a friend of his, now settled in Suffolk, might adopt the same construction.

The Marquis and Marchioness of Stafford, have given the most pointed instructions to their Manager, to carry on the improvements on their estates, both in the Lowlands and Highlands, on a scale, perhaps more extensive than has hitherto been attempted in the North; and Earl Gower has spent some time in Sutherland, superintending the general plan of management over the estate and on the farms of Skelbo and Achavander in particular, of which his Lordship has taken a lease.

Short as the time is, since these improvements commenced, the face of the country is wonderfully changed: a better proof of what may be expected, cannot be given, than by stating, that the farm of Skelbo, was, last year, (both land and houses), an entire ruin; now, a set of farm offices, with thrashing and meal-mills to go by water, all of the most commodious and substantial construction, have been erected; roads in all necessary directions have been completed; stone enclosures are now building, and this farm of 280 acres, besides 40 acres of cow pasture, after being dressed, dunged, and limed, is to be put under a rotation of, 1. Turnips and Potatoes; 2. Barley, Bear, or Wheat; 3. Clover, and 4. Oats.

Lord Gower has also trenched two-acres of haugh ground for willows, which, with five acres more at Dunrobin Mains, have been let at 9/. per acre to a basket-maker from Edinburgh, who is to settle in the county.

His Lordship has brought a stallion and three mares, the best that could be found in Suffolk, to improve the breed of horses in the north; and his other working stock, consist of Clydesdale and Moray-shire horses, with oxen from Moray-shire. His cows are from Banff-shire. They combine good shape with abundance of milk, and crossed with the Dunrobin bulls, which are real Argyle-shire, will, it is supposed, produce a very useful breed of cattle.

Neat stone cottages are already built for some of the dispossessed tenants, who get three acres of improvable moor land, and ground for a garden, and are allowed 10/. for trenching each acre, in such proportions as they choose to execute the work: other tenants, who wish for larger allotments, get from 10 to 25 acres, on a nineteen years lease, and Lord Gower ploughs the  
ground



ground for them, with his farm horses. The people seem quite satisfied, and are now pressing hard for lime, which is to be furnished for them; a certain proof of their future prosperity.

*In* arranging farms, both' arable and pasture, the Marquis and Marchioness's uniform instructions are, *to attend to the people*. Cottages of various descriptions, suited to their circumstances, are to be erected for widows and old men, and those who prefer it, are getting allotments of ground near churches and mosses. Some of them prefer building for themselves.

The new tenants have also begun *to* build their houses on plans previously agreed upon, and according to the size of their farms; and while substantial convenience is studied, economy is not neglected.

Villages, both maritime and inland, are begun, and leases of 99 years are given for house and garden-ground, and to each tenement, two or three acres for the keep of a cow will be allotted, on an adequate duration of lease, and reasonable terms of rent.

Carding mills, (a prelude to more extensive manufactures), will be encouraged; and fishermen from the East Coast of Scotland, have offered to settle in the county, when houses are finished for them.

Coal has been bored for, and found on the banks of the river Brora, on the Sutherland estate, and st shaft is now sinking, to the depth of 250 feet, (a particular account of the strata is annexed), under the superintendence of Mr. Wm. Hughes, an eminent engineer from Wales. Salt will be made, as has formerly been done in that vicinity; ironstone may be found, (appearances of it being observed in boring for coal), and the shores abound with limestone.

**With** all these promising appearances, **th**s Marquis  
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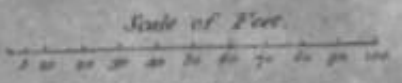
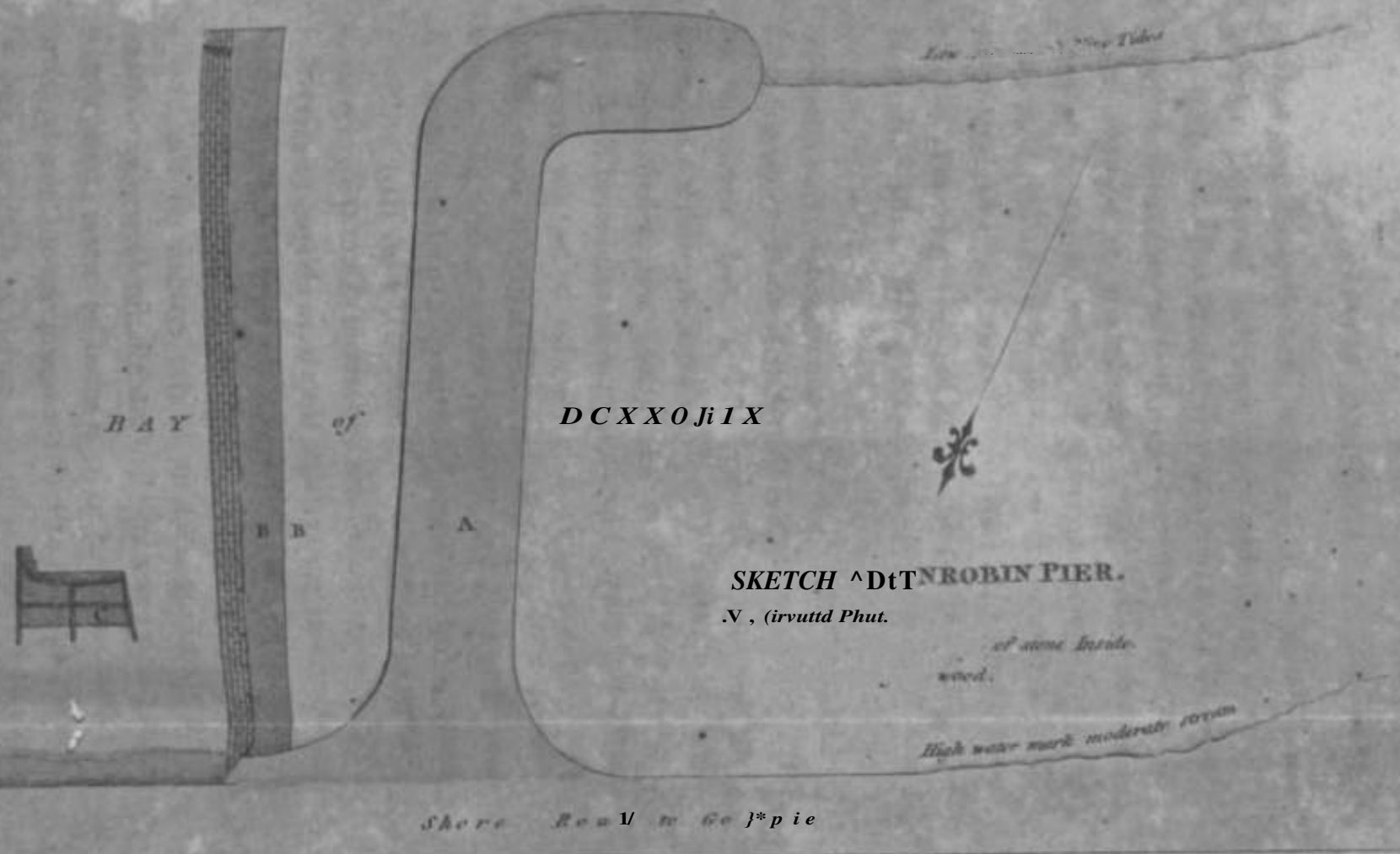
and Marchioness of Stafford have, directed, that no hazardous or speculative attempts shall be made, knowing well, that in a new country, failures and want of success, in any works undertaken, have the most baneful effects, and a certain tendency to throwback useful improvements.

Lord Gower proposed this season (an. 1811), to plant 200 acres near his farm of Skelbo, in the parish of Dornoch, with hard wood, larch, and Scotch fir; and other plantations of fir, &c. are to be made, wherever suitable situations can be found, in each parish on the Sutherland estate.

In 1807, there was only one imperfect thrashing-machine in the county, as then stated: there is now a thrashing machine at Dunrobin Mains, and water conducted from the burn of Golspie to work it, which also serves to water the willow plantation, and, when required, serves the dairy. Pipes also may be conducted from it to the Castle; a supply may likewise be had for irrigating several fields in the Mains; and lastly) it is to be conducted to scour the harbour, where a new pier is now erecting, on the shore near the garden of Dunrobin. (A Sketch of the New Pier is annexed, *Plate III.*)

Formerly the Mains or farm of Dunrobin, was so ill supplied with water, that they were obliged to carry that necessary article in carts from the burn of Golspie, about a mile off, to serve the dairy, &c. in the summer season.

A thrashing-machine is also erected on the Skelbo farm, with a new invented machine for *hummeltng* or dressing bear, attached to it, worked by water; one also is now erecting, on each of the new farms of Culmaly, Drumoy, and Kirkton, in the parish of Golspie; and all other necessary improved implements for agricultural purposes are there to be met with. There are now ten thrashing-machines in this county.



*Found in  
English*

In order to ascertain the nature, and the extent of the improvements recently carried on, the Reporter submitted the following Queries to the consideration of William Young, Esq. of Inverugie, (the intelligent gentleman who has the management of the Sutherland estate, and the superintendance and direction of all its recent improvements); who favoured him with answers to the following effect.

1. What may be the extent of the Sutherland estate?

*Ans.* This estate has been but partially measured; a Land-Surveyor who made some calculation from Arrowsmith's map, believes, that it may extend to, about 700,000 Scotch, or 889,560 English acres.

2. What is the extent of arable land ?

A. For the above reason, no accurate account can be given of the extent of arable land. It is supposed there may be about 7000 Scotch, or 889/5 English acres, on the east coast alone, and the straths adjoining to it.

3. What is the extent of the natural woods; also of land planted ?

A. The natural woods have been much demolished, by the practice of cutting them down for bark to tan their leather. The extent cannot be determined: the few plantations are confined to Dunrobin\* Cyder-hall, and Balblair, and that neighbourhood's perhaps in all about 800 acres planted with Scotch fir: but new plantations are begun, and will be continued in every parish, on the Sutherland estate.

4. What is the extent of the Assynt estate, on the west coast of Sutherland \

A. By a plan of that estate, made by a Mr. Hume, about the time that property was acquired by the Sutherland family, the extent of Assynt appears to be as follows :

|                                       | <i>Acres.</i> |
|---------------------------------------|---------------|
| Arable land,.....                     | 2193          |
| Pasture in shealings,.....            | 1620          |
| Natural woods, (now demolished),..... | 2895          |
| Mountains, moss, and hills,.....      | 79,705        |
|                                       | 86,413        |

It is evident, however, that the extent of arable land is exaggerated in that survey, because, from every account I could procure, and from my own observation, the arable land now in Assynt does not much exceed 1000 Scotch acres.

5. What is the extent of the farm of Dunrobin, in arable, pasture, woods, and plantations ?

A. Dunrobin farm may contain about 1000 acres, arable, pasture, woods, and plantation ; about 500 acres of which are arable.

6. What is the extent of the farms of Culmaly, Drumoy, and Kirkton, in Golspic parish \ and of Crackag in Loth ?

|  | <i>Acres.</i> |
|--|---------------|
| A. Culmaly contains of arable, and of meadow land to be brought to culture,..... | 300           |
| Moss, moor, and pasture,.....  | 600           |
|  | 900           |
| Drumoy about 150 acres arable; moor and pasture uncertain, say 300.....          | 150           |
| Kirkton, all arable,.....  | 120           |
| Crackag, arable,.....  | 170 acres     |
| Meadow and pasture,.....   | 135           |

7.-What is the extent of the farm of Skelbo?

A. Skelbo contains 280 acres arable, and 40 acres burn grass, or grass land on the sides of burns or streams.

8. What

8. What is the plan of rotation proposed to be adopted on the farm of Skelbo ?

A. The rotation proposed is in five divisions:

|           |  |
|-----------|--|
|           | 128 acres turnips.                           |
| 1st year, | ditto potatoes.                              |
|           | ditto beans.                                 |
|           | —  |
|           | 56   |
|           | —  |
| 2nd year, | 528 acres barley after turnips.              |
|           | ditto potatoes,                              |
|           | —  |
|           | 56   |
|           | —  |
| 3rd year, | 56 acres hay.                                |
| *th year, | 56* ditto pasture.                           |
|           | 28 acres wheat in that lot which carried     |
| 5th year, | 28 acres grass after potatoes,               |
|           | 128 ditto oats after the grass sown out with |
|           | 28 wheat.                                    |

9. What is the nature of the offices erected at Skelbo, and the advantages expected therefrom ?

A\* The offices are constructed on the best plan that could be devised, for securing the following advantages; 1. That the cattle shall be comfortably accommodated in stables or sheds, and the greatest possible quantity of manure collected. 2. That the turnips and straw shall be consumed, partly by cattle reared, and partly by others bought in, which is supposed to be a good rule in most situations in the North, as, in this way, there can be no over stock, **consequently** no scarcity of provender, which all farmers ought to guard against, and which has hitherto been too little attended to in this county.

About 100 yards to **the east of** the offices, there is an area of grist mill now building, wrought by the water which runs from the thrashing-machine and in the

the other end *of* the same building, the kiln for drying the corn is erected. This kiln is 1\* feet diameter, and the corn is dried upon plates of sheet iron, supported by cast-metal bars. It dries five bolls at a time; the expense of erecting which is computed at 30/., including the iron plates and metal bars which support it; and the only fuel required, is the shelling seeds collected at the milling the grain, which is a considerable saving in the course of the season; and k has this additional advantage, that there is no ris<sup>T</sup>; from lire; whereas many accidents happen from kilns on the common construction taking fire, and destroying the whole premises. In short, when the square of offices, on Earl Gower's farm at Skelbo, is finished, it will be one of the completest in Scotland. (A Sketch of Earl Grower's Farm is annexed, *Plate IV.*)

10. What is supposed to be the best plan, in regard to cottage farms? The best plan of a cottage? The best extent of land to be attached to it, and the best rotation of crops *i*

11. Hpw are the cottagers employed ?

A. Where a tolerable quantity of arable land can be found in one place, it has been found to answer, and will be adopted on the Sutherland estate, to divide it into two fields, and allow two to four acres to each family, according to the quality of the land. One field in pasture grass, into which each settler is to put his cow; the other to be cropped as follows:

One-fourth turnip and potatoes \

One-fourth barley or oats, sown out with grass.

One-fourth red clover, with a little rye-grass.

One^fourth oats or wheat \

Which admits of a sufficiency of vegetables for the families, and thftr cows.

Sufficiency of straw, and some hay, which may be u<sup>l</sup>-ed for their cattle in tje shape of hay-tea, or otherwise, when

SKETCH of EARL GOWIE'S FARM STABLES

by Horse Lick above.  
 by Oxen Lick above.  
 by Cows Lick above.  
 by Sheep Lick above.  
 by Pigs Lick above.  
 by Chickens Lick above.  
 by Ducks Lick above.  
 by Geese Lick above.  
 by Rabbits Lick above.  
 by Cats Lick above.  
 by Dogs Lick above.  
 by Hares Lick above.  
 by Foxes Lick above.  
 by Badgers Lick above.  
 by Weasels Lick above.  
 by Mice Lick above.  
 by Rats Lick above.  
 by Squirrels Lick above.  
 by Beavers Lick above.  
 by Otters Lick above.  
 by Badgers Lick above.  
 by Weasels Lick above.  
 by Mice Lick above.  
 by Rats Lick above.  
 by Squirrels Lick above.  
 by Beavers Lick above.  
 by Otters Lick above.

M. Cow Byre above.  
 N. Cattle Stable above.  
 O. Oxen Stable above.  
 P. Sheep Court above.  
 Q. Horse Court above.  
 R. Milk House above.  
 S. Milk Cellar above.  
 T. Servants Kitchen above.  
 U. Bread Press above.  
 V. Turnip Court above.



INDIAN ...  
 Acc. No. ....  
 Date .....

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when the turnips are done, and before the grass is ready.

When the land tires of this rotation, it is to be put into pasture, and the other pasture park thrown into this four-shift course.

Cottagers so situated, may find work in the county, or, having left their families in so comfortable a state, have it in their power to go south during the summer, and to return home in November.

12. What is allowed for trenching, &c. ?

A. People settled on new ground, as cottagers, are allowed 10/. per Scotch acre for trenching and improving ground, equal to the maintenance of a cow, as above, and are charged five per cent, interest; others prefer continuing as small farmers on improvable moors. The option is given them, and in the latter case, 12, 15, to 25 acres are marked off. These people build their own houses, and such as are settled near Lord Gower's farm, get his horses to break a part of their new ground, and give work in return. During the first two years, no rent is exacted; and for five years more only a trifle. During this period they are bound down to have all the ground under the plough, the quantity taken having been left to themselves, and it is then to be valued by men mutually chosen, for 12 years more, who are to take all the circumstances of the case into consideration, although there can be no doubt that the tenants will be settled with on liberal terms, without the necessity of resorting to arbiters.

13. Are small farms of about 50 acres, an eligible plan to be adopted in the present state of Sutherland ?

A. Some situations in Sutherland are adapted to 50 arable acre farms, and will pay better than if larger, especially with some grass ground attached to them: others may

turf is preferred to stone for a coping, small rotted stones should be placed above the turf or feal, and grass will grow up from the feal among the small stones, which binds them together like a net-work : this kind of fence is durable and effectual.

No hedges have been tried, since the recent improvements commenced.

20. What plan has been tried for improving the sea-beach to the north of the Little Ferry ?

A\* The sea-beach between Golspie and the Little Ferry, contains about 300 acres, consisting of barren sand, and small round stones, in which *whin* and *broom* seeds were sown last April, (1811), in drills by the plough, 15 feet asunder. The seed has taken root, and being already above ground, has every chance to answer. Next season, the whole will be sown; and in a few years, this waste will not only beautify the country, but produce food for horses, and for young sheep. Whins, cut green and bruised, are known to be excellent winter provender for horses; and the blossom of broom, is considered to be a specific against the braxy for lambs and young sheep.

21. Does wheat answer? Either spring or winter? When is it sown & In what rotation? Is the culture likely to be extended? Is it proposed to erect a flour-mill?

A. Wheat has now been tried, and will to a certainty pay well, on the coast-side lands of Sutherland, where the climate is good, and the soil is in general dry. The season for sowing ought to be from the 20th September to the 10th October; the mode of culture, is mentioned in the rotation for the farm of Skelbo.

It is proposed to erect a flour-mill at Golspie, and an estimate of the expense is preparing.

22. What villages are in contemplation on the sea\*  
coast\*

coast, and in the interior; and what is considered to be the best plan for their erection ?

A, Various villages are not only in contemplation, but will this season be commenced, namely, a maritime village at Loch-inver, in Assynt; and another at Mid-Garty, on the east coast, are immediately to be set out. In the interior, one at Lairg, and another at Pitentrail, in Strath-fleet.

23. When was the packet set on foot between Burgh-head and Sutherland? On what plan? How does it answer? How many cattle does it carry over?

A. The packet was set on foot in May 1809, The partners are, the Marchioness, of Stafford, and the Proprietors of Burgh-head.

At Burgh-head, the London, Leith, and Aberdeen goods, for Tain and Sutherland, are landed, and shipped on board the packet for these places. Its tonnage is 45 tons burden; navigated by a master, two men, and a boy. It sails every Tuesday from Burgh-head, and returns on Friday; is often full of goods, with many passengers. The packet carries 15 large, or 20 small cattle; occasions a great intercourse; and is most useful to both sides of the Frith.

24. How are the sheep-farms doing on the Sutherland estate? How many Cheviot sheep are now on it? Are the sheep-farms to be extended? How are the people to be provided for?

Sheep-farms are paying well on the Sutherland estate. The number of Cheviots are now about 15,000. More ground will be laid off for the same mode of husbandry, without decreasing the population. Situations in various ways will be fixed on for the people. Fishing stations, in which mechanics will be settled; inland villages, with carding machines; moors and detached spots calcu-

calculated for the purpose, will be found ; but the people must work. The industrious will be encouraged and protected, but the slothful must remove or starve, -as man was not born *to* be idle, but to gain his bread by the sweat of his brow.

25. Who are employed in trying for coal; and what may be the expense ?

A. Mr. Telford has seen, and given his opinion as to the best mode of searching for, and working, the coal at Brora. The work is carried on, (as formerly stated), under the direction of Mr. William Hughes, who has had much experience in such undertakings, and has been employed on the Caledonian Canal since its commencement. The expense cannot yet be ascertained.

26. What may be the expense of making Dunrobin pier ? What the advantages ? What other piers are in contemplation ?

A. Dunrobin pier will cost 400/. The advantages are, that the packet, in place of being at sea during a night in winter, (as no vessel can take the Little Ferry when the tide turns to ebb), may run in one tide from Burgh-head to this pier, with her cargo and passengers; and that coal, timber, slate, and other commodities, wanted for Dunrobin and its vicinity, may be landed at it. On a moderate calculation, this will produce a yearly saving of 70/. in carriage, and detention at the Little Ferry, to the family at Dunrobin, besides other eventual benefits to the coasting trade and fishing on this coast..

A plan and estimate has been made up for an intended harbour in Torsdalc Bay, where the Water of Naver discharges itself into the Northern Ocean. The walls of the pier to be about 600 feet long on each side, the height 19 feet, breadth 20 feet, and the parapets seven feet by eight feet high; the depth of the entrance 12 feet

at

at low water, and from nine feet *to* three feet within 5 to be denominated Port Naver ; but there is no inten-

\*

tion of having this scheme immediately executed

' 27. When was the plan of willow plantations commenced ? What sorts are planted? What the profit per acre ?

A. Willow plantations were ordered by the Marquis of Stafford in September 1810. In the spring following, seven acres, after being trenched, manured, and enclosed, were planted with sets, picked out in East-Lothian, by a basket-maker of Edinburgh, who has taken a lease of the ground, not then worth 15/., at 9/ per acre, of yearly rent. He is to settle in Sutherland, and expects to supply the several towns in the North with baskets : he is a perfect workman, and well recommended.

28. What roads are proposed through Sutherland, in addition to the post-road along the east coast to Caithness, now finished ? Are the people convinced of the advantages *to* be derived from them ?

