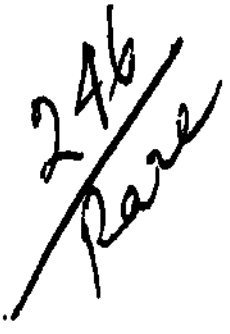
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THE JOURNAL

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(BOTANY.)

The Heleoplankton of three Berkshire Pools.

By B. MILLARD GRIFFITHS, M.Sc.(Birm.), F.L.S.

(PLATE 1.)

[Read 16th March, 1922.]

IN August 1910, a survey was made of nine pools in North Worcestershire with a view to ascertaining the plankton contents of relatively small bodies °£ water (Griffiths, 1912, 1916). The largest pool did not exceed eighteen acres in area, and the smallest was less than one acre.

The following work is a continuation of this type of investigation, and it *s hoped to extend the survey over the lowland arras of the British Isles, kittle work has been done on the heleoplankton of this country, although the larger lakes of the northern and western areas have been extensively studied.

Dining June and July 1920,.three pools were examined in the neighbourhood of Heading, Berks. The largest pool was twenty-three acres in area and the smallest seventeen. In every case the pools have been artificially constructed by the laying down of dams across stream-\alleys. The pools are all situated in extensive private estate, and are used only for fishing and shooting. They lie at an elevation of about 180 feet O.D., in the relatively flat district between the rivers Kennet and Loddon. They are all head-Waters, and receive their supply from low elevations little more thsin 200 feet i" height. The two Bulmershe pools drain to the Loddon, but Whitekuighfa

drains to the Thames. The oveiflow streams are of small volume, and their courses are for the most part through drainage ditches. The soil is London Clay.

Description of the Pools :—

1. Bulmershe North Pool.

   Area about seventeen acres. Depth about ten or twelve feet over the larger area. Banks covered with tall trees and a thick undergrowth of Rhododendron. A small stream enters at the top end. Sides of the pool fringed with large masses of *Equisetum limosum* and some *Nymphca alba* ; on the bottom much *Myriophyllum,* and in some places *Polygonvm ampldbium.* Water dark in colour and opaque, owing to quantity of plankton. Middle of pool free from weeds. Temperature of water six inches below the surface, 18 deg. C.

2. Bulmershe South Pool.

   Area about twenty-three acres. Pool much broader than the former and not so much shaded by trees. Banks covered with thick growth of Rhododendron, with trees some distance behind. At the upper end is park-land extending back to the mansion. Depth of water about six to ten feet over the larger area but shallower towards top end, where considerable masses of *Folygonum ampldbium* **and** *Ranunculus aqnatilis* occur. Water clear. At the south-west angle there is a small sphagnum bog. Temperature, 18 deg. 0.

3. Whitekniglits Pool.

   Area about eighteen acres. Pool elongated. Banks of pool lined with tall but not densely crowded trees; the dam lined with pollard willows. Sides of pool fringed with broad sheets of *Xympliea alba* ; middle completely free from weeds. Depth about twenty feet or more in middle, and the sides rapidly shelving. Water brownish in colour and opaque, owing to quantity of plankton. Temperature, 20 deg. C.

The water-supply of all the pools is from bottom springs and from park-land, and it is probably entirely free from contamination either from arable land or from house-drainage. In no case does a strong stream enter, and the outflows are small. The two Bulmershe Pools are separated by only a few hundred yards of woodland. Whiteknights Pool lies about a mile west of Bulmershe South Pool.

Tlie collections of plankton were taken by means of a fine silk net, six inches in diameter and eighteen inches long, towed behind a boat at a depth of n few inches below the surface. The course of the boat was along **the** middle of the pool, where weeds were absent.