A, Parliamentary assistance having now unfortunately ceased, in so far as regards any new undertakings, and the county assessments locked up with roads and bridges, until 1816, future improvements on roads must therefore be confined to the commutation money for statute labour, and private subscriptions; but every thing possible will be done, and roads to the intended villages will be particularly attended to.

29. What bridges are going forward ? When will the iron-bridge at the Bonar be completed ? What will be the expense of the intended mound bridge across the Little Ferry?

A. The iron-bridge erecting at the Eonar, will cost about 9000/.

The plan and estimate for the mound intended across  
 the

the Little Ferry, is not yet finally settled by the authority of the Parliamentary Commissioners, but it is supposed that the whole will be completed for about 6000/.

The bridge of Helmsdale is now completed, and is of the greatest benefit to travellers to and from Caithness, who were often detained at that rapid river, in the winter season, and obliged to swim their horses over it, at the risk of losing them.

This bridge consists of two fine arches, each 70 feet in the span, by 26 feet high. The contracted price was about 2300/.

30. What are the wages of farm servants? Has working by the piece been tried, and how has it answered?

A. The inhabitants of Sutherland have hitherto been very little accustomed to farm labour on an improved plan; and on the coast-side lands, it has been found more advantageous, to bring ploughmen from **the** southern counties, till the natives are instructed in ploughing, &c. The expense of course is equal, if not beyond, what is paid in the counties of Moray and Banff. Of piece-work, (except stone walls), the natives **are** equally ignorant; but trenching, &c. is carried on by spade-men from the south, and already the natives begin to learn, and will soon contract for work on similar terms, but not cheaper than in other places.

31. How is the dairy carried on?

A. No particular information on this subject **can. yet** be given.

The breed of cows is principally the Argyle-shire; **the** Banff-shire cows having been brought to Dunrobin only this season (1811). The chief attention is paid to the rearing of young stock, and for that purpose, a calf is kept to each cow, and the milk, after giving the calves their allowance, is made into butter and cheese, in **the** usual manner.

**The**

The intended improvement of stock, by crossing the Banff-shire cows, with the Argyle-shire bulls at Dunrobin, is already noticed in the account of the farm of Skelbo ; and experience alone can determine the result.

32. What is the rent of the salmon fishings ? What is done for their preservation ?

A. The rent of the salmon fishings of the waters of Naver, Helmsdale, and Bfora, is at present 1650/. per ann. payable at Martinmas and the Whitsunday following, by equal portions.

Some irregularities in killing fish out of season have been discovered; and pointed instructions have been sent to punish the transgressors\*

33. What quantity of kelp may be made on the Sutherland estate ?

A. About 150 tons of kelp is annually made on the east coast, and in Assynt. It is doubtful if that quantity can be much increased.

34. Has any recent alteration taken place in regard to the property in the county ?

A. Yes, the estate of Uppat has been purchased by Lord Stafford, and annexed to the lordship of Sutherland.

35. Are there any disputes regarding the patronages in the county ?

A. Criech is disputed; but Assynt and Clyne are indisputably Lady Stafford's\*

COAL.

Copy of the Journal kept *zohilc boring* for Coal at the Water of Brora^ County of Sutherland^ (with a Section of the Coal Shaft, arid the several Strata, Plate V.)

| Date. |               | Description of the Strata.   | Depth of Strata. |            |
|-------|---------------|--|------------------|------------|
| No    | <b>1810.</b>  |  |                  | <i>ln.</i> |
| 1     | Oct. 13       | Soft grey stone in this layer, containing iron-stone ualls.....  | 63               | —          |
| 2     | 31            | Soft dark grt-y sandstone in thin layers, and stones as above.....   | 18               | 6          |
| 3     | Nov. \        | Dark, very soft coal metal in thin layers, with partings of yellow pyrites, and water, which rise to the <b>surface</b> .....                    | 2                | —          |
| 4     | 15            | Dark grey stone in thin hycrs, with soft partings  | 6                | 10         |
| 5     | 19            | Dark hard stone with strong sulphureous smell, perhaps alum <b>ihale</b> .....   | 1                | 8          |
| €     | 23            | Soft sandy stone, mther lighter coloured than the abiwc.....   | 9                | 7          |
| 7     | 29            | Lighrih-coloured sandstone, containing marine putrefactions .....  | 14               | 10         |
| 8     |               | Very hard ironstone.....   | —                | <b>H</b>   |
| 9     | 30            | Hard grey clunch, a common coal-measure .....  | 2                | 9          |
| 10    | Dec. 18       | Light coloured metal stone, rather soft in boring  | 2                | 6          |
| 11    | is            | Lightish-coloured clayish strata, soft m boring, and containing a considerable portion of <b>spary</b> malter and marine putrefaction. ....      | 2                | 9          |
| 12    | 21            | Ditto still darker, <b>containing</b> more of the white spar, Milphurroua, effervesces briskly, hut does not contain any slack after burning ... | 4                | —          |
| 13    | 25            | Ditto, <b>light</b> coloured.....  | 11               | 10         |
| 14    | 1811. Fan. 1? | Ditto, still lighter coloured than the <b>above</b> .....  | 2                | —          |
| 15    | 23            | Ditto, much darker, <b>containing</b> white powdery? inaticr.....  | n                | <b>8</b>   |
| 16    | 2P            | Dark ckmch, <i>a. clavbh. strata</i> .....   | 7                | II         |
| IT    | Feb. 6        | Ditto ditttt, . . . . diltm .....  | 4                | 10         |
| IS    | IS            | <b>Very</b> dark coal shale, rather »ytt in <b>bariag</b> .....  | 5                | 7          |
| 19    | 20            | Ditto ditto.....   | 5                | 11         |
| 20    | 26            | Asli-roloured metal stone.....   | 12               | 0          |
| 21    | 28            | Very hard brown stone, perhaps ironstone .....   | —                | 5          |
| SS    | ttfar.S       | A&II-COIOUJVI clunch and biivl .....   | 5                | 4          |
| 23    | 8             | Dark bituminous shaft*, with soft partings .....   | 7                | U          |
| •24   |               | Very hard close-textured sandstone .....   | —                | 8          |
| S3    | April 1       | Sjndttonc with blue streaks, soft in boring .....  | 12               | 9          |
| *J6   | 17            | Very hard limestone nixed with freestone .....   | 2                | 3          |
| 27    | 18            | Grey shevcry sandstone, rather soft .....  | —                | 6          |
| 28    | SO            | Sandstone, mixed with limestone, very hard in boring .....   | —                | 7          |



| No.               | Date.  | Description of the Strata.  | Depth of each Strata. |        |
|-------------------|--------|---|-----------------------|--------|
|                   |        |   | Ft.                   | In.    |
| 28                | 1811.  | As: -coloured metal stone', rather soft   | 2                     | —      |
| 30                | May 14 | Black caking coal   | 3                     | 3      |
| 31                | 16     | Black ciuuen, <b>pavemep* dS</b> the coal   | 2                     | —      |
| 32                | 18     | Hard splint coal  | 1                     | 4      |
| S3                |        | Black-btmtn^ shale, like Kannei coal  | 6                     | 7      |
| J1                |        | [Very hurtlstuoe, perhaps ironstone.  | 1                     | 2      |
| 35                |        | <b>29 Black shale</b>   | 2                     | —      |
| 36                |        | [Very hard stone  | —                     | 1 1/2  |
| 37                | June 1 | Soft black shale, <b>speckled</b> with <b>white</b> powdery matter  | —                     | 2      |
| as                |        | 5 Hard black-bnruing BIUI?, c;une u£ in <i>tha</i> au-<br>^;ir in Urge pieces, very promisiog, and not <i>jet</i> cut through | 4                     | 2      |
| Total depth Iwrcd |        |   | 250                   | 11 1/2 |

*Fairs established.*

In order to remedy the difficulties formerly complained of, regarding the sale of black cattle in this county, (see page 115 of the Report in 1807), the following fairs were established in 1811.

\*1, A fair at Duillish, in the parish of Kildonan, a place on the cattle road from Caithness and Strathnaver, southward, held on the 14th August annually; and one at Pitcntrail, in the parish of Rogart, in Strathfleet, on the line of said cattle road southward, and near its junction with the roads from the west and north-west coast; held on the 16th August. These markets connect with the great Kyle market, held on the 19th, 20th, and 21st August, and the great Falkirk tryst on the second Tuesday in September.

2, A fair or tryst at Duillish on the 12th of September, and one at Pitcntrail on the 16th, to connect with that of the Kyle on the 18th of September, and the **Falkirk tryst** on the second Tuesday in October.

3. A market or tryst at Knock-glass, in the parish of Clyne, on the said Caithness road, on the 9th of October; and one at Pitentrail on the 11th, to connect with the Beauly tryst on the 15th of October annually.

Drovers from the south of Scotland, may expect to find great numbers of Highland cattle at these newly established fairs or trysts, which will suit their views for the southern markets, and will prove of advantage to the Sutherland and Caithness farmers or cattle dealers, in getting fair prices, and ready money, for their cattle.

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### *Improvements at Culmaty\**

In page 126 of this Report in 1807, it is remarked, that much might be done by draining, in the Valley from Golspie to Kinauld, *Sec.* That improvement has now, (in 1811), been successfully prosecuted on the farm of Culmaty, in that valley. Mr. Sellar, (a Gentleman from Moray-shire, who has taken the lease of that farm), has drained a considerable extent of the marshy ground within the lines of his possession, in some parts to the depths of 11 feet, through a stratum of sand, incumbent on blackish mould, and peat moss on a clay bottom. He prepared 4 Scotch acres of the drained marsh in spring 1810, and sowed it with 4 bolls of potatoe oats, and the produce amounted to 51 bolls. He has 18 acres of the same ground under an oat crop, this year, (1811), 12 acres of which he considers equal to the last year's crop; the rest was not sufficiently harrowed, but he believes it will yield from six to seven returns.

Mr. Sellar has erected a handsome dwelling house, and a commodious square of office houses, near the burn of Culmaty, where there is a grist mill, and the command

mand of water for his thrashing-machine, from whence he has made a canal to an arm of the sea, west from tkt Little Ferry, about a mile distant. This jcanal carries off the water from the mills, and from the drains in the marsh ground: it is about 8 j\ feet deep, and upon it he has a boat which carries 8 tons; this boat is anchored on the sands of Little Ferry, or Loch-fleet, when the tide is in ; at low water the boat is filled with the shelly sand, which is abundant in that loch or arm of the sea -, and when the tide returns, the boat is afloat and warped to the canal, and by it brought up to very near the farm offices, where the shells, &c. are conveyed to the cattle-sheds and square, and there mixed with peat-earth, seaweed, and cattle dung. By these means, from the 1st of July to the 30th August, he collected of compost manure, what served 18 acres of fallow, which he was to «ow with wheat in September. He had 30 acres in fallow, prepared for wheat this season, with every prospect of success, 'as the wheat sown in 1810 on several farms on that coast-side, had every appearance of a good crop in August 1811.

This intelligent farmer had four bolls of wheat sown in October 1810, and the produce was thrashed in November 1811, which yielded 37 bolls of wheat of good quality, and 2£ bolls of damaged corn, on the top of the stack, which is very near 10 bolls per acre. He had H acres of wheat appearing above ground, on the 20th November, 1811, and was then sowing wheat, and expected, betwixt his winter and spring sowing, to have ^0 acres under wheat in summer 1812. He finds one essential good quality in the land of the Vale of Golspie, or Strath-fleet, *i.e.* that it will produce turnips,,grass, and wheat unlimed. The mode of improving the marshy ground, so \* productive of oats, is (his: having made a catch-water

drain betwixt it and the hill, there w<sup>^</sup>ere cuts or cross-d<sup>^</sup>ains made from it to a main drain\ the ground w<sup>^</sup>as ploughed in February thereafter, and sown in April; and the produce was as already stated. He is to fallow it in summer 1812, when it will be manured and sown with wheat.

The other gentlemen who have recently taken farms in that valley, are draining their marshy ground, and improving the old arable land within the<sup>^</sup> lines of their respective farms, after having erected commodious houses and squares of offices. Some of them receive a stipulated sum in advance from the proprietor, for the purpose of building, for which they pay five per cent, interest; others are to be allowed meliorations at the expiration of their lease, to a certain extent.

I annex a copy of the estimate made of the probable expense of the Mound across the Little Ferry, which has been submitted to the consideration and approval of the Government Commissioners for roads and bridges, by the Right Hon. Earl Gower, who has offered to lodge the moiety thereof, which falls on the county, as soon as the plan and estimate are agreed to.

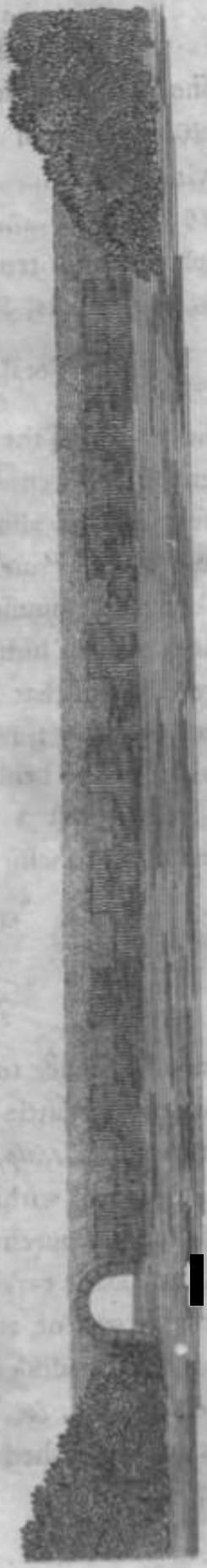
The probable estimate made up by an engineer in the Marchioness of Stafford's employ, is thus:

|   |       |
|---|-------|
| To large stones and chingle for the front\        | £1125 |
| 15,000 cubic yards at 1/. 6J.....,.....«....., /  |       |
| To large stones to be used, which will require "I | \orr\ |
| blasting, 5000 ditto, at 5s.....J                 | —     |
| To earth to be brought on rail-ways, 50,000 T     | 1125  |
| ditto, at 9a.....— J                              |       |
| To sand, &c. from the beach on each side of 1     | 250   |
| the mound, 10,000 ditto, at 6d..#.....J           |       |

Carry forward, •.....«..«>..••. £3750

Brought

*Plan of the Proposed Mound  
across the Little Ferry in Sutherland?*



Small vertical text or signature on the right edge of the page.

|  |              |
|--|--------------|
| Brought forward, .....   | £3750        |
| To one bridge, 40 feet span, with sluices, .....                             | 15&6         |
| To 2000 yards of timber railing, including"<br>laying, <i>Sec.</i> .....     | 250          |
| To 15 waggons,.....  | 120          |
| To planks and trusties, 25/.; 40 barrows? "<br>34/.; incidents, 321/.; ..... | 380          |
| <b>*Total,.....</b>  | <b>£6000</b> |

The length of the\* mound and bridge to be 953 yards; contents 60,473 cubic yards, the average depth, twelve feet four inches, allowing a rise of four feet above the highest tide.. {Plate VI.)

When this mound, with its bridge and sluices, are finished, several hundred acres of a rich clay soil may be recovered from that loch, to the west of the mound, now covered by every tide, by cutting a straight channel from Morvich to the bridge of the said mound because the river 11 but a small river beyond Balm tr a id, the highest point to which the tide flows.

*Mussie Bank\**

A small distance to the east of the intended line of this mound, in the Little Ferry, or Loch-fleer, there is a mussel bank, or *scaip*, of considerable value, though little attended to until within the two last years. The Morayshire fishermen purchase the mussels at the rate of one guinea the boat's cargo \ with this, bait, they fish on the Sutherland coast of the Murray Frith, and catch abundance or\* cod, haddock, &c, which they carry to the Inverness market, *Sec.* As soon as the intended fishing villages are established on the south-east coast of Sutherland,

and, it is to be hoped that the natives of Sutherland, will imitate the industrious habits of the Murray fishers, and consume their mussels as bait for fishing on their own shores, which will add much to their individual comfort, and to the resources of the community to which they belong.

Shoals of herrings have been seen off the Sutherland coast, opposite Helmsdale, for the last two or three years; but no attempt has hitherto been made to fish for them there.

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### *Feeding Horses, Cattle, &c.*

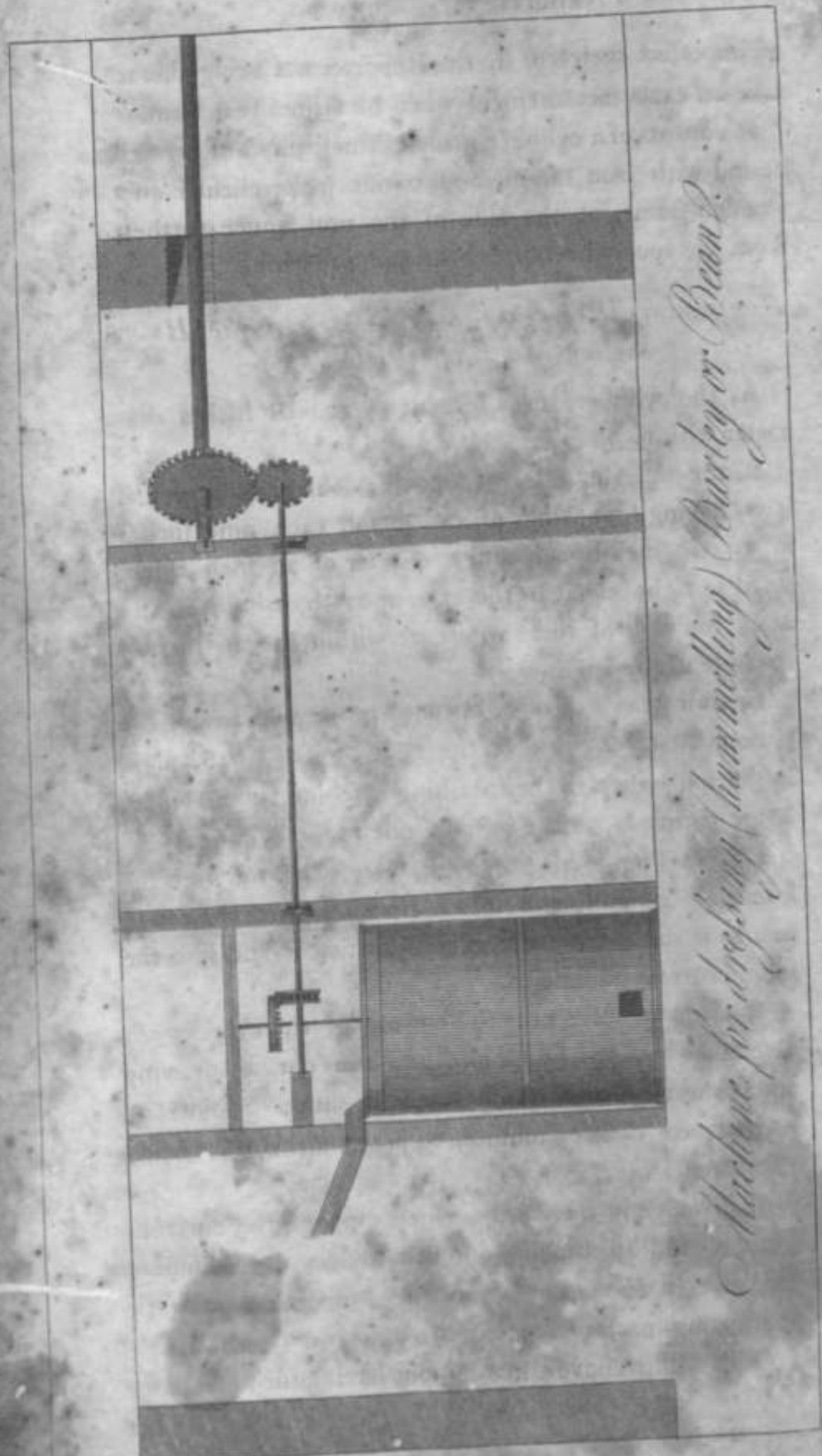
The Reporter having inquired of one of the gentlemen who have lately taken farms on the coast-side of Sutherland, if they used chaff-cutters, was answered, "We have every implement of husbandry common in Scotland: we have scarifiers and horse-hoes for our land, good Scotch carts, with cast-metal naves, draining tools, &c.; but instead of cutting our chaff, we infuse it in a steaming-machine, which gives us wort for our young stors, and divides the chaff more minutely than any edge instrument can do."

The same steam-machines prepare potatoes for their horses, one of which is erecting on the Skelbo farm; it has six steaming tubs. It is set up in a small building near the square of offices.

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### *Hummeling Machine\**

As the hummeling-machine attached to the Skelbo threshing-machine, is the first of the kind invented in Britain, that has proved successful, it is proposed to give an



*Machine for drying (hammering) Barley or Beans?*

*Trade or Service*



an imperfect sketch of it, the Reporter not being able to take an exact measurement when he visited that farm.

It consists of a cylinder made of thick staves of fir, well bound with iron hoops, and stands perpendicular in a wooden frame, at the side of the mill-fanner furthest from the spur-wheel of the thrashing-machine.

*Explanatory Reference to the Sketch of the Hummeling-Machiite. (Plate VII.)*

A, the cylinder, three feet high and 19 inches diameter within.

B, the upright axle, of one inch thick, of stanchial iron, having four wings of cast-metal, each nine inches long, one inch broad, and a quarter of an inch thick, fixed at right angles in the axle, at a; the same at b, and at c: the ends of these wings are within half an inch of the side of the cylinder.

C, an iron axle of about *one* inch *In* the side, having the pinions S, and 3, fixed on the ends of it. No. 3, plays in the spur-wheel of the thrashing-machine D, and No. 2, in the pinion J, on the upright axle in the cylinder.

E, a feeding-board or trough, projecting out from the frame of the mill, and into it a person pours the rough bear as it comes from the mill, by which it falls into the cylinder to be hummelled,

\*, a square valve near the bottom of the cylinder A, through which the hummelled bear runs out, by drawing «p a shuttle-board which keeps it shut} it must be opened nearly every minute, to prevent the grain being over done.

5, a wedge in the frame, which supports the horizontal axle\* and by drawing out this wedge, the pinion of the axle is disengaged from the spur-wheel, and the hummeling-machine stops, and *vice versns*

N. B. The above three pinions having the same num.

ber of teeth with the pinion of the drum, therefore the wings of the upright axle in the cylinder A, moves with the same velocity as the drum of the thrashing-machine does.

If the awns or beard of the ear, is not very tough or damp, the cylinder will hummel as much as the mill will thrash, in the same time ; but if tough,- the overplus may be done by disengaging the drum pinion from the spur-wheel, and yoking one horse in the machine; or a smaller quantity of water will hummel the remainder when they are done thrashing. The only risk is, that by leaving the valve to, or lo<sup>r</sup> unopened, a part of the grain may be overdone, or the skin taken off<sup>r</sup>.

The inventor of this hummeling-machine is entitled to 5 premium for his successful invention; yet it is probable that a considerable improvement may *be* made upon it, by placing the cylinder A, horizontally above the fanner of the thrashing-machine, so that the pinion 1, of the axle B, may act in contact with the spur-wheel. This would cause less friction, and render the axle Cj with its pinions, unnecessary. An iron thin bar or hoop may be fixed on the ends, or some other part, of the three sets of wings, so as to act more effectually, even than the wings now do while their axle is vertical; and the grain to be let out of the cylinder, by a longitudinal narrow board, to be occasionally drawn out of the lower side of the cylinder; and lastly, this machine may be so constructed as to be removed from the thrashing-mill when it is not required for hummeling ear or barley.

The suggestions have just occurred to **the** Reporter, on considering this useful invention, and he trusts, that it will be put in practice by **some mechanic** with the desired effect, although he by no means inserts them from any wish to depreciate the merits of the original inventor, who, he hopes, will be well rewarded for his ingenuity.

Statistical Table of the County of Sutherland, from the Reform made to Government, July, 1811, in terms of  
 Act 51 Geo. III. Cap. 6, b// Parishes, viz.

| Names of Parishes.                        | Question 1 <sup>st</sup> . |                                | Question 2 <sup>nd</sup> and 3 <sup>rd</sup> . |                       | Question 4 <sup>th</sup> , Occupations.   |  |   | Question 5 <sup>th</sup> , including Persons of whatever Age. |          |                   |
|---|----------------------------|--------------------------------|--|-----------------------|---|--|---|---|----------|-------------------|
|   | Inhabited Houses,          | Occupied by the same Families. | Houses now built.                              | Of the same Families. | Families chiefly employed in Agriculture. | Families chiefly employed in Manufactures. | All other Families not included in the two preceding. | Males,  | Females, | Total of Persons* |
| 1. Assynt . . . . .                       | 514                        | 514                            | —  | —                     | 426                                       | 11   | 74  | 1119  | 1880     | 2199              |
| 2. Clonfert . . . . .                     | 354                        | —                              | 1  | —                     | 293                                       | 11   | 8   | 721   | 918      | 1629              |
| 3. Creech . . . . .                       | 410                        | 119                            | 4  | 5                     | 328                                       | 27   | 64  | 879   | 1000     | 1009              |
| 4. Dornochtown & Ullapool . . . . .       | 601                        | 603                            | 13   | 5                     | 533                                       | 35   | 15  | 1219  | 1111     | 1155              |
| 5. Durness . . . . .                      | 223                        | 230                            | —  | 3                     | 179                                       | 18   | 39  | 508   | 647      | 1155              |
| 6. Edderachy . . . . .                    | 218                        | 218                            | —  | —                     | 161                                       | 20   | 37  | 520   | 627      | 1117              |
| 7. Farr . . . . .                         | 444                        | 449                            | —  | 9                     | 373                                       | 25   | 51  | 1030  | 1100     | 2108              |
| 8. Golspie . . . . .                      | 319                        | 322                            | 5  | 1                     | 115                                       | 93   | 11  | 1117  | 755      | 1391              |
| 9. Kilmoran . . . . .                     | 292                        | 292                            | —  | 9                     | 241                                       | 37   | 14  | 633   | 881      | 1374              |
| 10. Lairg . . . . .                       | 213                        | 243                            | —  | —                     | 150                                       | 10   | 87  | 60+   | 850      | 1354              |
| 11. Lotfa . . . . .                       | SH4                        | 284                            | 1  | —                     | 203                                       | 10   | 48  | 598   | 732      | 1030              |
| 12. R. Gartnavel . . . . .                | 432                        | 432                            | —  | —                     | 315                                       | —  | 95  | —   | 1101     | 2201              |
| 13. Toiigue . . . . .                     | —                          | 297                            | 3  | —                     | 140                                       | 11   | —   | 01U   | B63      | 1493              |
| 14. The Sutherland part of Reay . . . . . | 179                        | 179                            | —  | —                     | 150                                       | 10   | 19  | 382   | 470      | 861               |
| <b>Total in 1811</b> . . . . .            | 4814                       | 4814                           | 26   | 42                    | 313                                       | 421  | 297   | 10,488  | 11,111   | 23,629            |
| <b>Do. in 1801, Government</b> . . . . .  | 4315                       | 4384                           | —  | 9                     | 1646                                      | 270  | 424   | 10,488  | 12,692   | 23,117            |

Increase since 1801 . . . . . 95a  
 Decrease ditto . . . . . 111

Balance is the increase of population . . . . . 512

\* The other part of the parish of Reay is included in Caithness-shire.

At O NAL pi 000

The Reporter has applied again to the Parochial Schoolmasters of the county, for tables 'of marriages and births, during the two periods, ending in 1800 and in 1810; but he has not yet been favoured with any returns from them\*

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### CONCLUSION.

WHEN these extensive plans of forming villages, both maritime and inland, establishing manufactures, and encouraging the herring and cod fishery, &c. on the sea-coast of the extensive estate, or lordship of Sutherland, shall be executed, it will tend most effectually to increase the number, as well as the comfort and happiness of the population of this county; and whilst it will put an end to emigration, sheep-farming may be gradually extended in the interior of the county: thus increasing its wealth and resources, in a pecuniary and political point of view. An example will thus be given to other proprietors in the Highlands of Scotland, that it is possible to extend sheep-farming, and to increase, instead of diminishing the population and resources of a district; a measure not hitherto sufficiently attended to, with the exception of the estate of Langwell, in the county of Caithness, where the President of the Board of Agriculture proved, by an experiment on a great scale, that the Cheviot breed of sheep, would thrive on the bleak mountains of the most northern county of Scotland; and that a large proportion of the old inhabitants might be retained under the new system.

# APPENDIX.

No. L

DESCRIPTION OF SUTHERLAND, IN 1632;  
AND AN ACCOUNT OF ITS ORIGINAL INHABITANTS\*

( *Extracted from Sir Robert Gordon's History.* )

SUTHERLAND is divided from Ross-shire on the south, by the Kyle and river of Pprtnaculter, or Oickel, which falls into the Murray Frith between the town of Hornoch in Sutherland, and the town of Tain in Ross-shire\*. The tide flows up the river Oickel 25 miles to Rose-hall, where the river Chaslie joins it; thence this river Oickel bounds the county, to its source at Ken-Joch-ailsh-, then by the height of Glenmuich to Auldna-kealagach by Loch-burlan, and a rivulet running from it due west, dividing Coigach from Assynt, till it joins the West. Sea at Loch-kerkag.

Sutherland is divided from Caithness on the north, east by *the-Motid*, or mountains of the Ord, commonly called the Ord of Caithness; and the line of march runs from the Murray Frith on the south, to the summit of the hill called Knock Corric Phuil, and thence by the summit of the range of hills to the Northern Ocean, by Druim Chalasten and the Myre of Chalasten, which divides Strath-naver from Caithness\*, and Strath-naver, Durness, Edderackylis, and Assynt, (a part of Sgthexland), are bounded by the Ocean on the north and west to Loch-kerkag, as above.

Sutherland is bounded on the south, and south-east, by the Murray Frith, an arm of the German Ocean.

EXTENT

## EXTENT OF THE COUNTY.

What is called the south-east, or coast-side of Sutherland, from the Meikle Ferry, or Portnaculter, to the Ord of Caithness, is 32 miles and a half. From Dornoch Point, or the Gizzing Briggs of Portnaculter, by the river Oickel, and over the mountains to Loch-kerkag on the north-west, is 52 miles and a half; and from Loch-kerkag to Cape Wrath, in Durness; being the north-west promontory of the county, is 42 miles and a half; from Cape Wrath due east to the line of march of Druim Chalasten, where Strath-naver bounds with Caithness, along the North Sea, is 50 miles; and finally, the distance from the Ord to the junction of Druim Chalasten, at the North Sea, is 37 miles and a half, being nearly the continuance of the line from Portnaculter to the Ord.

Sutherland was anciently divided from Strath-naver by a range of mountains from east to west, viz. by the hills of Halladale, Millaninlarg Kenloch, Strathie, Keavagan, Loyni Keil, Loyn Farfiend, Derloyn, Lead Stron-ne-Garranach, equally divided by Corrie-ne-Fèan, Bein-Cherral, Bein-hie, Corrie Chrutter, Auldabanagh, Knockan Challagh, Auldmillan Ceil, and Droit Bein-Leoyd, on descending to the West Sea. Sutherland was separated from Durness by the *Diri More*, or the Great Forest; and divided from Edderachylis by the *Diri-Menach*) to the end of Kyle's-Cow, where Assynt begins. Sutherland was divided from Assynt by the Gorm Loch, Fen Loch, and Loch Markal, towards Tom-na-toin, by the Glas-bhein, lying north-west from the Bein-mhor, in Assynt, and by Strath-nardal, falling to Kenloch\*ailsh, the source of the Oickel, as before noticed.

The

The ancient name of Sutherland was *Catte*^ which included all the land lying north of Portnaculter, or, Oickel, to the North Sea, at Duncansbay-head; and that part of it lying north-east from the Ord mountains, was afterwards called *Catteness*^ now Caithness.

The most ancient and authentic accounts of its original inhabitants are thus recorded.

<sup>cc</sup> In the reign of Corbert the First, 19th King of Scotland, in\* the year of the world 4025, the 63d year of Christ, 373 years after Fergus the First had obtained the Crown of Scotland, Nero being Emperor of Rome, there came out of Germany, a certain people called *Murraysy* with their Captive, Roderick, expelled out of their native country; and being inhibited to land in France, they arrived in the river of Forth, between Lothian and Fife. These Murrays were sworn enemies to the Romans, and rejoicing to find any occasion to be revenged on them, they did entreat the King of Scots and Picts (being then ready to fight against the Romans) that they might pass foremost in the battle and if the Romans chanced to be vanquished, the King of Scots should give wives to the Murrays, that so they might increase in one blood with his people; which conditions being granted, the confederate Kings, the Queen of Britain, VoaJa, sister to King Corbert, together with the Murrays, fought presently a cruel battle against the Romans, where the Romans were overcome, and their Procurator, Catus Deciannus, wounded.

• " Then came Paulinus Suetonius, the Roman general, hastily out of France into Britain, and fought against them.

<sup>w</sup> After a long and terrible battle, the Albions were <sup>va</sup>quished, the Murrays were almost all slain, with their  
 SUTHERLAND.] M Captive,

Captive, Roderick. Voada killed herself, to escape injury from the Romans.

" King Corbert, in recompense of their good service, did give to the Murrays who escaped out of the battle, a great part of the country of *Vararis*; where they seated themselves, and married Scots wives. This *Vararis* did contain all the region lying beneath the river Spey, even to the great Ocean; and that part of it which lyeth between Spey and *Ness*, was then, from this people, called Murrays' Land, and doth retain this name into this day (1630). Gordonus Lesmoreus, in his *Chronojogie*, differeth from Flavius Josephus, Charion, and Melancthon, in computation of years, for he maketh the 63d year of Christ, wherein this happened, to be the 4064th year of the world.

•• Now the Murrays came to Sutherland in the reign of Corbert the Second, surnamed Gald, (the famous King of Scotland, whom Tacitus callieth Galgacus), son to Corbert the First. The year of Christ 91, Domitian being Emperor of Rome, there arrived in the river of Tay, a great number of Germans, named *Catii*, or *Usipii*, a valiant people of mighty bodies, who were banished out of their native land for killing of a Roman general, and his legion; Domitian having before triumphed over their nation. King Corbert Ghld received them very favourably, as his father had done those who had formerly come into the country, and did appoint them certain lands to inhabit, beneath of the Murrays, in the remotest limits of *Vararis* which lay almost void of inhabitants, and was then by them called *Cathey*. In progress of time these Cattcan Germans were called *Murrays*, for they were of one blood with the Murrays who came into Scotland with Rotkrirk: they assisted King Corbert in all his  
valorous



valorous enterprises, as the other Murray\* had done his father, and were in good reputation with him and with<sup>l</sup> all his people.

" At their first arrival in the river *lines*, now called the Little Ferry, near Dunrobin, a commodious safe harbour, their Captain went on shore to recreate himself, and to spy the land, where he was suddenly invaded by a body of monstrous large *wild Cats*, that infested the country. The *fight* between them was fierce, and continued long, yet in the end, (being grievously wounded in several parts of his body), he killed them all. From thence the Thanes, or Earls of Sutherland, even unto this day, carry in their crest or badge, above their arms, a Cat sitting, with one foot up, ready to pounce upon his prey. Some do think, that from this dangerous adventure, this country was first called *Cattiy*, for Catt, in the Gaelic language, signifies a Cat; but I do rather incline to their opinion, that as Murrays' Land was called from the Murrays, even so this country was called *CatUy*, from this people, who then arrived from *Catii*; for in ancient times, countries took their names from their inhabitants; and as the people changed, so also were the names of provinces renewed: an usual thing in those tlays, and in the beginning of the reigns of Scotland.

" But whether from this people, or from the above adventure, certain it is, that this country was then called *Caftey*, and the inhabitants *Cattigb*. Claudius Ptolemaeus, (who lived in the days of Antoninus Pius, about tta year of Christ 155), in his geographical description of Britain, calleth the people of *Cattey*, *Canta*.

<sup>ei</sup> These *Cattii* and *Usipii* were a mighty people in Germany, against whom the Emperor Domitian waged a sharp, doubtful, and cruel war, and triumphed over,, them. Of these *Catteans*, Tacitus de *Moribus Germa-*

nicum thus writeth:—<sup>c</sup> Beyond these the Cattii begin from the Hyranean forests, but have not so wide and marshy a country as the other cities, in which Germany doth open and spread itself; for the hills are one by another, and continue a certain space, and then by little and little wax thinner, and the Hyranean forest doth contain the *Cattii*, and is the bounds of their territory: they are a people hardened to labour, well sett, stern countenanced, and of great courage. As Germans go, they are sensible, wise men, and considerate; they prefer choice men, hearken to their leaders, know their ranks, know where advantages are, bridle their heat, dispose of the day to their benefit; intrench in the night, hold fortune among things doubtful, and esteem of valour as a certainty; and which is most rare, and understood only by discipline, they repose more assurance in their leader than in the army.

" ' All their strength consists in footmen, whom, besides their arms, they load with iron tools and provisions. Thou may see others go to skirmishes, but when the Cattii march to war, they seldom skirmish or fight at adventure: their horsemen are of this property, that they quickly win the victory or yield; suddenness is near to fear, lingering draweth nearer constancy; and that which is never used among other people of Germany, through their boldness and hardiness, it is grown to a common consent among the Catteans, that is, where they come to ripe years, they suffer their hair and beard to grow at length, and never put off that vowed ornament of the face, and as it were a bond of virtue, untill they have killed an enemy: upon blood and spoil they uncover their forehead, and say they have paid back the price of their birth, and think themselves worthy of their country and parents. The cowardly and uqwarlike remain in their

ill-favouredness. Besides this, every man, as he is most valiant, weareth an iron ring (an ignominious thing \$o\* that people) as it were a bond, until they rid themselves of it by killing an enemy. This quality pleaseth many of the Catteansj and as they grow grey, respected of their own people and enemies j these begin every battle; these make always the first rank, strange to behold! *Sec.*

" \* Next to the Cattii, the Usipu and Tincteri doth inhabit the Rhine, running *into* a certain channel, and which may suffice for a bond, &c.<sup>1j</sup> Thus far Tacitus.

"'From the Catii *in* Germany Crantius derives the Saxons, who being called into England by the Britons, for their defence against the Scots and Picts, expelled the Britons, and made themselves absolute lords of that kingdom."

\*\* Mercator, in his Atlas, and Charfon, *in* his Chronology, with divers others, think these Catii in Germany to be that people, who are at this day called Hessi, under the dominions *oi* the Landgrave of Hesse, in which place Mercator citeth the opinion *of the* learned Junius, Who, as may be translated, writteth in this manner of the etymology of the Catteans :

" TheCatti," says he, "whom our age and\*!ie former have called Hessi, do seem to have taken a common name with the Cats, from'the fierceness by which they did insult over their enemies \ for who is he that doth lot know the fierceness and violence of this beast, (although it be tame and domestic), in seeking to pull Kim by the throat, who by bringing it to any distress, ^ould offer it any injury ? Or from the crafty fetches ^and wilds, whereby they were wont to fly upon their enemies, as the Cats do loup upon the backs of *the mice*;

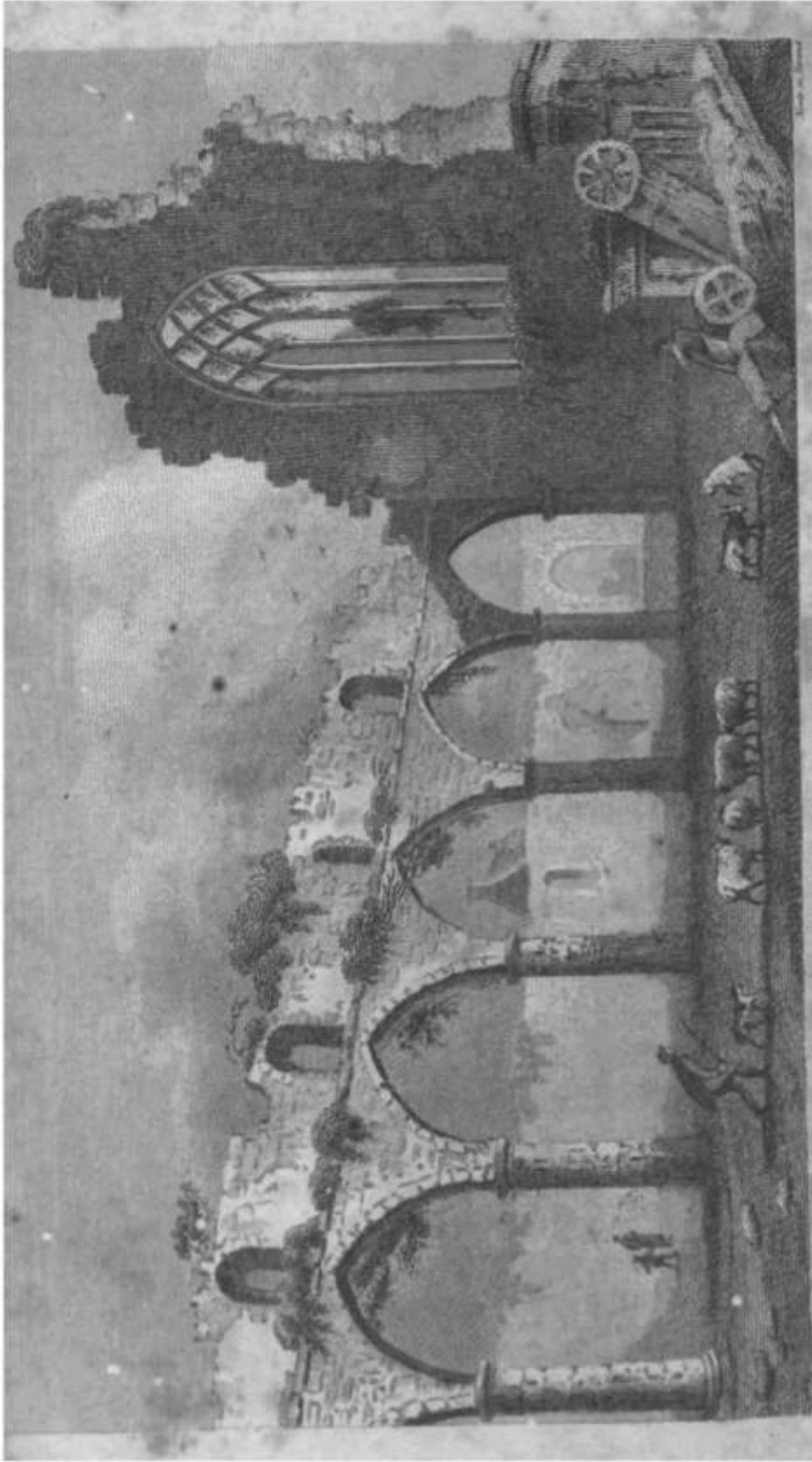
£\* such doth appear to be the spirit of that fierce and warlike nation of the Catteans. To *this* nvy be added,

that among the people of Heusden, the word Hessi is uspd for a Cat; ajx! wlienever they Would express that domestic beast, they call it Hcssie. Moreover, men surmounting to virtue might have hitherto been named by the ancients by the word Cattii. Surely you cannot learn the virtue and excellence of that nation better from any than Tacitus, who doth attribute unto them more honour, and manner of **military** discipline, than to all the rest of the Germans, &c. ? And therefore, the nature bf that people was expressed by a most fit name, whether you have respect to their fierceness, or violent assaulting, or to their excellency." Thus far iYlercator out of Junius.

" However these Cattii of Germany, for\* their fierceness or valour, have their denomination from the Cats, doubtle\* their offspring, the **Qitteen** Murrays, who did inhabit Sutherland, did call the country **Cathey**, and the inhabitants *Catiicbt* either from the people themselves, or from the killing of the Cats, on their arrival there \ and even unto this ciay the county of Sutherland is called *Cathey*, the inhabitants *Cattichy* and the Earl of Sutherland *Morrer-Chatt.*, in the Gaelic language; which language the inhabitants of the county still use\*."