List of Algtv.

ccc=abundant, cc=common, c=fairly common, r=lėw, rr=rare, rrr=very rare.	1S ool. B	if 1. •goo	Whiteknights Pool.
Temperature in ° 0.	18	18	20
CHLOltOPHYCE-E.			
Pandon'na morum (Miill.), Bory.	..	..	cc
EudorUia eleyans, Ehrenb.	..	cc	
Volvox aureus, Ehrenb.	..	c	
Pediastrum duplex, Meyen.	rrr	..	r
„ *tetras* (Ehreub.), Ralfs.	..	rr	
Crucigenia rectanyularis (Naeg[1].), Gay.	r	c	
„ *Tetrapedia* (Kirchn.), \V. & G. S. We3t	..	..	rr
„ *minima* (Fitschen), Brunnthaler.	..	..	rr
Scenedesmus quadricnuda (Turp.), 13r^b.	...	..	r
„ *hijuyatus,* var. *arcuatus* (Lemm.), G. S. West..	rrr		
Anhisti'Oflesmm lalcatus (Oorda), Ralfs.	..	c	
Kirchneriella obesa (West;, Schmidle	..	r	
Oocystis parva, W. & G. S. West	..	rr	
„ *solitaria,* Wit tar.	..	r	
Nephrocytium obemm, West	..	rr	
Tetraedrun minimum (A. Br.), llansg.	..	c	
„ *triyonum* (Naeg.)> llansg.	..	r	
„ *muticum* (A. Br.), flansg.	..	..	c
„ *hastatam,* var. *palatinum* (Schmidle), llansg. ..	..	..	*v*
„ *reyukwe,* Kiitz., var. *Incus,* Teiling[1].	..	..	*v*
Lagerheimia wratislaviensis, Schroeder.	..	..	rr
Dictyosphairium pulchellum, Wood.	c	rr	rrr
Spheerocystw Schroeteri, C hod at———r			
(rlatocystis yiyas (Kiitz.), Lagerh.		r	
Clwterium aciculave, T. West, var. *subpronum,* (J. S. West..	..	ccc	
Pleurotanium Trabecula (Ehrenb.j, Naeg.	..	r	
fi'fastrum vernicosum, Ehrenb., var. *coarctatum,* Delp.		rrr	
Micrasterias papillifera, Brób.		rrr	
Cosmarium abbreviatum, Hacib.		rrr	
„ *bioculatum,* Bre*b.		rr	
„ *Phaseolus,* Bre'b.		c	
„ *turgidum,* Bréb.		rrr	
„ *man/at itiferum,* Menegh.		rrr	
„ *ovale,* Raifs.	..	rrr	
„ *Meneyhinii,* Bre'b.		cc	
Xanthidium antilopeum (HrGb.), Kiitz.		c	
Arthrodesmus bifidus, Br^b., var. *truncatus,* West.		rr	
Staitrastrum Bienianum, Rabenh.			
„ *altcrncms,* Bre'b.		IT	
„ *cuspidatum,* R'llfs		rrr	
„ *furciyerwn,* Bréb.	..	rrr	
„ *tetifenmi,* Rsilfs.	rr		

List of Algta (contd.).

ccc=abundant, cc=common, c=fairly common, r=few, rr=srare, rrr=very rare.	Bulbochaete Pool.	Bulbochaete Pool.	Nitella Pool.
Temperature in ° C.	18	18	20
CHLOROPHYOE/E *(cant.).*			
Desmidium Schwartzii, Agr.	..	r	
Spharozosma sp.	..	rr	
Railiqfilum conjunct in wn, Schniidle	..	rr	
Geminella intervupla, Turp.	..	r	
HETEROKONTiE.			
Tribonema affine (Kiitz.), G. S. West	ccc	..	c
BACILLARIE/E.			
Rhizosolinia lomiUeta, Zach.	..	..	r
Synedra ^4«w, Kiitz.	..	..	ccc
Cyclotella Kuetzinyiana, Thwaites	..	..	c
Stephanodiecus Hantzschianus, Gruu.	..	..	r
MYXOPIIYCEiE.			
Microcysiis (Bruginosa, Kiitz.	..	r	
Aphanothece microscopica, Naeg.	..	r	
*Aphanocapsa delicatis*ima,* G. §. West	..	c	
„ *Grevillei* (Hass.), Ilabenh.	..	IT	
Nodularia sph(Bromrpa, Born. & Flah.	..	..	rr
TERIDINIE.E.			
Glenodinium uliyino$um, Schilling'	..	rrr	
Peridinium Willei, Huitf.-Kaas.	cc	cc	
„ *cinctum,* Ehrenb.	c		
„ *an</licum,* G. S. West	rr	..	c
„ *bipes,* Stein, and var. *evcisum,* Lnnm.	c	c	
„ *incompicuum,* Lemni.		c	
„ *Suttoni,* sp. nov.		..	cc
Ceratmm Hinindmella (0. F. Miiller), Sehrank, 3 h.	ccc	..	ccc
,* tt ;; ;; 2 h.	..	ccc	
DINOBRYACE/E.			
Dhwbryon Sertularia, Ehrenb.	ccc	1	