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• Sec Sir **Robert Gordon's History** of Sutherland, written an. 1632; and recently published by Constable aiitl *Co.* of Edinburgh.



EAST END OF DORNOGH CATHEDRAL.

Designed by G. B. Dorr, Architect, Edinburgh, in the 11<sup>th</sup> Century, enlarged by Gilbert, Murray (Bishop of Caithness) in 1240, (Burnt by John Gilmour, Master of Caithness, in 1570, and repaired by Sir Robert Gordon, Master of Caithness, in 1670.) The West End, which was repaired, and is now the Parish Church, Caithness, 1812.

## No. II.

## ANTIQUITIES OF SUTHERLAND.

IN the year 1630-1632, Sir Robert Gordon, uncle to John Earl of Sutherland, and afterwards tutor to that noble family, wrote the History of Sutherland; in which he narrated the ancient conflicts of the Northern Clans. He states, that in the 11th century, St. Bar, Bishop of Caithness, built a church at Dornoch, called St. Bar's Church, which was the Bishop's Cathedral (*see Plate VUL*), that the Bishop's Castle, and the residence of the Canons, were built there, and that all the glass required for the church, was made by St. Gilbert, at Sidry, two miles west from the town of Dornoch. Adjoining this church, Sir Patrick Murray, between the years 1270 and 1280, established a monastery of Trinity Friars, and it was about the same time, or soon after, that Gilbert Murray, Bishop of Caithness, caused the church to be enlarged and embellished in the magnificent manner the present ruins indicate.

Tradition says, that about the same time, a brother of Bishop Murray's fell at the head of a chosen band of men, when repelling a body of Norwegians or Danes, who had landed at Ferry Unes, near Embo, to pillage the country; and that a monument to his memory was placed near the font, in the east aisle of the cathedral. In that Place is still lying in the earth a mutilated, but well-carved, figure of a warrior, in *alto-relievo* (see *nefc A* on the annexed view), which formed the lid of a stone coffin. This was the most honourable mode of sepulture at that time, and is therefore no doubt the monument of **the** warrior alluded to. Many stones, with curious carv-

ings on them, are scattered in the ruins of this cathedral, of which some specimens appear in the annexed sketch of it.

Where the battle was fought at Embo, there is a stone, with the figure of a cross, erect in the ground, called *Croisen Righ* (the king's cross), where, by the same tradition, a king or chief of the Danes was killed and buried.

In 1570, John Sinclair, Master of Caithness, and Jye Mackay, of Strathnaver, came with d banditti to Sutherland, plundered the town of Dornoch, and burnt the church, which church was repaired by the said Sir Robert Gordon, who had interest enough to obtain the erection of Dornoch into a Royal Burgh.

In those days four fairs were held at Dornoch annually, viz. Sr. Gilbert's fair, the 1st of April; St. Margaret's, 20th July, St. Bernard's, 20th August; and St. Bar's, 10th October. To these fairs, a great concourse of people convened for traffic, from all parts of the kingdom. The other feirs are, St. Andrew's at Golspie, St. Tewgnach's at Criech, St. Callin's at Rogart, St. Maria at Lairg, St. Alayn's at Clyne, St. Cardin's at Kilmaly and at Loth, St. Doñan's at Kildonan, Our Lady's at Brora. Brora was erected a Burgh, by John Earl of Sutherland, in 1620.

*Chapels in Sutherland in 1630.*—At East Garty, one built by Magdalen Baillie, Countess of Sutherland; one at Naviedale, dedicated to St. Ninian, where in old times there was a Sanctuary; one at Wester Helmsdale, called St. John's Chapel, at Kinauld and Golspie, dedicated to St. Andrew; and one at Kilcolmkill, dedicated to St. Columbo.

Sir Robert describes the forests of Sutherland in 1630, thus:

thus : " There are several forests in Sutherland, beside Scottany in Strath Brora, Tuary in Strath Ulli, Glen Shin, on the river Shin, and divers other particular chases; and hunting places full of woods and rid deer, to wit, the forest of Diri Chat, in the parish of Kildonan, wherein are contained the hills called Bcln-arnúns Diri Menach, in Lairg parish, containing Cori Kenloch, and Diri More (Great Forest); also in Lairg parish, Beinhie, &c. All these forests are profitable for finding beastials, and delictable for hunting; they are full of rid deer and roes, wolfs, foxes, wild-cats, brocks, squirrels, whitrets, weasels, otters, martins, hares, and fumerts. In these forests, and in all the province, there is a great store of partridges, plovers, caper'-caills, black-cock, moor-fowl, heath-hen, tarmakins, swans, banter, turtle-doves, stears or sterling, lair flich, or knag, (which is a bird like a parrot, that makes her nest with her bill in the oak-tree), duck, drake, widgeon, teal, wild-goose, rein-goose, roe, whicaps, woodcock, lark, sparrows, snipes, black-birds or oisles, mavis or thrush, and all other wild-fowl and birds, to be had in any other part of the kingdom. In the Diri Moce, there is a mountain called Arkel; all the deer that are bred therein, have forked tails three inches

»

long, whereby they are easily known from any other deer.

" There were excellent pearls found in Loch Shin, that were sent to the King at London.

*"Mines.—In 1620 Sir Thomas Menzies, provost of Aberdeen, found a silver mine in Sutherland; heft it assayed in London, and found it very good; but on his return he died, and the mine lay undiscovered, as he did not point it out to others before he went to London.*

« TITere



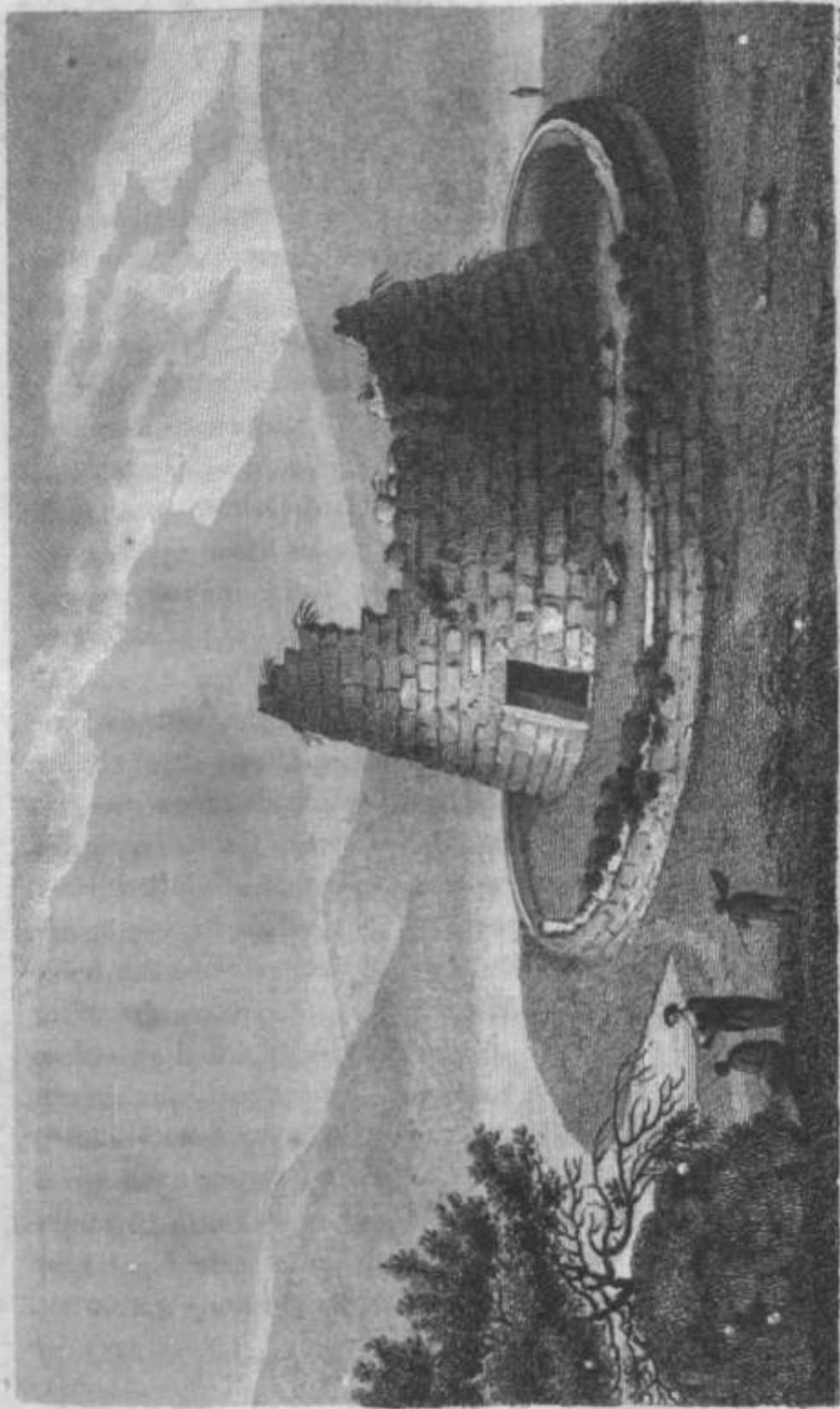
" There is iron ore in Sutherland, of which the inhabitants made iron."— *Sir Robert Gordon's JMSS.*

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### COLE'S CASTLE,

Upon a rock in the black water of Strath-beg, about \* mile and a half north from the junction of that river with the water of Brora, stand the ruins of *Cole's Castle*, a view of which is annexed (see *Plate IX.*) It is a circular building, 54 yards in circumference round the base on the outside, or 18 diameter; and 27 yards circumference, nine yards diameter within, by which it will appear that the walls are 4£ yards, or 13½ feet thick in the base; built of large stones, well connected, without any cement. The building has a batter or inclination inwards, of nine inches in every three feet in height. The door on the south-east side is 3½ feet high, and 2½ feet broad. In the middle of the wall on each side of the passage by the door to the interior, is a small apartment, about six feet square and five feet high, as if intended for a guard to watch the entry. The highest part of the wall is 11 feet, but old people remember it twice that height.. It is destroyed by the wantonness of cow-herds throwing the materials off the walls into the river. Beyond this building, and six feet from the wall, are the remains of an outer wall, which surrounded the castle, and an oblong garden of 27 yards long and 18 yards broad, to the verge of the rock- This wall seems to have been joined by large flags to the wall of the castle, leaving a passage of six feet broad by seven feet high between the two walls, where it is said they kept their cattle in the night time. In the face of the rock, at *a* is an oblong seat, where tradition

*Southwell Repert.*



*CASTLE COLE, AN ANTIENT CIRCULAR BUILDING,  
on the Black Water of Strathbeg in the Parish of Ullapool in the County of Sutherland.*

tradition says, *Cole* used to rest himself, fronting the meridian sun, and that there he was slain with an arrow from the bow of an assassin, and that when *Cole* felt the wound, he struck his hand upon the rock, which made such an impression, that it remains there to this\* day.

A ditch appears to have carried the water of the river round to the land side, which is now filled up with rubbish. \_\_\_\_\_

There are the ruins of the Pictish buildings, now called *Cairns*, or *Dūnes* at Dunrobin, and on the several straths connected with the south-east and north coasts of this county. In the parish of Golspie, near Craigton, subterraneous buildings have been discovered, having a small oblique entry from the surface, of about 2 feet in the side of the square, which after advancing three yards, widens to about three feet in the side of the square, which winds a few yards to an apartment of about 12 feet in the side of the square, and nine feet high, covered on the top by large broad stones, which terminated in one stone like a mill-stone, with a hole in the centre, probably to emit smoke. A passage from the room led to other rooms, inaccessible, owing to the earth falling in.

At Bakies, above Dunrobin, is a very large cairn, with subterraneous passages, now choaked up.

At Kildonan, is a cairn on each side of the river, with a passage said to be under the river from the one to the other. On a high rock between Naver and Torsdale, are the remains of a large circular building, and the rock on which it is built is very difficult to ascend.

At Shyberscross there is a large circular cairn, and on a high heathy hill near it, there are about 50 round tur uli, in regular order, at about 12 yards distance from each other; and in front of them, a few yards lower down the hill, are the remains of two square forts, 10 yards in the side,

side, having angular works on the corners. This seems to have been an encampment in some remote period, of which the people there have no tradition. There are remains of such encampments on Strath-fleet, Brora, &c.

Dun-Dornadil, and Castle Cole, are the only buildings of the circular kind that are not reduced to a heap of rubbish, within this county.

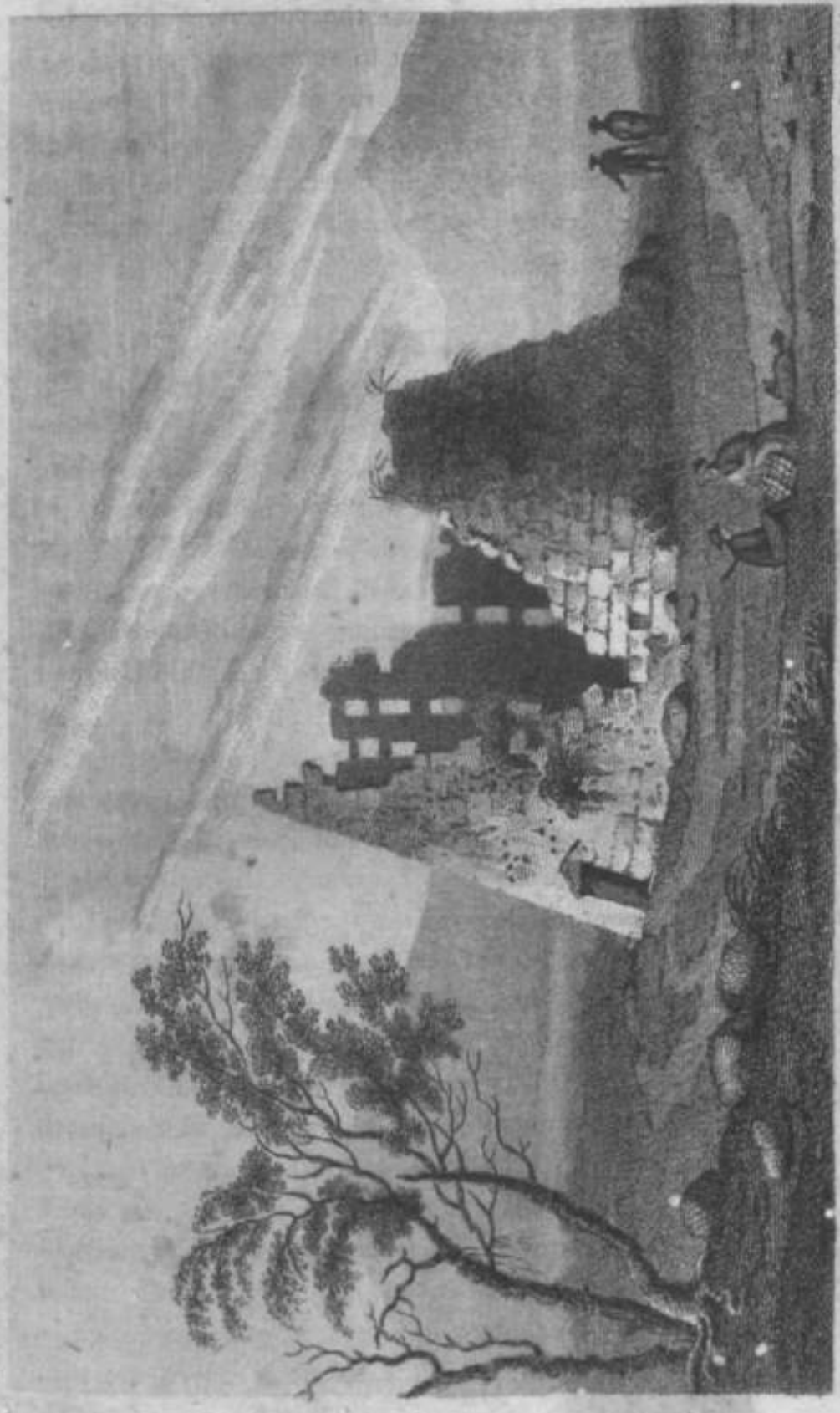


### DUN-DORNADIL.

*Dun-Dornadil*, or *Dornadill's Tower*, in ruins, stands in the valley of Strathmore, in the parish of Durness. A sketch of the ruins is annexed, (see *Plate X.*) which is a complete specimen of ancient Pictish architecture. Some old people in the parish remember a part of the walls 80 feet high; but the same cause that demolishes Cole's Castle, equally injures this residence of the ancient Chiefs of the Fingalian race.

It is evident, that at the period when this fabric was reared they had no instruments of iron; not a stone of them is moulded by a hammer, nor is there any fog or other material used to fill up the interstices among the stones; yet the stones are most artfully laid together, seem to exclude the air, and have been piled with great mathematical care, else could they have remained in a tower like this, thirty feet high, so as to have withstood the casualties of more than 1000 years? In the ninth century, when the communication of these northern territories with the continent freely opened, they could not fail to learn the use of cement in building, if they had not before discovered it; and to obtain instruments of iron. From these circumstances we may be enabled in some measure to ascertain the so-much contested era of  
Ossian's

*Dublin and Report p. 270.*



*Printed in Scotland.*

*DUN DORNADIL, or DORNADILLA'S TOWER,*

*in the Parish of Strathmore, County of Down.*

Ossian's heroes, as well as that of the Fictish towers. The car-born Chief, implies a proficiency in arts, almost incompatible with a state of life where the application of metal is unknown. The Bards were men of renown at the above period, when the Scandinavian adventurers infested the northern coast of Scotland, and the Western Isles: the commanders of fleets and the leaders of armies carried them along to celebrate their achievements, and to narrate the difficulties and dangers which their fortitude and prowess overcame\*. The same enthusiasm which inspired the Bards in the day of battle, would lead them to indulge the expression of softer sentiments in days of ease, and strains of lamentation in the pensive hours of sorrow. These hereditary songs were preserved by oral tradition, and many of them were put upon record by a Danish historiographer in the Island of Flota, one of the Orcades. Perhaps the poems attributed to Ossian, the son of Fingal, are the productions of various bards, preserved in the above channel of oral traditions: even to this day, some Highlanders are at equal pains in teaching Ossian's poems to their sons, as in teaching them the principles of the Christian religion.

A particular description of this structure, its romantic situation, and external form, is given in the article *Dun-Dornadilla*, p. 105, &c. of "Antiquities and Sceneries, by the Rev/Charles Cordiner, of Banff." It is celebrated as a place of renown by an ancient Erse ballad of a few lines, of which the following is a translation.

" Seven miles from Ocean, in the cheerful dale,  
 " 'Stands the large tower where Dornadilla reigns;  
 "\* From whence, when war, or civil feuds prevail,  
 " The warriors jdbur into the Caithness plains."

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\* See Torphei's Authority, Antiquities and Sceneries, of Scotland, P. 150.

## No. HI.

*Hints regarding the State of the Parish of Kildonan.*

As the report received from the Rev. Mr. Sage, Minister of Kildonan, shews how the Highlanders lose by keeping an over stock of cattle, and how the decay of their natural woods (with which their valleys once abounded) diminishes the quantity of grass, as well as shelter, &c. I think it right to insert it here, *verbatim*. It is as follows.

" The parish of Kildonan has, in the course of the last three years, undergone a very great alteration, with regard to their stock of every sort of cattle. In harvest 1807, the inhabitants sustained almost a general loss of all sorts of crops. In spring 1808, from a general loss of all sorts of cattle, cows, horses, sheep, and goats; and from the great quantity of victual required by the parishioners, and the very low price of cattle in the years 1807 and 1808, the inhabitants were reduced to less than half the stock they used to have. In spring 1808 there were at least lost within the parish of Kildonan, 120 milch cows, 500 yell cattle, small and great, and about 300 horses.

" From these causes, and three pendickfs or farms occupied by about 26 tenants, being let to sheep-farmers, (\* e. Halmydary, Scisgill, and Towary), the population is decreased. In the course of the last two years, upwards\* of 40 families (making an average of five persons each) emigrated to Aberdeen, and several other towns in the south of Scotland; many of whom were obliged to solicit aid from their friends, and well-disposed people, to transport them to Aberdeen, &c. That through the distressed situation of the Highlanders! tha,

loss of their horses, the weakness of those that escaped, the scarcity of food and seed, the labouring in spring 1808 was very deficient, but what was laid down, proved a tolerable crop; and as the low country had a good crop, no serious want was felt the immediate last summer. That in spring and summer 1808, there were upwards of 1000 bolls of victual bought by the inhabitants of the parish of Kildonan, (a great part of which was imported by the factor for the family of Sutherland), and divided among the people, according to their consumption, which, with the considerable augmentation of their rents, which were every where doubled, and in some places trebled, and took place in harvest 1807, with the other circumstances above alluded to, reduced the greater part of the tenants to a low extreme; but the kind interposition of Providence, in giving this year (1809) a favourable seed-time, they got their small crops completely down, and have the finest appearance ever seen in the place (and, barring mildews; to which most of their lands are subject), they will have some chance of retrieving yet, notwithstanding the uncommon disasters which they experienced.

" The brisk demand for black cattle this year, will enable the greater part of them to pay the great arrears into which they have fallen in the course of the last three years 5 and another occurrence which contributed to their relief this year, is the number of Irish horse-jockies who came to the county, and bought all the old horses (*garrons*) they could find, at a tolerable good price, with all the refuse of that species of animals, and in short, every sort they could procure. And this circumstance will not only help them to pay their rents, &c. In the mean time, but will enable them hereafter to rear  
more



more black cattle, which is by far a more profitable kind of stock for the Highlands, than horses.

• There is another remarkable alteration on the face of this part of the cuncy in the course of the last 20 years: the woods, with which a great part of the straths were covered, are naturally decaying, and this is attributed to the uncommon severe frosts, and storms of snow, that happened of late years in the months, of April and May; and a striking proof of this took place last May, when the woods and shrubs were in the most thriving state they ever were seen, a severe storm of frost and snow came on, which blasted a great part of the natural woods irretrievably. This decay of the woods is against the rearing of cattle 5 for while the woods were thriving, a great many of the inhabitants out-wintered their cattle till the beginning of January, whereas they must now house them in the beginning of November; and where the wood wasted away, it is overgrown with coarse strong heath, in place of the fine strong grass with which the woods abounded, which occasions a degeneracy of black cattle in the parts that were formerly covered with wood.

<sup>a</sup> With regard to the state of agriculture in this place, its local properties, particularly in the height of the strath of Kildonan, will not admit of doing any thing considerable or effective in this way, as the quality of the soil is bad, lying on a rugged bottom interspersed with rocks, hollows, links, and braes, except some dales or plains on the water-side, which are generally a poor sandy, insipid sort of soil, subject to speats, (floods) or mildews; yet in the course of their last leases, the tenants have forced a good deal of land out of the skirts of the moors lying next their arable land \ but since their leases a<sup>^</sup>e out, their exertions are slackened, and keeping tenants in a  
state

state of suspense, is a ready way to ruin the tenants and hurt the proprietor's interest. Roe and deer, with which the forests of this county abounded, a part 'of which was in the height of this parish, are extirpated» its now rare *to* see one of them, even in the heart of the forest, excepting a few straggling ones, hunted from place to place.

" About three year; ago, an epidemical distemper was discovered among the moor-fowl (grouse), of which the most of them died; many of them were *seen* falling dead an the flight: this preceded the loss of cattle. In the lower part of this parish, the soil, though liable to mildew, is fertile, and produces good crops. There was a victual-rent paid to the proprietor prior to 1727, called tiend-meal, which was singe converted, for the convenience of the proprietor and tenant.

" ALEXANDER SAGE,

\* Minister of Kiitlonau."

No. IV. Statistical Table of the County of Sutherland, by Parishes, from the year 1798, in 1798.

|                             |                                |  |       |
|-----------------------------|--------------------------------|--|-------|
| MOOJ<br>aqi jo ainojii]     | *S 0 0 0 0 0                   | < I   S ° 2     ° I I   ° I                |       |
| *eui[i^i]                   | Annual Col.                    | j 1 12 [ 2     o I       ]                 |       |
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| •jno,t<br>jo jaqmnji        | ^s? in it*                     | K n o 1 « 5 1 I 1 i-w                      |       |
| Schoolm-<br>ters' Salaries. | 4 I . - M I I I U M            | K < 5 I Q Hi                               |       |
| jo jatjirifj                | Scholars.                      | 1 v 1 1 I 1 1 1 0 : 1 v                    |       |
| penda.                      | Ministers' Sal-                | s 0 0 0 K C O C 0 0 0 0 0 C K              | 4     |
| Real Rents,<br>Sterling.    | SO 0 0 0 0 0 0 0 C O v To O K* | ^ 0 0 0 0 0 0 0 0 0 0 « n Ci               | 584   |
| *sioag                      | Decrease.                      | 0 >>                                       | 1     |
| Increase.                   | HI uoi ivjmllo^                | 0 ! c 1 ° 6 r - A < 0 c                    | 584   |
| 'SLL\                       | oi uoinijtuioj                 | »p *p »ft ( O O p a 8 6 9 r t a . ^ o . x* | 20, ^ |
| Parishes.                   |                                | 1 1 F 1 i j 1 1 1 M . 1                    |       |

|   |        |
|---|--------|
| Population In 1775,.....                            | 20,774 |
| Ditto in 1790-1798,.....                            | 22,361 |
|   |        |
| Increase, .....                                     | 1687   |
|   |        |
| Increase on the whole, .....                        | 2530   |
| Decrease on the whole, ».....                       | 94,3   |
|   |        |
| Increase,.....                                      | 1587   |
| Dornoch, the only town in the county, about         | 500    |
|   |        |
| Consequently in the county part and small villages, | 21,861 |

The valued rent of each parish not known to *Sir John Sinclair*; but the total valuation of the county, is in Scots money,.....£26,193 9 7

(Sterling, 2182/. 15s. 9d. V/.)'

|  |         |    |    |
|--|---------|----|----|
| OS which the Sutherland estate is .....  | 16,024  | 6  | 1  |
| The Reay estate.....                     | 3556    | 0  | 0  |
| Skibo, Pulrossie, and Newtown,.....*     | 1904    | 11 | 2  |
| Bighouse,.....                           | 900     | 0  | 0  |
| The Strathy estate,.....•.....•          | 564     | 0  | 0  |
| Pronsy, Rearquhar, and Palgrudy wadsets, | 530     | 0  | 0  |
| Xoyjitzieici, .....                      | 1017    | 4  | 45 |
| Balnagown,.....                          | 431     | 18 | 0  |
| Rose-hall,.....«.....                    | 400     | 0  | 0  |
| Cadboll, .....                           | 354     | 0  | 0  |
| Embo,.....                               | 346     | 0  | 8  |
| Ospidale and Ardeans,.....               | 213     | 6  | 8  |
| Pririt .....                             | 0       | 0  | 0  |
| Achany,.....                             | 100     | 0  | 0  |
| Melness wadset, .....                    | 91      | 13 | 4* |
| Over-Skibo, .....                        | 71      | 0  | 4  |
|  |         |    |    |
| Total,.....                              | £26,193 | 9  | 7  |

Fourteen proprietors and four wadsetters.

Freeholders in 1790, 35.

Real rent, 9764/. 12j. 5*d.*; including itnt of Dor\* noch, perhaps 200/., and fisheries, 37?/. 6/. 8*rf.*

Ministers' stipends, S84/ 13J. 4*d.* ; average, 6*L* 1/.

Number^of scholars in three parishes, 120; in the whole county, supposed 700.

Sr <sup>1</sup>listers' emoluments not **particularised**\* perhaps 32/ each > 13*d*/ altogether, including salari<sup>1</sup>.

Number of poor in seven parishes, 429 ; in the whole county, computed at 800.

Capital of poor's funds in three parishes, **114/.** 10/.; scarcely any in the others.

Income of 379 poor only 46/., or 2*x.* 6*d.* each.

Extent, according to Sir John Sinclair, 2310 square miles, 1,175,790 Scots acres, or 1,478,400 English acres.

*Stock.*

|                                 | <i>Thrstt.</i> | <i>C.tfth.</i> | <i>Shetp.</i> | <i>Coat-</i> |
|---------------------------------|----------------|----------------|---------------|--------------|
| Assynt,.....                    | 384 ....       | 3840 ....      | 3840 ....     | 1024         |
| Clync,.....                     | 700 ....       | — ....         | 4000 ....     | 400          |
| Criech,.....                    | 1531 ....      | — ....         | 4000 ....     | —            |
| Eddcrachylis, . . . . .         | 351 ....       | 2753 ....      | 2629 ....     | 1307         |
| Farr,.....                      | 200 ....       | 1500 ....      | 600 ....      | 220          |
| Golsple,.....                   | 350 ....       | 1100 ....      | 1000 ....     | —            |
| Kildonan,.....                  | 812 ....       | 2479 .»        | 5041 .....    | 570          |
| Loth,.....                      | 500 ....       | — ....         | 17,50 ....    | —            |
| Tongue,.....                    | 538 ...»       | 2142 ....      | 2846 ....     | 714          |
| Clyne, Criech, and \            |                |                | <sup>m</sup>  |              |
| Loth, supposed                  | — ....         | 3000 ....      | — ....        | «—           |
| about •...*,...• *              |                |                |               |              |
| Nine parishes, . . . . .        | 5366           | <b>16,814</b>  | <b>25,706</b> | 4235         |
| The other four pa- <sup>l</sup> | <sup>q</sup>   | 7478           | 11,424        | 1992         |
| risfies supposed •>             |                |                |               |              |
| % Total Stock,                  | 7736           | 24,287         | 37,130        | 6227         |

APPENDIX.

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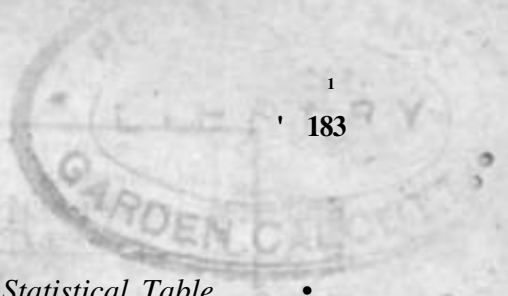
|  |          |       |   |
|--|----------|-------|---|
| 7736 horses, at 2l. 10s.....                     | ^£19,340 | 0     | 0 |
| 24,287 cattle, at 2l.....                        | 48,574   | 0     | 0 |
| 37,130 sheep, at 5s.....                         | 9282     | 10    | 0 |
| 6227 goats, at 5s.....                           | 1556     | 15    | 0 |
|  |          | <hr/> |   |
|  | £•78,753 | 5     | 0 |
| In Lord Reay's forest, &c. 2000 red deer, > 200Q |          | 0     | 0 |
| stags, &c. ....                                  |          |       |   |
|  |          | <hr/> |   |
|  | £80,753  | 5     | 0 |
|  |          | <hr/> |   |

No. t.

Statistical Table of the County of Sutherland, so far as, the Reporter was favoured with Answers from the Clergy of that County in 1808.

| 1.                  | 2.    | M     | A.     | 1     | *.1       | 6.                  | 7.                   | 8.                            | 0.        | 10                  | f II.           | IB.                      | 13.                  | H.     | 15. | 16. |
|---------------------|-------|-------|--------|-------|-----------|---------------------|----------------------|-------------------------------|-----------|---------------------|-----------------|--------------------------|----------------------|--------|-----|-----|
| Parishes.           | Vol.  | PiffC | do     | do    | Increase. | Valued Rent, Scots. | Real Rent, Sterling. | Boils of V...<br>tual-Stipend | Iti       | Number of Scholars. | Number of Poor. | Annual Col-<br>JecLions. | ec.                  |        |     |     |
| 1. Assynt - -       | XVI.  | 163   | 8000   | 5G00  | 200       | £. 2CJF7 13 4       | 7:700 0 0            |                               | 87 4      | 200                 | 100             |                          | 3 0 0                |        |     |     |
| a. Ciyne - -        | X.    | E98   | 1060   |       |           |                     | •10J0 0 0            |                               |           |                     |                 |                          |                      |        |     |     |
| 3. Cnech - •        | VIH.  | 3G2   | 1734   | 1530  | 200       | 20SJ 19 0           | MJ00 0 0             | SO                            | 55 13 4   | f 20                | 15 0 0          | 0i*»                     | 9 0 0                | 9 0 0  |     |     |
| 4. Durness ~ -      | fit.  | 57«   | 1182   | J 114 | 68        |                     | * 900 p 0            |                               | •16 1:1 4 | f RO                | 15 0 0          | 0!S                      | 0 C 70 57 10 03 12 6 | 5 10 0 |     |     |
| 5. Dornoch -        | VIII. | 1     | 2541   |       |           |                     | "•2000 0 0           |                               |           |                     |                 |                          |                      |        |     |     |
| 6. Fdderachylia     | VI.   | *7B   | 1024   |       |           |                     | • 5.10 0 0           |                               |           |                     |                 |                          |                      |        |     |     |
| 7. I-arr - - -      | HI.   | 538   | S600   |       |           |                     | *2000 0 0            |                               |           |                     |                 |                          |                      |        |     |     |
| 8. Goispie - - -    | [X.   | 26    | 1700   | 1710  | 10        |                     | 1700 0 0             | 128                           | r2 0 0    | 60                  | 27 17 4         | 70 53 1^ 0 14 6 .5       | 17 0 0               |        |     |     |
| 9. Kildonan - -     | lit.  | 405   | 13K3   |       |           |                     | NO00 0 f             |                               |           |                     |                 |                          |                      |        |     |     |
| 10. l,«lrg - - »    | XL    | 569   | I35(   |       |           |                     | •1000 0 0            |                               |           |                     |                 |                          |                      |        |     |     |
| 11. Loth - - -      | VU    | 311   | 1370   |       |           | 2G64 4 8            | *1000 0 0            |                               |           |                     |                 |                          |                      |        |     |     |
| It-1. Rojji-nrt - - | UL    | 563   | 2000   | 1800  | J00       | 17«1 0 0            | 1166 12 6            | SO.*                          | 75 0 0    | SO                  | SO 0 0          | 48                       | a o 0                | 8 0 0  |     |     |
| 13. Tongue - -      | III.  | 517   | H;J9   |       |           |                     | • SM 0 0             |                               |           |                     |                 |                          |                      |        |     |     |
|                     |       |       | 22,361 |       |           | 26,103 9 7          | 16.2J 6 IS           |                               |           |                     |                 |                          |                      |        |     |     |





*Observations on the preceding Statistical Table.*

Columns 1,2, and 3, contain the names of the parishes, and the volume and page of the Statistical Account of Scotland, in which a description of each parish is to be found.

Columns 4, 5, 6, and 7, contain the population of Sutherlandshire in 1790-1798, and that of five parishes in **1807-1808**. I received no return from the other parishes, although I took the liberty twice, of writing to the Ministers of each parish on this subject. These five parishes shew a decrease of 258 in their population, equal to an average of 51 decrease in each parish ; but had I received returns from all the parishes of the county, the average decrease would be much greater. This is principally owing to the extension of sheep-farming in this mountainous district. The decrease of population would appear greatest in the parishes of Lairg, Edderachylis, and Farr, and even in Kildonan.

The population of this county in 1790-1798, was 22,361  
 It may be supposed in 1808, at about . . . . . 21,260  
 (500 of whom may be in Dornoch, the only town within the county.)

Decrease since 1798, about . . . . . 1101

Column 8, contains the valued rent of the county of Sutherland, as entered in the records of the Exchequer at Edinburgh, amounting to 26,193/. 9/. 6d. Scots, or 2182/. 15/. 6d. sterling. Strath-halladale is included in this valuation, though a part of the parish of Rca, in the county of Caithness; but as I could not obtain any account of the valuation by parishes, it makes little difference,



difference, as Strath-halladale, or the Bighouse estate, is a part of the county of Sutherland.

Column 9, contains the real rent of the county, calculated in such parishes as have sent *no* returns of that particular (marked thus \*), at die progressive rise or difference of the rent, betwixt that in 1798 and in 1808, in the three parishes from which returns were received, which, upon the whole, is about the rent of the county, from the best information I could obtain, amounting in all to.....sterling, £16,216 12 6

|  |       |   |           |
|--|-------|---|-----------|
| The salmon fishery on"}<br>theriversHelmsdale, f ^<br>Brora, Shin, and Na-1 *<br>ver,.....%o%J     |       |   |           |
| .The fishery of Tors-^<br>dale, Hope, and Di-f<br>liart rivers, on Lord C<br>Reay's estate, .....J | 150   | 0 | 0         |
| J)o. on the Bighouse,^<br>and Assynt rivers, }<br>supposed about. ....J                            | 50    | 0 | 0         |
| The Kelp shores on the }<br>Reay estate.....3  | 30    | 0 | 0         |
|  | <hr/> |   |           |
|  |       |   | 1750. § 0 |

The balance is the land rent, includ- }  
 ing about 200/. rent of houses in } jgl 4,466 12 6  
 the town of Dornoch, ..... ^

Column 10, contains the stipends of five of the Clergy of the Established Church, who made returns of their income, or stipend, exclusive of their glebe, which ought to contain eight acres of arable land, or an equivalent of Inferior ground. I find that the stipend of these five Minister\*

Ministers in 1790 was 352*l.* sterling, (stating the Assynt stipend the same as now returned, viz. 87*l.*), and their present stipend appears to be 244*f* bolls of victual (oat-meal, and bear, or big) and 296*l.* 11*l.* sterling; and converting the victual, at 20*l.* per boll, both amount to 541*l.* the present stipend of the five Ministers, making an average of 109*l.* each\*

I find that in 1790, the stipend of the 13 parishes was 8847*l.* sterling; therefore *as* 52*L* : 54-1*l.* :: 884-*l.* : 1356*V*, 15*l.* the supposed present stipend of the 13 parishes, to which add 130*l.* for the thirteen glebes (I will *not* include about 45*l.* for communion elements, as that is expended, not for the Ministers, but the parishioners), which makes 1488*l.* for the whole, or an average of about 114*l.* sterling each of the 13 Ministers.

N. B. The Sacrament is administered only once in two years in the parishes of this county, to save expence!

There is a Missionary who assists the Ministers of the extensive parishes of Durness, Edderachyiis, and Assynt, and receives 50*l.* per ann. from the Society for Propagating Christian Knowledge. There is another Missionary in the highland part of the parish of Farr, who receives an annual allowance from the above Society, and *from* the Marquis of Stafford, the proprietor. There are none of any other religious persuasion in this county, all are of the Established Church of Scotland and perhaps there is no other county in Scotland, whose inhabitants are so unanimous in religious concerns. There are one or two Society Schools in each parish; and in Durness, and some others, a salary of 5*l.* to 8*l.* is given to women who teach the female children of poor parents.

Columns 11 and 12, contain the number of scholars\* and the income of schoolmasters, for five, parishes from whom

whom I had returns: the numbers (marked thus\*) are Society Schools, and those not marked, are Parochial Schools, except Assynt; the Minister of that parish gave the aggregate number of scholars in the parochial and other schools. I find the number of scholars in these five parishes to be 444; the population of the five parishes is 9354, of course the scholars are to the inhabitants in the proportion of about 1 to 21. This proportion would make the number of scholars in the county 1012.

The salaries of six schoolmasters, in column 12, amount to 119*l.* 8*d.* which divided among six, gives the average of 20*l.* nearly to each schoolmaster; but the society schoolmasters, receive school fees of from 6*d.* to 1*s.* 6*d.* per quarter, from such as can afford it. The average income of the schoolmasters of all the county may be estimated at 24*l.* each.

Column 13, contains the number of poor in the five parishes from which I received returns, viz. 346, which is in the proportion of 1 to 27 by the population of these five parishes; but I believe that had I received returns from the 13 parishes, the proportion would not be so great; it might be perhaps about 1 to 32.

Column 14, is the capital stock of two parishes, viz. 111*l.* 2*s.* the other three returned have none. The annual collections in five parishes is 33*l.* 15*s.* *lid.* as per column 15. The total income of the poor in the five parishes, column 16, amounts to 42*l.* 10*l.* annually, or 2*l.* 2*d.* for each of the 346 poor in these parishes. A very small allowance indeed!

There are a few pounds annually collected in each parish, from fines for anti-nuptial delinquency; the usual session censure is commuted for the payment of one or two pounds for the poor of the parish. The poor derive

derive their principal support from private charity; they go begging through the county, and even the county of Caithness, where they collect meal, &c. every housewife gives them either meal or other sustenance; and such of the poor as are confined to their houses by sickness or otherwise, are supported by the humanity and benevolence of their nearest neighbours, who send them food, &c

*State of Property\** See p. 40.—The names of the Proprietors are very diversified, not three of one surname except *Munroy* and their proportion of the property but small. The lordship of Sutherland is by far the largest estate : next to that is Lord Reay's.

The prevailing surnames in the county, are Murray, Mackay, Sutherland, Grant, &c. This is one evident proof of the county being originally occupied by the jCattean Murrays from Germany, as stated in No. I. of this Appendix\*

*Extent of the County.*—In the Original Report of the county of Sutherland, it is stated at 2310 square miles; 1,175,790 Scots acres, or 1,478,400 English acres. From the best information I could collect, as to the distances in miles, and the most correct calculation, made both by triangling the map, and covering it with fine paper, which I carefully weighed and calculated, I make it to contain 2925 square miles—equal to 1,872,010 English statute acres, or 1,497,600 acres, Scots measure in the proportion of four to five, which is nearly the ratio of the two measurements).

|  | <i>Scotch Acrest</i> |
|--|----------------------|
| Of which arable land under wheat, barley, oats, potatoes, pease, or grass, may be computed about.....                              | 14,500               |
| Green pasture and haugh meadow ground, about.....  | 35,000               |
| Plantations of fir and hard wood, about 936; natural wood or shrubbery in the straths of the several rivers and rivulets, &c. .... | 2286                 |
| Mountains, hills, moss, salt and fresh water lakes, &c. ....   | 1,497,600            |
| Total.....   | 1,497,600            |

The above calculation is, however, made on very general grounds, as must be expected in a county where but a small proportion of it has been measured; the arable land, is computed from an idea of the rent per acre; the pasture from a mere comparative conjecture from travelling over the county; the fir plantation partly from measurement, and the natural shrubbery altogether from a conjecture of its apparent extent: this latter is rapidly decaying -, but many parts of the straths on the south-east side of the county would do well for plantations of fir, oak, &c.

*Live Stock.*—People in general are strongly prejudiced against giving information on this head: the more superstitious consider it unlucky; others suspect a design of imposing new taxes, &c. The ministers of parishes, aided by their elders, are the only people who could obtain any correct account of stock, but it is attended with more trouble than many of them would choose to take.

I received returns of stock from only three parishes, which I will state, with that of the same parishes in the statistical account of Scotland in 1790, viz.

| Parishes,               | Per Return"; in |         |        |        | Per Returns in 1808. |         |        |        |
|-------------------------|-----------------|---------|--------|--------|----------------------|---------|--------|--------|
|                         | Horses.         | Cattle. | Sheep. | Goats. | Horses.              | Cattle. | Sheep. | Goats. |
| 1. Aschburgh            | 384             | 11300   | 1034   | 90     | 8000                 | 60      |        |        |
| 2. Crieff               | 350             | 11000   | 1000   | 965    | 9000                 | 60      |        |        |
| 3. Goispie              | 350             | 11000   | 1000   | 260    | 1100                 | 100     |        |        |
| Total of three parishes | 1084            | 33300   | 3034   | 1215   | 22000                | 180     |        |        |

By making a similar comparative calculation of the live stock in the other ten parishes, the numbers would stand as follows, viz. in the thirteen parishes about 4291 horses, 17,333 cattle, 11,750 sheep, 1123 goats, and 270 swine.

|   |               |               |            |
|---|---------------|---------------|------------|
| 4291 horses, exclusive of a few horses on the proprietors' farms, &c. :- £25,74-6 0 0 at 6/.        |               |               |            |
| 17,333 cattle: 350, at 10/ and 16,933 at 31/.   | 350           | 16,933        |            |
| 11,570 sheep: about 14,000 natives, at 6s. and 11,570 of the black faced 2nd Cheviot breed, at 12/. | 14,000        | 11,570        |            |
| 1123 goats, at 6s.  | 1123          |               |            |
| 270 swine, pigs or hogs, at 20/.  | 270           |               |            |
| <b>Total</b>  | <b>33,313</b> | <b>28,503</b> | <b>8 0</b> |

About one-eighth of the above are sold out of the county annually, equal to 13,117/ sterling.