THE ALGA-FLORA.

The marked individuality of planktons noticed in the pools of North Worcestershire (Griffiths, 1916) was found to hold in the case of the Berkshire pools. The planktons are so different that a single glance under the microscope is sufficient to distinguish them from each other.

The dominant plankton constituents, arranged in order of abundance, are as follows :—

1. Bulmershe North Pool. *Ceratium Hirumiinella* (three-horned for in), *Tribonema affine, Dinobryon Sertularia, Peridinium Willed P. cinctum, P. bipes, Dictyosphwrium jndchellum.*

2. Bulmeishe South Pool. *Ceratium Hirundinella* (two-horned form), *Closterium acieulare* var. *subpronum> Peridinium Willei, Kudorina elegans, Cosmarium Aleneghinii, Peridinium bipes, Volvoa aureus.*

3. Whiteknights Pool. *Ceratium Hirundinella* (three-horned form), *Syncdra Acus, Peridinium Suttom, Pandorina morum, Peridinium anglicum, Tribonema aftne, Cyclotella Kuetzingiana.*

It will be seen from the above table that the most abundant organisms of the plankton are the Peridiniea?, no less than eight species being present in the three pools. In this respect tie pools differ from those of North Worcestershire, but resemble that of Bracebridge Pool, Warwickshire (West, 1909 ii.). One species, *P. Suttoni,* occurring abundantly in Whiteknights Pool, is new, and *P. Willei,* found in quantity in the two Bulniershe pools, has not been recorded previously for small lowland pools. *P. Willei* closely resembles *P. cinctum,* with which it was associated in Bulmershe North Pool. *P. anglicum* was originally described from Bracebridge Pool, and it also occurred in Stanklin Pool, Worcs. (Griffiths, 1912, 1916). It formed a considerable proportion of the plankton of Whiteknights Pool, in association with *P. Suttoui.*

In every pool the bulk of the plankton consisted of *Ceratium Hirundinella.* The form with three basal horns occurred in both Bulmershe North and Whiteknights, but the twe-horned form was confined exclusively to Bulmershe South. The two three-horned forms were not absolutely identical. It is notable that the two Bulmershe pools, in spite of their close proximity, contained entirely distinct forms of the organism, whereas the more distant Whiteknights had a form practically identical with that of Bulmershe North.

Peridinium bipes occurred in both Bulmershe pools, and in each instance included the type-form together with the variety *excisum.*

Peridinium inconspieuum has been found previously in Brsicebridge Pool. It was fairly frequent in Bulmershe South.

Glenodinium uliginosum was found in very small numbers in Bulmersh© South, but its condition indicated that it was probably a mere casual from the small sphagnum bog near the south-west corner of the pool.

A striking feature of the plankton is the very small number of J\lyxophycea> present. Only five species were found, and none were in any quantity. The Bacillariere are also very poorly represented by four species, but one of these, *Synedra Acus,* OQeurred in quantity in Whiteknights Pool. The paucity of these groups may be due to the absence of contamination ot the water by house-drainage or by drainage from arable land.