*Aggricultural Produce.*—In a county where no regular returns could be got, of any system of rotation of crops on a mo-

a mo-

a modern plan, I could only form a data from the best information the country people would give, and from which the following table has been drawn up. It is as accurate as can be expected in a matter of so fluctuating a nature.

| Crops.  | Scots Acres | Bolls per Acre | Price per Boll. | Value per Acre | Total       |
|---|-------------|----------------|-----------------|----------------|-------------|
| Oats, either Elamsley or black  | 8056        | 5              | 15              | 120840         | 120840      |
| Bear or big   | 440         | 5              | 80              | 35200          | 35200       |
| Wheat   | 10          | 7              | 30              | 2100           | 2100        |
| Pease   | 10          | 4              | 30              | 1200           | 1200        |
| Potatoes, no manure   | 1511        | 12             | 6               | 9066           | 9066        |
| Turnips, Dtnrohin, &c.  | 50          | —              | —               | —              | —           |
| Flax, no seed got   | —           | —              | —               | —              | —           |
| Stone.  |             |                |                 |                |             |
| Sown pnm, principally at<br>Pun robin                                       | 383         | 200            | 13              | 4979           | 4979        |
| Natural meadows, haughs,<br>&c. the straths being nar-J<br>at (if is        | 1000        | 50             | 4               | 2000           | 2000        |
| 15^500  |             |                |                 |                |             |
| Pasture for 1191 hordes, for summer*<br>months, at 10J.                     | 5           | —              | —               | —              | 64,114 13 8 |
| Ditto for 17,31 cattle, ditto, at 10J.7<br>intruding town and lull pasture, | —           | —              | 8CS6            | 10             | —           |
| Ditto for 94,570 sheep, Cheviot, &c. do. at 2..                             | —           | —              | 9457            | 0              | 0           |
| Ditto for 1123 gaits, ditto, at 1l.   | —           | —              | 50              | 3              | 0           |
| Ditto for 170 swine or hogs, at fe  | —           | —              | 40              | 10             | 0           |
| Kidd aSout 500 red deer in the RcaY Forest, pasture<br>at (if is            | —           | —              | —               | —              | 20,365 1 0  |
| Total,  |             |                |                 |                | 8-1 13Q a 8 |

There is no wood sold from the plantations, as yet, except to tenants for repair of houses, and labouring utensils.

From the above calculation, the 805G acres yield  
40,280

40,280 bolls of oats, or, at two-thirds, 26,854- bolls of meal.

The 4400 acres of bear, yield 22,000 bolls, tfr, at one and a half, 33,000 bolls of meal.

The 90 acres pease, yield 360 bolls.

The 1511 acres of potatoes, yield 15,132 bolls; which make an average of from two to three bolls of meal, and about one boll of potatoes to each individual of the population. This accounts for the annual import of victual to the county of Sutherland. However, as the returns of bear in the northern straths of this county are very productive, owing to the great proportion of cowdung'laid on lazy-beds for beav, they in some places have from 10 to 12 bolls from the acre: perhaps the above average is rather b^low, than above the real produce of the county. It is the most fair conjectural calculation I could make from information or personal inspection.

*Manufactures) Fisheries, Minerals.*—The principal branch of manufacture, was the cotton business at Spinningdale, as before stated, but now discontinued. While the Durcli ports were open, the shop-keepers in Dorch, Golspit, Uroa, &c. imported tressed flax from Aberdeen, which they gave out to the 3011 ng women through the county to spin, at about 10</ per spindle, or four hanks.^ This branch of industry might bring about 3000</ per annum into the county. There was a very small proportion of the woollen stuff made by the .country females, sent to the Caithness markets.

There are about 250 tons of kelp manufactured annually from the sea-weed along the shores of this extensive county, •principally on the Reay estate ; '250 tons at 12</ is 3000<. A great quantity might **be mule** in Assynt, were



were it not that the people, occupying spots of land along the shore, make it a stipulation with the proprietor, that they must have the sea-weed\_for manure, which they cut every second year for that purpose.

The rent of the salmon fishery through this county is now about 1700/. per annum •, valuing the produce as to rent, it amounts to 6800/. From December 1806 to March 1807, there were 30,000 lobsters caught between-Bighouse-bay, on the north coast, to Rou-stoir, in Assynt, oh the west coast. The fishermen received 5*cf.* each for them, or 375/. They were all carried in smacks to the London market, where their value might be about 7000/. There are about 37 fishing boats on the coast of Assynt, reckoning about one boat to five fishing families: these contract with Mr. M'Donald, in Coulag, for their cod, and herring; in the season. Haddocks caught are consumed by themselves. I could not obtain any information as to the produce per boat in the year; but as cod, lingj and haddock, are in great abundance along their shores, if they were industrious they might produce 100/. per boat per annum. There are many fishing boats along the north coast from Assynt to the boundary of Caithness. Scourie, Loch-Eribole, and Port Sherra, are good stations, for contractors to receive their fish. Scourie in particular, would do well for a fishing village. There is a fall of water for a manufactory, and not far from\* fuèl, about 160 acres of arable land, and a safe harbour for shipping in Loch-Laxford, within four miles of it. Upon the south-east coast of the county there are from 20 to 30 small boats, who fish for haddock, which is sold to the country people. Three boats at Golspie make about 150/. per annum from haddocks; the fish is principally given in exchange for meal, butter, and cheese, to the country people.'

The principal articles of export from this county, are cattle, small horses, sheep, wool, salmon, and cod fish. The imports are meat, salt, tea, sugar, and snuff, and other groceries by the retail, shopkeepers' cotton goods and woollen cloths; coals, and tar for sheep-smearing. The butter and cheese made, is nearly consumed in the county.

The only minerals in the county, are limestone and marble. Mr. Jopling, marble-cutter at Gateshead, Durham, has taken away a cargo of marble from his quarries in Assynt, the value of which has not been communicated to the Reporter. There is very little limestone used.

*Statistical Table of the County of Sutherland. \**

|  |           |         |
|--|-----------|---------|
| Extent in square miles, including salt and<br>fresh, water lakes,..... | 3         | 2925    |
| Ditto in English acres, statute measure, . . . . .                     | 1,872,000 |         |
| Ditto in Scotch acres,.....  | 1,497,600 |         |
| Ditto arable acres,.....   | 14,500    |         |
| Ditto meadow and pasture (green) ....                                  | 35,000    |         |
| Ditto in fir plantations, &c. about ..                                 | 936       |         |
| Ditto in shrubbery of birch, willow, 7                                 | 3-0       |         |
| &c.....  | *         |         |
| Mountains, hills, moors, moss, ) j 4                                   | 45,814    |         |
| water, &c.....   | 1,497,600 |         |
| Horses,.....   | 4291      |         |
| Cattle,.....   | 17,338    |         |
| Sheep,.....  | 94,570    |         |
| Goats,.....  | 1128      |         |
| Hogs or swine, .»-.....  | 270       |         |
| <hr/>  |           |         |
| Value of live stock (exclusive of deer), £                             | 144,935   | 8 0     |
| Value of agricultural produce,.....                                    | 84,630    | II 8    |
| *UTB&R.]   | 1         | o Value |

|  |        |    |                 |
|--|--------|----|-----------------|
| Value of manufacturing, commercial, <sup>^</sup><br>fishery, and mineral produce; say ( 16 | £      | s. | d.              |
| salmon 6800/. kelp 3000/. cod fish, f  | 300    | 0  | 0               |
| 1000/. wool 11,000 stone, 5500/. ...J  |        |    |                 |
| Number of Proprietors, 13.   |        |    |                 |
| Valued rent, Scotch,.....  | 26,193 | 9  | 7               |
| Ditto in sterling,.....  | 2182   | 15 | 9- <sup>^</sup> |
| Reallacd rent, sterling, about.....  | 14,466 | 12 | 6 <sup>^</sup>  |
| Number of inhabitants in 1790-1798, . . . . .  |        |    | 22,361          |
| Number of lighting men,.....   |        |    | 3543            |
| Inhabiting towns, about . . . . .  |        |    | 500             |
| Inhabiting small villages, Golspie, Brora, \   |        |    | £,,             |
| Spinningdale, say,.....J   |        |    | 00              |
| Number of inhabitants to each square mile \  |        |    | 0               |
| (of land), nearly.....•>   |        |    |                 |
| English acres of land to each inhabitant, . . . . .  |        |    | 85½             |
| Ministers' stipends,.....  | £ 1488 | 0  | 0               |
| Average to each Minister, about . . . . .  | 114    | 0  | 0               |

Scholars, 1012.

Schoolmasters' salaries and emoluments, about 312/.

Average to each of the 13 parochial schoolmasters, 24/.

N. B. There are about 20 Society Schools, salary from 5/ to 15/.

Poor, 650.

Capital stock of the poor's fund—*no returns*.

Annual income of the poor in five parishes, is 42/.

Average to each in said five parishes, 2s\* 2d.

## No. VI.

*Valuation of the County of Sutherland, by Parishes, as reported to the Exchequer at Edinburgh, on the 5th October, 1802.*

|  | <i>Scotch.</i>  |    |    |
|--|-----------------|----|----|
|  | £               | *  | ¼. |
| Assynt—Right Hon. Earl Gower, .....                        | 1500            | 0  | 0  |
| Criech—Earl Gower, .....                                   | £149            | 14 | 8  |
| Sfcibo, .....  | 564             | 15 | 3  |
| Sir C. Ross, .....   | 431             | 18 | 0  |
| Rose-hall, .....   | 400             | 0  | 0  |
| Cadboll, .....   | 354             | 0  | 0  |
| <sup>1</sup> Dugd. Gilchrist, .....                        | 253             | 6  | 8  |
| H. Houstoun, .....   | 200             | 0  | 0  |
| Capt. K. Mackay, .....                                     | 230             | 2  | 1  |
|  | —————2983 19 7  |    |    |
| Clyne—Earl Gower, .....                                    | 1040            | 6  | 0  |
| Colin Mackenzie, W. S. ....                                | 144             | 13 | 1  |
| Carrol, .....  | 100             | 7  | 4  |
| Uppat, .....   | 19              | 1  | 2  |
|  | —————1304 7 7   |    |    |
| Dornoch—Earl Gower, .....                                  | 1773            | 14 | 1  |
| Skibo, .....   | 399             | 9  | 6  |
| Cuthil—R. Baigrie, .....                                   | 215             | 15 | 5  |
| Embo, .....  | 346             | 0  | 8  |
| Poyntzfield, .....   | 163             | 17 | 10 |
| Over Skibo, .....  | 71              | 0  | 4  |
|  | —————2969 17 10 |    |    |
| Durness, Tongue, and Edderachylis—Lord ? V <sup>^</sup> QQ | 8               | 5  |    |
| Rely, .....  | \               | "  | —  |
| Carryforward, ....   | £12,478         | 13 | 5  |

| 9                          | <i>Scotch.</i> |                |             |
|----------------------------|----------------|----------------|-------------|
| Brought forward, ....      | £12,478        | IS 5           |             |
| Farr—Earl Gower,.....      | 2140           | 17             | 4           |
| Borgiebeg,.....            | 248            | 8              | 8           |
| Lord Armadale, ...««.....  | 564            | 0              | 0           |
|                            | ,——i——         | 2953           | 6 0         |
| Golspie—Earl Gower,.....   | 2163           | 0              | 0           |
| Culmaly,.....«.            | 205            | 5              | 11          |
| Rhivcs, &c.....            | 202            | 4              | 8           |
| Ealblair,.....             | 49             | 6              | 6           |
| Uppat,.....                | 59             | 14             | 10          |
|                            |                | —————          | 2681 11 11  |
| Kildonan—Earl Gower, ....  | 677            | II             | 0           |
| Badinloch,.....            | 224            | 6              | 9           |
| Ulster,.....               | 201            | 16             | 2           |
| Balblair.....              | 175            | 9              | 11          |
| West Garty,.....           | 130            | 15             | 7           |
| Gartymore,..... HM.....    | 95             | 12             | 11          |
|                            |                | —————          | 1505 12 4   |
| Loth—Earl Gower,.....«.    | 1095           | 6              | 6           |
| C.Mackenzie(2566nir.6</.)  | 64             | 8              | 9           |
| Crakaig,.....              | 321            | 14             | 1           |
| West Garty,.....           | 85             | 12             | 7           |
| Helmsdale,.....».....«.    | 228            | 3              | 4           |
| Navadale,.....             | 228            | 13             | 4           |
| Gartymore,.....            | 116            | 6              | 5           |
| Sethmore,.....             | 223            | 15             | 7           |
|                            |                | —————          | 2566 14 6   |
| Lairg—Earl Gower,.....«... | 494            | 18             | 0           |
| Shiness,.....              | 259            | 18             | 8           |
| Torfeoll,.....             | 210            | 6              | 1           |
| Poyntzfield,.....          | 302            | 15             | 6           |
| Achany,.....               | 78             | 2              | 9           |
|                            |                | —————          | 1346 1 0    |
| <b>Carryforward, ,,»</b>   |                | <b>£23,531</b> | <b>19 2</b> |

**Brought**

|                          |         |    |                |
|--------------------------|---------|----|----------------|
|                          |         |    | <i>Scotch.</i> |
| Brought forward, ....    | £23,531 | 19 | 2              |
| Rogart—Earl Gower, ..... | 1108    | 4  | 4              |
| Jvluy, .....             | 18      | 0  | 0              |
| Gen. Wemyss, .....       | 239     | 2  | 8              |
| Dempster, .....          | 94      | 6  | 0              |
| zVciiany, .....          | 17      | 3  | 3              |
| Leaky, .....             | 94      | 2  | 4              |
|                          | 1761    | 10 | 7              |
| Reay—Bighouse, .....     | 900     | 0  | 0              |
|                          | £26,193 | 9  | 9              |



No. VII.

*Letter from Mr. Isaac Jopling of Gateshead, Durham, to the Secretary of the Society of Arts bfc. on the Marble Quarries in Sutherland.*

IN a letter of last June, from my good friend Mr. Charles Waistell, of High Holborn, I received, inclosed, a List of Premiums offered by the Society for the Encouragement of Arts, Manufactures, and Commerce, — in pages 18 and 19, he had marked for my notice the Society's resolutions and regulations concerning specimens of British Marbles. So far back as the year 1780 I began the business of marble-mason here, at Gateshead, in the county of Durham, which I have carried on ever since with some degree of success. In the year 1798 I was informed by iriy marble-merchant, who supplied me with foreign marble, that the French had got possession of Carrara, and that it was not likely that marble could be again imported into England from Italy for many

years. - As I had, from the writings of Camden, Knox, Pennant, Williams, and others, obtained a knowledge that there was white marble in Sutherlandshire, I made an agreement with the Countess of Sutherland, and the Earl Gower, for a lease of the marble quarries to be found in the county of Sutherland; and in May, 1799, I carried several Englishmen north, to search for marble. I spent seven summers and two winters in Assynt, a parish situated in the north-west corner of Sutherlandshire, not less than fifty miles from a market-town, where there had never been a road, a cart, or a smith who could shoe a horse; during which time I opened many quarries of marble, and made, at least, fourteen miles of road, through heretofore impassably mosses, bogs, and rocks, to the sea. The difficulties and disadvantages I have laboured under were innumerable: mert, coals, iron, and every article were, to fetch from such a great distance \$ and the people, " torpid with idleness," as Mr. Peinant expresses it in his Tour, and to which I refer for a description of this place, would do nothing for me without an exorbitant price, and never till it suited their own convenience; and from having no markets, and not being in the habit of selling, they could never be persuaded to part with any article at less than nearly double its worth. To help forward the road, I was, indeed, allowed the statute labor of the parish; but, after trying them awhile, so averse were they to work, that I refused to receive them, rather choosing to finish the road with my own men. The first summer was spent in trying and searching after quarries; the second, third, and fourth, were spent in making this road, which road Lord Reay passed about seven years ago, and last summer Mr. Anderson, a son of Dr. Anderson, who published the *Bee*: each of Ibese can tell what an arduous

task

task it was to make a road in such a country; and I believe they are both members of your's, or the Royal Society.

In 1806 I visited Ashford, in Derbyshire, to see the machinery there for sawing and polishing marble, and had a model made in London, like one which I saw that year in your rooms, said to be the model of a machine working at Torbay: my intention was to have had such-like machinery erected near the quarries, and to have dwelt there, and superintend the works; **but** not meeting with the encouragement which I needed, I did not afterwards return to Assynt, as I saw clearly it was only throwing away more money where I had already expended far **too** much for one individual to venture. I however still kept men at the quarries, and have since that time got one sloop-load of marble brought away, and have another nearly ready, and have yet ten years of my lease unexpired.

I have sent you a set of specimens, the produce of these quarries, and several other kinds of British marbles which I had by me. They are made 8 inches by 6, and 1 inch thick, except some that have been cut for veneers; yet, nevertheless, I backed them to the thickness with stone, and sent them also; they are as follows:—No. 1. A white marble that will **saw** and work with a tool, but takes a bad polish. I sunk several yards deep in this quarry, but could not find it better. About ten years ago, I proposed this marble to A. Davison, Esq. for building the Naval Pillar then subscribing for, and he and I exchanged two or three letters upon the subject; since that time I got Mr. James Smith, who is **now** making Lord Nelson's monument, to carve a small **head of this** marble, which I believe is now in the possession



session of Mr- Atkinson, architect. This may prove a useful stone, but cannot be got in large blocks ; and it has some narrow blue veins scattered through it. Nos. 2, 6, 8, 12, 14, and 16, are the produce of those quarries near No. 1; these will saw, work and polish easily, and can be got pretty large, and are all situated near half a mile up the sloping side of a hill. No. 4, is from a quarry close by, and under a small river, near half a mile from the former seven. In dry weather I have seen this marble bare six or seven yards by four or five, but it had all the appearance of being cracked. Although I have sent but one specimen of this kind, yet there is considerable diversity in the quarry, and it is compact, fine, and easy to work and polish, and is the very marble Williams described in his Mineral Kingdom, as pure white marble, fine as the Parian, and to be had of any size, without cracks or flaws, and situated under\* the^ bed of a small river, near a quarter of a mile from the house of Ardloch: this is exactly the situation; but for its being pure white, large, and solid, no doubt he fell into these errors by seeing its surface bleached by the weather, and making no further examination. I had people working here above a year, but never could get sound blocks of it large enough for chimney-hearths; no doubt larger blocks might be had going deeper. I have seen some of this burnt to very fine lime, and because it would make lime the inhabitants laughed heartily, to think a man should travel so far, and mistake his aim so much, as to take limestone for marble; for though they have a burn called in Gaelic, *Auk na Marable* (Marble River), they had no idea of marble when they saw it. No. 10, is got near a quarter of a mile further down the^ river, and is very hard to saw, work and polish: this water is called Lync, and the place Ledbeg, and I suppose it is  
fourteen

fourteen miles from hence to the sea at Ullapool, where there is a very safe natural harbour, where sloops may be secure in any weather, and take in a cargo from the end of a rock which projects a little into the sea; the surface of this rock I levelled to serve as a pier, and to this place I made the road. Nos. 5, 5, 7, 9, JS, and 15, are from quarries at Coubin, a place upon the said road about seven miles from the sea: these marbles, with some others in their vicinity, I discovered entirely myself, as it was never supposed there was any marble there, and that at Ledbeg it was, by those who wrote, supposed to be white. When I showed this Coubin marble to workmen in London, and fell into conversation with them about it, they seemed all to think it unique: it is hard to work and polish, but beautiful, and when polished, will retain it much better than softer marble; and I hope the public will rank these among the best foreign coloured marbles.

All these sixteen are specimens of the quarries I have opened: there are several other kinds in the district, but not so well situated for bringing away. Of these marbles I have made many chimney-pieces, particularly for Donald M'Leod, of Geanies, Esq. Sheriff of Ross-shire; Sir George Mackenzie, of Coul, Ross-shire; Colonel Duff, of Fetteresso, Aberdeenshire; Colonel Mitford, Exbury, near Southampton; and Admiral Sir Samuel Hood, London. I sent also several other chimney\* pieces, made of it, to London, of which I believe the Duke of Athol got one to send to the Isle of Man; but for an account of the others, and of several that were made of it by workmen in London, I beg leave to refer to William Atkinson, Esq. Architect, No. 20, Bentinck-street Cavendish-square, to whom I am much indebted for having recommended it.

Nos.

Nos. 17, 18, 19, 21, and 22, are varieties of serpentine from Portsoy, in Banff-shire, which place I visited before I went to Assynt: this rock runs right into the sea, and I was of opinion that large blocks were not to be procured. In the middle of this serpentine runs a very coarse marble, a specimen of which I have sent, marked 20\* No. 23, is a specimen of the Duke of Argyle's marble from the Isle of Tyrie; this is a beautiful marble, and I once, long ago, went from this place to Edinburgh, on purpose to see a sloop-load of it, but they would not sell it under three guineas and a half per solid foot, for which reason it never made its way into use.