The dominance of *Tribonema aftne* in Bulmershe North Pool is a peculiar feature, as its usual lntbitit is in ditches etc. Species of this genus appear^ to become temporary plankton forms occasionally. *Tribonema minus* (Will©)* Hazen, is recorded as suddenly appearing in the plankton of Lake Mendota, Wisconsin (Smith, 1920), and 7'. *bombycina* forma *depavperata,* Wille, occurs in some of the Danish lakes (Wesenburg-Lund, 1908). *T.* <#** is also given as occurring in some of the Scotch lakes (West & West, 190J)- In the case of the Berkshire pools, the distribution is peculiar, for ^e organism is absent from the adjacent Bulmershe South Pool and present in the more distant Whiteknights.

The Desmids are represented by some twenty species—nineteen i*1 Bulmershe South, one in Bulmershe North, and none in Whiteknights. Most of them were found in very small numbers, and they are most probably derived from the small sphagnum bog or from the weeds. In the case ot *Closterium acicidare* var. *subpronvm*^ however, we probably have a true plankton desmid. It formed a considerable part of the plankton oi Bulmershe South Pool, associated with *Xanthidium antilopevm,* which, though not in great abundance, was in a healthy and dividing condition. *Staurastrum teliferum* was the sole desmid found in the neighbouring Bulmershe. North Pool, but only in very small numbers.

Of the other important plankton organisms, *Pandorina monim* was confined to Whiteknights, and *Eudorina elegans* and *Volvos aureus* were confined to Bulmershe South. The Flagellate, *Dinobryon Sertularia,* was very plentiful in Bulmerslie North, where also *Dictyosphcvriwn pulchelhun* attained some importance. The latter alga was the sole form common to all three pools.

The above account shows that the planktons even of adjacent pools are very dissimilar. The causes of the differences are very obscure, for though it has been shown by West and West (1900) that, in general, dominant desmid planktons are associated with " purity " of water, the factors determining the distribution of other organisms are practically unknown. In the case of the Berkshire pools, their situation on similar subsoils, in closely similar environments and in close proximity, does not prevent the most

marked differences in the contents of their planktons. It will be seen that the adjacent Bulmershe Pools have only four species in common, whereas Bulmershe North and Whiteknights have five species in common and Bulmershe South and Whiteknights only one. Thirty-eight out of the forty species found in Bulmershe South are confined to that pool, five out of thirteen to Bulmershe North, and fourteen out of nineteen to Whiteknights.

The causes of the distribution are doubtless complex in any case, but the complexity will be even greater in a small pool than in a large lake. Assuming that the main factor is the nature of the substances dissolved in the water, it follows that the variations in the composition and concentration of the solution will depend mainly on the volume of water in the pool or lake. For in the first place, any given depth of rainfall will dilute the bulk of a large lake much less than the same depth of rainfall would that of a small pod. The drainage also, bringing in dissolved substances, will have a much smaller effect on the composition of the large volume ot water in a lake than on the lesser volume in a pool. Furthermore, the fringe of aquatic vegetation will materially alter composition of the water by the "*", .» J of "substances necessary for growth and by the addition of the products of decay ; and as the weed-fringe of a small pool is relatively greater in me-portion to the bulk of water than in the case of a lake, the smaller body ot water will undergo greater variations in the nature of the substance**.

In a small poof, therefore, slight differences in the volume of water, 01 „ the size and nature of the drainage of the area, or in the amount of kmdof aquatic vegetation, will exercise a relatively great effect on the eompo^on of the water solution. It is therefore not surprising that the planktons ot small pools should differ from one another to the extent they do.