Nos. 24 and 25, are from Kilkenny, in Ireland; 26, from a place called Gallow-hill; 27, from Belsay-castle, both in Northumberland: this last belongs to Sir Charles Monk, and can be had sound almost any size. 28, 29, and 30, are from Frosterly, in Weardale, in the county of Durham; these are taken from a thin stratum of the great limestone which stretches far through this country, and is to be seen both in Teasdale and Weardale. 31 and 32 are both from above Wearhead, but I believe cannot be got large, as far as I made trial; and no person knew of it, or ever attempted to work it but myself, about thirteen years ago. 33, 34, and 35, I suppose are from Devonshire. No. 36, Derbyshire-grey; this marble rises large in the bed, but so thin, that they seldom get more than one slab out of one block, as I was informed by the proprietor of the marble-works at Ashford.

I am exceedingly sorry that I was so late in obtaining a knowledge, that the Society had a wish to encourage a search after British marbles: these specimens might have been produced ten years ago, and perhaps such a sale  
for

for this marble might have been promoted, as would have reimbursed me for the expenses I have been at, the hardships I suffered in seven years' personal attendance upon a search for marble, in such\* a country, where, from bad houses and a wet climate, I was seldom dry, day or night, except in fine weather, of which there is but little, and for the loss my own business has sustained here in my absence. To this account of expense, hard\* ships and loss, I might add a little of vexation, in having my tools broken, and/frequently thrown into bogs; corn sown in *my* road ; my oxen hunted before my face, for miles, with their dogs, and my gras<sup>9</sup> eaten by their cattle for whole summers together.—This sketch may show how anxious I have been to bring forward this marble, though only an individual, having no funds but the savings made, daring twenty years, from a business not very extensive.

As I live in the north of England, and have quarries in the north of Scotland, if I can be of any use to the Society in helping to promote their views in regard to British Marbles, I shall be happy to serve them ; and if they think the Sutherland Marbles worth encouragement, I hope they will endeavour to bring them into notice.

I am, Sir,

Your obedient Servant,

ISAAC JOPLING.

*Gateshead, Feb. 17, 1810.*

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No. vnr.

*Plan Jo'r the Improvement of the Estate of Sutherland.—  
Drawn up by the late Hugh Rose% of Aitnach> an. 1786.*

*General View of the Sutherland Estate.—The lordship of Sutherland is unquestionably one of the most extensive and*

and most populous estates, belonging to one proprietor, in the Island of Great Britain. Its extent, I believe, has never been accurately ascertained; but containing nearly two-thirds of the valued rent of the county, it must have at least one half of the extent of ground in it, or 1755 square miles, (739,200 English acres), and consequently it is equal in size to either of the valuable counties of Chester, of Derby, or of Warwick. In regard to its population, according to the best accounts that Mr. Rose could procure from the Clergy and others, the number of persons fit for labour, exclusive of superannuated people and children, amounted, in 1786, to about 8000; and including them, the population cannot be estimated at less than 12,000 souls. The inhabitants of this extensive property are represented to be a manly, and civilized set of people, well educated, and well informed, according to their different stations in life, and still preserving a strong attachment to that noble family, under whose protection they and their predecessors have so long lived. The following is the account given by Mr. Rose, of the three great districts into which this estate is divided.

The Southern District stretches along the east coast of Sutherland almost without interruption, from Cyderhall on the Meikel Ferry, to the boundaries of Caithness, a distance of about 30 measured miles. The arable land of this district is, in general, a good kindly soil, fit for producing every kind of grain that is raised in any part of Scotland, having at the same time a great advantage in regard to manure, from the quantity of sea-weed that is thrown upon the coast, likewise an inexhaustible fund of limestone and sea-shells, and also every where water-carriage, with great abundance of sea-fish, such is cod, haddock, &c. not forgetting two excellent salmon fisheries on the rivers of Brora and Helmsdale. The inhabitants of this part of the estate, raise considerable quantities

tities of corn, such as barley, oats, pease, &c. Grain is their staple commodity for paying their rents and maintaining their families; in addition to which, however, they rear a few black cattle for sale, and spin some linen yarn for the manufacturers of Aberdeen and other places.

The middle district, consisting of the parishes of Kildonan, Rogart, Lairg, and a part of the parish of Clyne, are countries detached from the sea. They have, it is true, a good deal of arable land, but not of the like good quality with that on the coast. Black cattle, hill horses, sheep, and goats, are the staple commodities on which the inhabitants depend for the payment of their rents, and the supplying themselves with the necessary articles of living. In this district, they scarcely raise corn sufficient to support the inhabitants for more than one-half or two-thirds of the year, nor has industry, in the way of spinning or manufacture, yet reached them to any degree.

The third, or Northern District, comprehends the parish of Farr (known also under the name of Strathnaver) and the parish of Assynt, countries bordering on the Northern or Western Ocean. The inhabitants of these parishes are exactly in the same situation with those last mentioned; but with this exception, that such of them as are situated within a few miles of the sea-coast derive also some advantages from fishing. The greater part of this district, however, is inland (particularly in the parish of Farr) where the rays of industry have never as yet dawned, and which, it is believed, is in much the same state and situation now, that it was 200 years ago. There are good salmon fishings on the rivers o<sup>N</sup>naver and Torrisdale, in the parish of Farr, and also on the rivers fciver and Kirkaig, in Assynt. In many places in this district the plough is not used at all. The ground intended for corn is turned over either with the spade, or  
with

with a foot plough, called by the natives *eas chremh*, made of a birch tree, of a particular bend, and the point of it shod with iron. (*See a Sketch of it*, p. 57.)

*Forests.*—An extensive part of the Sutherland estate is appropriated to the feeding of mountain deer, of which, it is said, that there are on the whole estate above 1000. Little advantage is derived from this mode of occupying land, and as it has gone out in other places, it probably will in process of time become equally unusual in these northern districts.

The preceding observations will give a general view of this extensive property, which it was thought not proper to separate, though some of them relate, not to the eastern, but to the interior and western districts of the county.

*Means of Improvement.*—The following measures were suggested by Mr. Rose, and other friends to improvement, for meliorating the condition of the inhabitants of Sutherland, many of which are applicable not only to that county, but also to the northern parts of Scotland in general.

1. *Abolition of Personal Services.*—To emancipate the people at large, by freeing them from every species of personal service, is the first step that ought to be taken, for improving this part of the kingdom. Every individual would thus have the full use of his own time, would be enabled to manage his own affairs without molestation, and, from the very beginning, would be able to pay an adequate sum in lieu of those exactions\*

2. *Culture and Manufacture of Flax.*—Every possible means should be taken to introduce that particular species .

cics of industry which seems the most suitable to a country so very extensive as Sutherland, and to a people so very widely dispersed as its inhabitants, many of them living in countries almost inaccessible.

The raising of flax, and spinning linen yarn, appear to be the most likely means of giving full employment to the great number of idle hands now in the country. This, if properly attended to, would prove a source of infinite wealth to this much neglected corner; and there is little doubt but the Board of Trustees for Manufactures at Edinburgh, and other public bodies, would interfere, and on proper application being made, would give every assistance to rescue so many thousands from a state of sloth and indolence, to that of useful industry, and thereby prevent such emigrations to America as have already taken place from this part of the Island.

The Highland parts of Perthshire, in point of soil and<sup>1</sup> situation, are more barren, cold, and stormy, than any part of the county of Sutherland; yet by the industry of the people there, in raising flax and spinning yarn for sale, all the rents, as well as tradesmen's accounts due by the tenants, are paid from the produce of linen yarn, without depending on either corn or cattle for these purposes. This being the case there, and as linen yarn is an article for which there is always a great demand, and as it can easily be sent to market, where water-carriage offers at every quarter, why might not the county of Sutherland partake of the like advantages? There can be no doubt that the Board of Trustees for Manufactures, &c. in Scotland, would, when applied to, give every aid in their power, by furnishing flax-seed, and granting premiums here, as has been done formerly in most other counties. But still more would be wanted in Sutherland, where a total ignorance prevails, not only of the *nietti* of  
of



of preparing the ground for flax-seed, but of every operation necessary, from the sowing to the heckling and spinning. It is therefore thought absolutely necessary, in order to remove this ignorance, and to instruct the men as well as the women, in the different parts of the process falling to each sex, that a few hands, from the manufacturing counties, should be settled in each parish, in the manner afterwards to be taken notice of.

The factors, it may be proper to observe, ought to receive good linen yarn, in payment of rent, at the current price for the time being, and every tenant should be obliged to pay the whole, or a certain proportion of his rent, in that manner. Should such parts of the country as are adapted to the raising of flax, not produce a sufficient quantity to keep all the women spinning, there is another alternative, that is, importing Dutch flax. The manufacturers of Aberdeen, Dundee, &c. would gladly furnish what flax would be requisite *in* such an event; but then the difference of profit, in selling yarn from flax raised by the inhabitants, and that spun from imported flax, is as two and a half are to six. This difference would amount to a considerable sum, in the annual labour of some thousands of women.

It is not here necessary to descend to the minutix of the plan of management proper to be adopted, if the flax scheme, which is here proposed, be gone into. Such a plan may easily be formed, by collecting the skill and experience of other parts of Scotland. It may be sufficient to remark, that the advantage arising to a country, from having all the people in it usefully employed, is inconceivable\* The counties of Angus and Perth are standing instances of this, and no place more *so*, than the Duke of Gordon's lordship of Huntly, which, though entirely an inland place, distant twenty or thirty miles

miles from water-carriage, yet from the exertions and example of an honest Irishman, who began the spinning and linen manufactures there, about forty or fifty years ago; with a capital only of 7s. 6d. and an old silver watch, he, in a short space of time, carried so extensive a trade, and kindled such a spirit of industry, that that country is now become very wealthy, the rents well paid, and nearly doubled, and in some places tripled; and the honest Irishman himself, it is said, died lately, worth about 10,000l. after rearing a numerous family. Once industry is set afloat, cheapness of living and labour, with the additional convenience of water-carriage, may tend to attract manufactures and manufacturers. Were the inhabitants of Sutherland once become perfect and expert in spinning and raising flax, there is little doubt that weaving, bleaching, and perhaps printing, stocking-frames, and thread manufactures, may soon follow.

3. *Improvement of Waste Lands.*—Manufactures and fisheries are undoubtedly sources of much wealth, where they are properly established, and greatly tend to improve and enrich a country; yet experience has proved that they are in their nature but fleeting and uncertain benefits, which often take their departure from one country and fly to another. But improvements in agriculture, and the cultivation of waste grounds, are very different, being in their nature a lasting and permanent good. Nothing, therefore, ought to be more seriously attended to, than the improvement of waste lands; where there is a capability, and converting them to useful arable fields. This, it is believed, is only to be done to the greatest possible extent, and at least expense, by engaging every individual who holds a farm, to improve

less or more yearly, of such waste ground in the vicinity of his farm as may be 'fit for cultivation 5 and in order to encourage him thereto, he ought to have a reasonable allowance for his labour, as well as the whole profit arising from the improvement, at least for a given time. There is scarcely any farm in Sutherland that has not some ground adjacent to it fit for improvement: it is thought, therefore, that the (proprietors should allow so much per acre for cultivating wastes, either by delving or trenching (for there are but few places where the plough could be successfully employed); the price of labour to be estimated, according to the difficulty attending it, when the work was completed. So<sup>^</sup>ne acres might cost 5/., some 4/., others 3/., and even less, according as the ground was easy or difficult to work. This valuation to be paid to the tenant, as soon as the improved spot had been sufficiently dunged, and put under a crop of potatoes; flax to be the next crop, and after that barley and grass-seeds. The tenant, in return for the money thus given him, for effecting such improvement, to have five, six, or seven per cent, added to his yearly rent, as a compensation to the landlord for his advance of money. This would furnish useful labour to individuals now idle, and be equal to the buying of land at from fifteen to twenty years' purchase. It would, at the same time, produce an additional fund of subsistence for the inhabitants of the country •, for, as the spinning of yarn is the entire province of the women, thus delving and trenching the ground, attending their little farms, sowing, pulling, and dressing the flax for the wheel, would furnish employment to the men, who at present, for a great part of the year, lounge away most of their time in idleness. And supposing that one man should thus prepare, in one year, but the fourth, or even

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the eighth or sixteenth part of an acre, the labour of several thousand men would, in a few years, make a very great addition to the arable land of the county. But the utmost attention would be necessary, to take care that the work was properly and thoroughly executed, and that the ground which promised to turn out a profitable subject; and to prevent every imposition on this head, some very skilful person should view and line out the ground to be trenched or delved, before the work was begun, and examine it annually for three succeeding years. When leases are granted, a clause should be inserted, binding down each tenant to improve a certain extent of ground yearly, on the above plan, and making it a breach of lease if that were neglected. Such a coercive stipulation, joined to such liberal and advantageous terms, could not be deemed either unreasonable or oppressive.

4. *Establishing regular Markets.*—The laying down some proper regulations in the county, for the sale of black cattle, is a measure greatly wanted, and in which every Proprietor in it is deeply interested. No cattle should be sold, but to those who either paid ready money, or who lodged undoubted letters of credit for paying, at a fixed time, the prices of the cattle he bought on credit, and that without any claim for deduction, or what they call discount, from the prices agreed on. Attending to the above **precautions**, would prevent such heavy losses as the poor people have sustained for some year\* past.

*f>. Destruction of Vermin.*—Much advantage would accrue to the people of Sutherland, were the foxes and eagles destroyed— Vermin have been driven from other countries, and the inhabitants feel the happy **effects** of their

extirpation. Why not extirpate them here also? A great part of the county of Sutherland is well calculated for feeding moderate flocks of sheep; and could the owners, with safety from foxes and eagles, drive them to the mountains, and allow them to remain there all summer and autumn, their breed of sheep, and quality of wool, might be greatly improved, and the number much increased. At present, in order to preserve the few they have, they are under the necessity of housing them every night, and of course keeping them through the day on poor starved pasture, in the vicinity of their houses, the grass of which pasture ought to be reserved untouched, till the winter and spring, when it would be necessary for them to have their sheep nearer home. Introducing likewise a breed of the fine soft-woolled sheep, at least a number of good rams, of a superior kind to that now reared, in Sutherland, would surely be a means of improving the carcass of the sheep, as well as the quality of the wool.

6. *Woods*.—With respect to woods and plantations, the natural birch woods in the county are much on the decline, and from the present state of them, there is great reason to fear, that in a generation or two hence they will be mostly all run out. This would be a melancholy situation for the inhabitants, as the great distance many of them are from the sea-side, joined to the badness of the roads, would render it scarcely possible for them, did they get wood gratis, to carry it to their different places of abode, for keeping up their houses, and other purposes. There are two plantations on the east coast of Sutherland, besides those of Skibo; one at Cyder-hall, and the other at Balblair, near Dunrobin, which, with the new plantations there, may supply that district sufficiently

ciently in wood for one or two generations. But it is a measure which ought to be followed all over the county, to cause a certain tract of muir in each pash, to be enclosed and planted with larch, or Scotch fir, so as to provide a fund for posterity. This measure would be attended with no great expense, and would, in time turn out to be of real and solid advantage.

7. 77\* ^ W - W i t h respect to the fisheries, it is unnecessary to take any particular notice of them in place not being immediately connected with the subject in hand- and it is to be hoped, that the patriotic Society for improving the Fisheries in the Islands and Highlands will carry on their laudable views, so as to bring them to a very considerable perfection. -The fishermen at sea, are undoubtedly capable of great improvement. As to those of salmon in the different rivers of the county, it is thought they may be greatly improved, by taking proper care of the salmon that go up the rivers in the spawning season, preventing their being destroyed by the country people, and limiting those to whom these fishings are let, not to fish beyond the legal period fixed by the Scotch Act of Parliament, namely, the 26th of August; observing also what is called the Saturday slap.

8 *Premiums.* -!\*- is believed, that granting certain premiums, such as a gown or cloak, to the woman who wove the greatest quantity of the best spun yarn in each parish •, that of a coat of a particular colour, and a hat or bonnet adorned with ribbons, to the man who raised the greatest quantity of flax; the same, of another colour, with a hat or bonnet differently adorned, to the man who improved the greatest extent of waste ground, with several other premiums needless to men-

tion at present, might, when those who gained such premiums, appeared thus distinguished at **church**, or **market**, be the means of creating great emulation, and of producing powerful exertions **in these different** branches of industry.

*V. Sheep Farms.*—It is well known, that in many parts of the Highlands, sheep, instead of cattle, have lately been introduced, the policy and advantages of which alteration have been the subject of much discussion. It is certain, that the change of stock, above alluded to, has been attended with much mischief, from the manner in which it has been conducted; and the late Mr. Rose drew up a very strong representation upon that subject, which it may be right to state in his own words, as it relates to a subject of the utmost importance to a US\$e body of valuable subjects.

" A kind of rage for sheep-farming, having of late years prevailed in many parts of the Highlands of Scotland, it may, perhaps, be expected, that some notice should be taken of that mode of improvement, or, more properly speaking, that mode of stretching and increasing rents, (for the depopulation of a country, can, with no degree of propriety, be termed the improvement of it) more especially since **teat plan**, as conducted at present, has for its basis the immediate depopulation of a country, and the extirpation and dispersion of its inhabitants. It is hardly necessary to observe, that before such a scheme is gone into, it ought to be very maturely considered, as well as the consequences that may in time result from its being too hastily adopted. But were this mode of farming less chargeable with the want of philanthropy and state policy, than it really is, it is thought to be a very hazardous experiment; more especially when  
attempted

attempted in a country remote from markets, and frequently liable to the greatest severity and inclemency of the seasons. No mode of farming requires a greater capital to set it properly a-going. Of course, were it to be adopted in Sutherland, it would be requisite to provide sheep-farmers from other countries to carry it on, and entire tracts of country must forthwith be depopulated, to make room for one of those great sheep-farmers and his flock. Were it thus so far established, did there come on a season or two such as 1782, it would then probably be all over with sheep, and an end would be put to that inhuman speculation. The next consequence that would probably follow, is, that the sheep-farmer, being a stranger, would return whence he came. His bad success would intimidate others from following his example, and the depopulated country would lie waste and unoccupied, for want of inhabitants. For, let once the natives of these countries be extirpated or dispersed, it is believed that no set of people, whatsoever, from any other quarter of the globe, would be got to inhabit them. Now, laying aside entirely that remorse of conscience, naturally impressed on the mind of man, on the commission of any cruelty, or act of inhumanity towards his fellow creatures, as a principle that seldom, if ever, finds room in the covetous, avaricious soul, and supposing the heart to have become quite callous to every generous humane feeling, yet it is thought a consideration of the consequences already mentioned, (consequences to be expected and looked for) ought at least to deter every prudent and considerate man, from hazarding or sacrificing a certain permanent benefit, and in its room substituting an uncertain and barbarous speculation. The preservation of the state at large, is surely so much involved in the mischiefs that may accrue from this kind of speculation,

P 4>



tion, that it is surprising the public do not take the alarm so as to **restrain**, or put a stop, to private interest or avarice, when making wide strides towards **extirpating** the human race from these bleak dreary **mountains**, from whence, in times of national danger, armies were speedily culled forth, and legions rapidly completed."

10. *Public Encouragements*.—The assistance of the public, in carrying on the improvement of these remote districts, may be certainly expected, whenever the circumstances of the case are properly represented to Government. A few things shall be mentioned, the granting of which would be but a mere mite to the public, but might at the same time be the means of relieving many thousands, and rendering them happy in their private capacity) and useful to the state \ preventing, at the same time, any thoughts of flying to America, where the inhabitants of this country have a great number of their friends already settled, in consequence of former emigrations.

The introduction of manufactures, the raising and spinning of flax, might, it is thought, answer in a great measure the ends here proposed, joined to that of giving proper encouragement to the fisheries. But as the latter is under the management of the patriotic Society for Improving Fisheries, nothing shall be said on that subject. As to the former, giving flax-seed to the inhabitants gratis; granting an allowance, for a time certain to some skilful hands, men, as well as women, to be brought from the **manufacturing** counties, to instruct the people of Sutherland in **the** process of flax-dressing and spinning; wheels and reels also, with an annual allowance to two or three wheel-wrights, as an encouragement

to

to settle in different parts of the coun'y, to keep th^m in **xepair**, iniuht tend to establish industry and manufacures in a wide r.ud extended territory, where they arc at present unknown. Likewise so ~~nothing~~ l?y wny of **bbtmt** y, on each yard of cloth, or spindle of yarn, to mnl:e up fot the disadvantages under **wliTch** the manufacures must always be carried on, in consequent of the **diffi-**  
~~cult and dangerous navigation, both~~ of **the Dornoch** Frith and the North Sea. The risque and disadvantage **attending** tl v\* \*i.r.h.v.i\*ion, will!nut only occasion h^h, freightage, but constant insurance, on the seed or ilux imported, as **well** as yarn aad cloth exported ; and frequent demurrage must be incurred, when vessels cannot look in with safety to any of the Sutherland harbours, \* e. when the winds set in east, or at north, or south-east ; for though water-carriage may be had at all quar-  
ters, as already mentioned, yet the navigation is dangerous, and subject to tiic disadvantages above described : and without some such aid from Government, the inhabitants or manufacturers, in that country, cannot carry on the linen or flax trade on equal terms with those in the more southern and more accessible countries. An aid, also, towards getting bridges built, and roads made, to render the country more open than it is at present, as well as the post-office, to afford a regular communication between the Domoch Frith and the north coast. Unless these last mentioned advantages are speedily introduced, every other attempt towards improvement must prove fruitless and abortive.

lit *On the Managetment of Highland Property.*--V?h\$xs  
 a Highland estate is populous and extensive, ,it ought never to be put under the management of only one-factor, or land steward. One at least ought to be established in  
**each**

each district. Each of these factors to have a good farm, at the present rent, in a central part of the district, with an allowance of five per cent, for what rent he receives, and for what may pass through his hands for spinning. These factors to be at the same time restrained from exacting services, accepting presents, or dealing as drovers in the purchase of black cattle, under any pretence whatever. Whether these factors should be singled out from among the gentlemen of the county, or strangers from some of the industrious counties, is a matter *to* be duly considered. Were nothing else to be attended to, than collecting and remitting rents, the former would answer perfectly well. But unless where natives can be found, acquainted with the improvements above recommended, it is thought that employing strangers would be a much more eligible measure. As improvements in Agriculture\* flax raising, and the spinning business, can never be properly introduced, or effectually carried on, without first introducing strangers from some one or other of the industrious counties, to teach and instruct the people of Sutherland ^ is therefore thought, that the factors to be employed ought to be intelligent young men, well recommended, with a competent share of education, the sons of opulent farmers in one or other of these counties, each of whom should bring with him a few married men, of the labouring class of people 5 the men to be conversant with the flax raising business, and the women in spinning. These to be chiefly employed in the 'instruction of the inhabitants; at the same time that they might act as wood-keepers, bailiffs, or park-Leepers, and do at least as much in that way, as is done at present by those who officiate in these capacities. As the Highlands of Perthshire are pretty simitar, in point of climate, to that of Sutherland, and the language of the people the same, it is thought that factors and labouring

bouring people from that quarter might answer better than from any other.

Collecting, and remitting rents once a year, is\* the smallest part of a factor's duty. This can be done very well by any honest person, who, in a moderate degree, understands the ordinary and common routine of accounts. Much more, however, is included in that duty, viz. a constant and general attention to every thing in which the interest of the proprietor, of the people, or of the estate is concerned; and, also, an intimate knowledge of, and acquaintance with, all the tenants on the estate, their respective circumstances and characters, so as to be able to distinguish the industrious from the indolent, and the honest man from the worthless. But to attain this general knowledge, where there are from 1000 to 1500 tenants, the greater part of them residing in remote countries, distant, perhaps, forty, fifty, sixty, nay seventy<sup>1</sup> miles from the factor, is scarcely to be attained in a lifetime by one man ; but if a factor resided in each district, each would soon become sufficiently acquainted with all the tenants under his charge, and would, from a knowledge of their circumstances, prevent their running in arrear beyond what they could pay: could likewise, with ease, in his own district, take care that public edifices, such as churches, manses, &c. do not become ruinous for want of timely repair: could protect woods from depredations, and the salmon in the rivers from being destroyed by the country people, in the forbidden or spawning seasons: could settle and adjust any disputes or difference that might arise among the tenants, superintend the progress they made in cultivating the waste<sup>1</sup> grounds, the method they used in raising and working up their flax, and receive their yarn, from time to time, as it became ready: and lastly, could protect  
the

the people from many impositions, now complained of in some of the remote districts, namely, that of having their cattle taken from them, at an undervalue, by persons affecting a superiority over them; and at other times, by little extorting money-holders and engrossers, who, for affording a little supply of money, when any distress occurs, take their cattle at their own price.

Having said so much, as to the advantages that would arise from having different factors in different districts, on a large estate, it is surely unnecessary to state the disadvantages which must necessarily arise from having only one, more especially if the property is particularly extensive.

*Conclusion*,—On the whole, as this country, though thinly peopled for its vast extent, has in it a number of unemployed inhabitants; as they are supplied, at little or no expense, with several of the principal necessaries of life, such as fuel, candles, &c.; as they have some corn to feed themselves, and a good deal of grass to maintain their cattle, it is thought that with such advantages, if agriculture and manufactures were carried on with spirit, these people, now struggling with poverty and distress, might, in the course of a very few years, not only pay the rents to which they are now subject, without difficulty, but also, in process of time, might be able to bear a considerable advance without oppression, living, at the same time, much more comfortably and happily than ever.

## No. VII.

*Plan for the Improvement of the Estates of Skibo and Puffrossie.—Drawn up by George Dempster, Esq.*

THE estates of Skibo and Puffrossie contain about 18,000 acres of land, extending from the Point of Ardnacalk, on the north bank of the Frith of Dornoch, westward to Port-Leak, being an extent of twelve or fourteen miles. The bulk of the estate is hilly; but the hills are of no great height, seeming generally to rise about from 500 to 700 feet above the level of the Frith. There may lie about 200 families living on these estates, with the exception of the *mainsi* or house-farms, of each place. The farms are of small extent in arable ground, which produce some corn, and potatoes, hardly sufficient to maintain the families of the tenants, who pay their rents by the sale of cattle, which are fed in their houses, on straw, through the winter, and pick up a miserable subsistence on the waste and common ground of the estate, during the summer. The whole of the present rent is from 700/. to 800/. a year, of which more than a fourth part is paid by the two large farms belonging to the mains, or mansion-house. The estates furnish some wood, with which, and the swarded surface of the ground, cut into the form of large bricks, they make houses and offices for themselves, covering them with the same swarded turf, cut thinner, and resembling slates in their form. Once in three years, all the earthy part of these houses are thrown on the dunghill, and new houses built again of the same materials. The cattle commonly occupy one end of the house, during the winter season. Some holes in the walls and roofs serve for windows and chimneys.

An

An iron pot, for boiling their food, constitutes their principal furniture. Nothing can exceed the wretched appearance of these habitations. As to the occupation of the people, the women begin to earn a little money by spinning. The young men go early in the spring to the South Country, and hire themselves for all kinds of country labour; towards harvest, many of the women also go the same way, to assist in cutting down and getting in the crop. They all return before winter, and are said to pass their time round good fires of peat, which the country every where furnishes, and to do very little work. In the South Country, however, to which they go, they are remarked for their assiduity, and are said to be indefatigable in executing all manner of task-work. Those who remain at home, attend to the concerns of their corn, potatoes, and cattle, and to the providing of their fuel from the neighbouring peat-mosses. The climate, near the banks of the Kyle, or Frith of Dornoch, ripens wheat, barley, oats, and pease; becoming gradually colder, as you recede therefrom, and ascend the hills, which are covered with heather, interspersed with coarse grass. The valleys among the hills, and the ground on the sides of the hills, appear to be capable of being cultivated: and there are many little rising grounds, some flat moors, and the face of some of the hills so bare and stony, as to be fit for plantations only. I need not premise, that the inhabitants are in general poor; that is, possess little money or goods, except a stock of very indifferent cattle.

*Plan for their Improvement.*—It is not the intention, therefore, of the Proprietors, to exact for some time any increase of rents from these people; but, on the contrary, to encourage them, by every possible means, to improve their little **spots of land**, and to construct for themselves  
**more**

more comfortable houses, and to build them of more durable materials. On these estates, there are some stations remarkably well adapted for villages. They lie on the banks of the Kyle, which is a frith or arm of the sea, navigable for seven miles by vessels of considerable burthen, and for small craft about fifteen miles more. In all, this frith is navigable for twenty-four miles. To give a beginning to these villages, a company is formed, consisting chiefly of Glasgow gentlemen, who have subscribed a capital of 3000/. and made some progress in erecting a manufacture of spinning cotton by jennies, and of weaving their yarn. Instructed persons are sent from Glasgow to conduct the work, and to teach the natives of the county the arts of spinning and weaving. The town is lotted out, and some houses for weaving in forwardness. Vessels of fifty tons burthen can land their cargoes at this place.

A second village, two miles lower down the Kyle, is also lotted out, and a large warehouse already built. Here the water is deep enough to receive any vessel which can enter the Kyle, and come over the bar at its mouth, known by the name of the *Gizzing Briggs*, on which there is four fathom water at spring tides, and six or seven feet less at neap tides. Here, also, a gentleman has undertaken to establish the weaving of linen, and to encourage the extension of the spinning of yarn all around the country. At both manufactories, apprentices will be instructed in weaving, in order to introduce that art into the houses of the small tenants, as it is found already to be in the shires of Renfrew^ Perth, Angus, and Aberdeen. By these means, constant employment will be found for people of all ages and sexes and a considerable market opened for the productions of the county.

That



That the people may have nothing to divert their attention from their own business, all the services performed by them and their cattle, to their superiors, are commuted into money, and thirlage to the mills of the baronies is also abolished. Measures are taking to give the people secure possession (for their own lives at least) of their houses, gardens, and arable lands, with full liberty to cultivate as much of the waste land as they please. Their cattle are suffered to pasture on the waste lands, as long as they shall remain in a waste condition; but the Proprietors reserve to themselves the power of enclosing, and planting, all such parts of the waste lands as are fit for no other purpose. Some plantations of this kind have been already made, and the trees seem to thrive very well on the lightest soils. The trees are principally the larch, the Scotch fir, and the birch intermixed with beech and mountain ash. The rest of the waste lands are open to every new settler who shall incline to cultivate them. Twenty or thirty new settlers have already exhibited strong proofs of what Highlanders can do in the improvement of their own country, when secured in the enjoyment of the fruits of their labour: it may be worth while to mention the nature of this security. The first settlers may improve as much land as they find waste around them, for which they pay only one shilling a year, during their lives; when they die, their heirs have the refusal of their fathers possessions, at an appraised value to be fixed by arbitrators mutually chosen. This rent invariable till the next generation, When the valuation is to be repeated, and so on every generation. A little iron for tools, wood for their houses, and seed potatoes, and corn, are furnished to them \*br the first two years. They are exempted from every species of personal service. Those who have visited  
the

the mountainous countries of Switzerland, Wales, and Norway, have seen what liberty and security can do towards rendering them fertile. In addition to the **general freedom**\* which the inhabitants of this happy island enjoy under our mild and durable constitution, the inhabitants of these estates will enjoy perfect security as occupiers of land. **That** these **advantages** will lead them gradually to better their houses, to improve their lands, and to alter their own condition in every respect, for the better, is beyond doubt.

To **calculate** the **advantages** which **will** in time accrue, from this system, to the owners of 18,000 acres of land on which it is introduced, would be no easy matter -, but the following observations will lead, perhaps, to the forming some idea of them.

Land lets for potatoe grounds and other purposes, round many towns in Scotland, at various rents, from 1A to 10/. Manufacturers in Lancashire, and in some of the counties of Scotland, pay for the little spots they occupy, in the country round their **own** houses, from 1/ to 4A **starting per aa**. The cotton manufacture is said to **have** doubled the rents of Lancashire, within these last 20 years. The demand for wood is very great ^ and as all the wood on this estate will be near a **navigable** frith, the wood will fetch the current price, and be liable to little **deduction**, from the facility of carrying it to market; while the facility of being supplied with that article from the Baltic is said to lessen yearly. The **probable** future value of these estates cannot be easily ascertained i but, we know, that wherever industry ha^ extended itself in Scotland, the rents of land have risen at least threefold, and much more in the neighbourhood of towns, it is to be observed, that this system is attended with no expense whatsoever to the Proprietors, **except**

that part of it, which consists in planting the useless land ; and which, as it is considerable (perhaps not less than 3/. per acre), may either be omitted, or done on a smaller scale, and by slow degrees, according to *the* faculty and inclination of the Proprietor.

Shall we state none of the advantages but those of *a pecuniary* nature ? Is nothing to be set down for the pleasure of beholding the progress of the prosperity of a country ? Is the Joy of seeing houses and towns rising around you, of no value ? Nor the ultimate benefit derived to your country, by adding to it industrious inhabitants and cultivated land \ thriving towns and flourishing manufactures ? Is there no pleasure in beholding the growth of woods of one's own planting ? Nor the success of a system so intimately connected with the happiness of people placed by Providence under our care ? Some have thought, that it would be a fitter use for the Highlands to convert them into sheep-walks. That it might be better for the people to cultivate sheep, instead of black cattle, is probably true. That the sheep is a hardier and a more useful animal than the ox, may be true also. That the increase of rents, by converting cattle-breeding farms into sheep-walks, would be more sudden, than by the system here suggested, is not to be disputed. But that the estates would ultimately become more valuable, is by no means so clear a proposition. Tracts of land which have been converted into sheep-farms, yield little more, at an average, than 1/, sterling per one hundred acres. This is indeed a better rent than before. But how contemptible must this rent appear, when compared with an estate occupied by industrious manufacturers, and abounding in large woods of the finest fir, larch, and Other trees ? It is to be observed too, that there is a certain incompatibility between sheep, and inhabitants  
and

and trees. No care can protect new plantations from the depredations of sheep ; the common breed overleap every fence, and elude the utmost vigilance of the shepherd. The leaves of trees are their favourite food in summer ; and the bark is their medicine, as well as food, in winter. The lower grounds, now occupied by people, must be reserved for the food and shelter of the flock in winter and this circumstance seems to form the chief incompatibility between sheep and people. This argument will have the greatest weight with those, whose observation or inquiries may have led them to compare the mountainous parts of Spain, appropriated to sheep-walks, with the mountains of Switzerland and Wales, occupied by free industrious inhabitants. The comparison is not to be made by units or decimals for the advantages of men instead of sheep, are as thousands to one. As the understanding industry, and ingenuity of man, in a state of freedom, are superior to those of the brute creation, so is the value of an estate inhabited by mankind to one occupied by sheep.

It is true, that people need not be driven out of the country, because sheep are introduced into it. Villages may be built for them, where they might be employed in manufacture; . Let me ask, has that been the case ? And let me doubt a little of the success of villages by compulsion. It is one thing to build a village, to which people may resort if they choose it, and another to drive them from the country into villages, where they must starve, unless they change at once their manners, their habits, and their occupations. How much better would it be, gradually to introduce spinning-wheels and looms into their houses, than to drive them from their houses, their gardens, and their little fields ? Besides, are men as advantageously placed in villages, for cultivating the soil,

as **thea** dispersed over every corner of the estate / T<wds are said to thrive in proportion to the populuss of the **fcountry** around them. It is by a mutual exchange so commodities, that both towns, and I the country (round, mutually s;?pi>ort o ne another. Tocoiu!..!e, it is neither by feeding black cattle nor sheep, in the Highlands, that that country enr be improved, but by the introduction of arts and agriculture. **The** frst will *mzTG&e* the number ntid wealth of the people •, the latter will a ug- ment the quantity of the productions of the soil, both) for the Maintenance of people and cattle. But neither arts nor agriculture can prosper, unless the inhabitants are secure in the tenure by which they occupy the spots on which they live. Good laws, a **vigorous execution** of them, feus, and long leaser, are rhe great sources ot the prosperity of every country, and of Highland, as well .a of more fertile and champaign countries. Try the question by this test; X>ct us ask v ourselves, if the Highlands of Scotland possess at present those sources of improvement and wealth ? To the=c indeed, must be si:perade led, on **the** part of Government^ good roads, made at **the** public expense ; for no mountainous country can be completely improved, till it be made accessible by grod roads, tlu: expense of which its inhabitants are unable to defray.

To conclude, Sutherland, of all the counties north from Inverness, the eastern half of Caithness, and of Ross-shire, exceptcd, appears to me the most capable of improvement. The summits of its hills may be improved by being planted with larches; its valley\* by the plough. There es an immense tract of Lmd bounded by Lochshin on **the** west, and extending to the eastern extremities of the county, of great breadth, and almost flat, capable, in my opinipn, of carrying barley, **turnip**, potatoes, and sown grasses, but now covered with heath, and

and devoted to summer coarse pasture of a few miserable **fattie**. A lime, or rather marble **quarry** on the same side of Loch-shin, joined to decomposed moss ifrd turf, offer endless means of impf *oving this tr...* All *v* other valleys in this county may be improv< d a great *WLLJ* up the sides of the hills, by which they Arc i.v.mcd. The natural genius of the inhabitants of the county disposes them to delight in its **cukrwaios**. But **leases** must be granted tbcn, of no short duration \* they must be freed fro^n **pwcry-fcsdal servitude** } they must havet: *ab. j!utc disp<.is.il uf thtir'time, ami their labour; and,* for a "eieration or two, their rents must be small and **fixed**, and paid solely in cash, Premiums aftight be annually distributed among those who had cul.:v.:ted their possessions to **the best** purpuhi-; who *k\*&* built the b<st housesj and bred the best horses, cattle, and sheep. Their frugal habits enable them to live, from the start-Lhgahjost, on the scanty produce of **theft\* little** spot\*\ and, in tame, to cultivate them more extensively. The industry **of their** women by spinning yarn for our manufacturers, would, and does now, help them to subsist. Schools should be multiplied, so as *to* be within the reach of their children. V\* **ant** of schools is one of the greatest disadvantages under which those Highland **districts** labour. The law allows and provides for a school in every parish j but a Highland parish is almost ^s extensive ;5 • Lowland county. The **parish** of LVlech, in this county, & of 2G miles extent, **and** the **paHsii-sdiool** i be attended but by a small part of *the childre a.* Those who have visited Switzerland ana vVaies, wilt easfty mvc credit to the **soundness** of **th«e** ideas, for rendering a Highland district fertile and populous.

It is not much more **than** a **century** since **die** interior, *and* higher parts of the county of Forfar, were **nearly** in

the same condition with the interior of Sutherland. The tenants of its wanner and more kindly coast situation, occupied farms in the upper districts, to which they sent their horses and cattle to graze, during the summer months, while their own farms below were applied to the producing of corn, on the *in-field* and *wt-fitld* system. Many of those interior farms are now enclosed, improved, adorned with hedges, and hedge-row trees, and producing rich crops of wheat, turnips, oats, barley, and potatoes, almost to the summits of its two ranges of mountains, known by the names of the S:dlaw and Grampian Hills: while their summits have been planted with thriving woods of larches and Scotch firs, giving to the whole county of Forfar, a richly cultivated appearance. Such does Sutherland present itself to my sanguine imagination. But ideas precede realities. Fifty years ago, what were the canals, the agriculture, the illumination of our ~~ttt\*~~ the roads, the bridges, the villages, and plantations of the Highlands of Scotland, but ideas?

———7Vivenda dies en attulit ult-o,

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 \_\_\_\_\_ Mazagan.  
 Broom. Common yellow.  
 Buck, or French wheat.  
 Burnet. \_\_\_\_\_  
 Cabbage. Gibbs' true" drum-  
 head, for cattle.  
 \_\_\_\_\_ Thousand-headed.  
 \_\_\_\_\_ Scotch.  
 \_\_\_\_\_ American.  
 \_\_\_\_\_ Large red.  
 \_\_\_\_\_ Long-sided.  
 \_\_\_\_\_ White turnip above  
 ground.  
 \_\_\_\_\_ Purple ditto ditto, or  
 icohl rabi.  
 \_\_\_\_\_ White turnip under  
 ground.  
 \_\_\_\_\_ Tall green borecole.  
 \_\_\_\_\_ Tall purple ditto.  
 \_\_\_\_\_ Siberian hardy  
 sprouting.  
 Carrot. Large thick orange, for  
 cattle.  
 \_\_\_\_\_ Large thick red, ditto.  
 Canary.  
 Chicory.  
 Clover Common red.  
 \_\_\_\_\_ Perennial, or \$ow-grass.  
 \_\_\_\_\_ White Dutch.  
 \_\_\_\_\_ Yellow, trefoil, non-  
 such, or black grass.

Clover. Malta.  
 \_\_\_\_\_ Providential.  
 Flax, or linseed.  
 Furze.  
 Grass. Meadow foxtail  
 \_\_\_\_\_ Meadow fescue.  
 \_\_\_\_\_ Sheep's fescue.  
 \_\_\_\_\_ Hardish fescue.  
 \_\_\_\_\_ Purple ditto.  
 \_\_\_\_\_ Float ditto.  
 \_\_\_\_\_ Crested dogstail.  
 \_\_\_\_\_ Rough cocksfoot.  
 \_\_\_\_\_ Tall oat-grass.  
 \_\_\_\_\_ Yellow ditto.  
 \_\_\_\_\_ Meadow ditto.  
 \_\_\_\_\_ Sweet vernal.  
 \_\_\_\_\_ Great meadow.  
 \_\_\_\_\_ Common ditto.  
 \_\_\_\_\_ Marsh ditto.  
 \_\_\_\_\_ Compressed ditto j  
 \_\_\_\_\_ Annual ditto.  
 \_\_\_\_\_ Common ray-grass.  
 \_\_\_\_\_ Peacey ditto.  
 \_\_\_\_\_ Improved perennial d«  
 \_\_\_\_\_ Timothy.  
 \_\_\_\_\_ Yorkshire.  
 With many othrsortl.  
 Hemp. Russian.  
 \_\_\_\_\_ English.  
 Honeysuckle. French.  
 Lettuce. I^arge Cos\*. -  
 Lentils. Small.  
 \_\_\_\_\_ Large.

CATALOGUE OF AGRICULTURAL & BED 5.

Lucerne.

Mangel wurצל.

Mayf-seed.

Medicago, ntritma sorts.

Mitlr. Red.

White.

Mustard. Brown.

Oats. Early Es >rx.

Dutch brew.

• ' ' » Tartarian.

Poland.

Potatoe.

i Inlanders.

• Caspian.

Black.

Pank-y. Pfain.

Parsnip- L^r^o thick.

Pea. Mariboroug g rey.

Large grey rotmoval.

Early white.

White boiling,

Pearl.

• • • Blue I Russian.

Maple.

Potatoes. Ox-noble.

• \* , • • • Lac clampion.

• • »• Lari^c red.

^ - ^ ^ Nicholson seedling,

**I b i l l**

Rib-grass. Lamba-ton^ue, or

Upright plantain,

Rape, or coleseed.

Rye.

Sainfoin.

Sin della.

Tares. Spring.

Winter.

White

Pernmial.

Trefoil. Birdsfoot.

Common, various sorts.

Turnip. Eirlv <ironc

White NorfbJk.

Norfolk bell.

Stubble.

"•-•" Green top.

Turnip. Red-top,

Laree yellow.

(Jlobe.

-^ - - White tankard.

Grtn ditto.

Red-top dit.

Large Dutch.

True yellow Swedish,

or ruta haga.

White Swetf-ib.

Vetch. Kidney.

Chickling.

Pale-flowered.

Everlasting.

Great wool.

Six-flowered.

Tufted.

Bush.

Hoary.

Sainfoin.

Red-flowered.

Biennial.

East ;rd.

Broad-pod tied,

Rcmi

Sing Ic-flowtrcd.

Bfarbqnoe.

Flat-podded.

Hairy ditto.

exved.

Straked.

White-flowered.

White-stiedcd.

Horse-shgc.

Milk

Liquorice.

Weld.

Wheat. Red Lammas.

Common whit\*.

White hedg-c.

White Siberian.

Egyptian.

Sicilian.

Round African.

Zealand.

Cap.

Dantzick.

Woad.

Yarrow.