Whatever the chemical effects of the aquatic vegetation may be, what one might call, the ecological effects are all important in the case of the snuer bodies of water. The alg* collected by the plankton net are in the majority o£ cases not permanent denizens of the surface water, but are derved£rom the benthos. Their true habitat is among the leaves of the macrophytic aquatic vegetation or in the mud of the shallower parts, and they .re earned out by the agitation of the ..tor by the wind. They mingle widi the troplanktonic alg* for a time, but as they have no devices with which to^ counteract the pulf of gravity, they soon sink below the region ot minimum photic

" Of the [illegible] *uliginosumlL* Volvocacea,, and perhaps the two desmids and *XantLuan antilopeum* may claim to be planktonc The jebt.it from the benthos, even though they may be in large numbers. It i o k ^ therefore, that the plankton of a small pool is to a large « ^ « P ™ ^ the presence of aquatic vegetation; and as it is possible that diflerent species

of aquatics may harbour different communities of algae, the various plant-associations met with in small pools will again tend to accentuate the differences in the planktons.

SPECIES OF SPECIAL INTEREST.

1. PERIDINIUM WILLEI, Huitf.-Kaas., West, Algse 1916, p. 62.

This Peridinian occurred plentifully in the two Bulmershe pools. In the South Pool it occurred alone, but in the North Pool it was associated with P. *cinctum*. It is widely distributed in the larger lakes of the British Isles (West & West, 1909), but it has not been found in any of the Worcestershire or Warwickshire pools. Its occurrence in a relatively small pool is therefore of some interest. P. *Willei* resembles P. *cinctum*, differing mainly in the shape of the third apical intercalary plate and in the slight median asymmetry of the platos of the hypovalve. It also closely resembles *P. Volzii*, Leinin., var. *australe*, G. S. West (West, 1901 i.), thu chief difference being in the even more marked asymmetry of the hypovalve ot the Litter. The diagram of the plates of P. *Willei*, given in the ' Siisswasser-flora,' Heft 3, p. 45, fig. 51, differs considerably from that given by West. The identification has been made from West's figures, as they seem less diagrammatic than the others.

2. PERIDINIUM SUTTONI, sp. nov. (PI. 1. figs. 1-6.) '

This species formed one of the dominant constituents of the plankton of Whitoknights Pool. It appears to differ from any species previously described. The epivalve is more or less conical and slightly longor than the hypovalve. The latter is hemispherical and' provided with short, stout spines. Using the nomenclature of Kofoid (see West, Algse, 1916, p. 15), the structure of the cell-wall is as follows :—

The plates of the epivalve comprise 6 precingulars, 4 apicals bounding the somewhat elongated pore, and 1 pentagonal apical intercalary plate surrounded by 2", 3", 4" and 2', 3' (PL 1. figs. 3,5). The hypovalve is medianly symmetrical, consisting of 5 postcingulars and 2 equal antapicals (figs. 4, 6). Each of the postcingular plates except No. 3, and both the antupical plates, bear one broad-based conical spine more or less centrally placed. Occasionally there are two spines on each antapical plate and none on the Nos. 2 and 4 postcingulars (fig. 6).

All the plates are minutely punctate. Intercalary bands may develop between the plates, but as a rule those between the apical plates remain narrow. There is an elongated and sinuous flagellar pore in the vontral groove.

Most of the specimens were either empty or thoir contents were aggregated into cysts. The alga is therefore most probably an early summer

form, and the collodion was taken at the end of its phase. The associated *P. anglicum* was in the same condition.

The species has been named after the family of Sutton, whose name is closely associated with the Heading district, and whose contributions to horticultural and agricultural botany are well known.

DIAGNOSIS. *Peridinium Sultoni,* sp. now ; corporc in partibus insequalibus duabus a fossa transversa diviso, parte apicali vel anteriori conicali, parte mferiori vel posteriori semisphsericnli; fossa transversa requatoriale disposita.

Epivalva e tabulis 11 composita ; tabulis precingularibus (3, tabulis apicalibus 3, tabula intercalaria 1.

Hypovalva e tabulis 7 composita; tabulis antapicalibus a?qualibus 2, uni vel duobus spinis conicalibus ornatis ; tabulis postcingularibus 5, e quibus 4 plus vel minus medialibus spinis conicalibus ornatse sunt. Tabulae punctulalse delicatissima?.

3. PERIDINIUM BIPES, Stein, and var. EXCISUM, Lemm.

The type-form and the variety occurred together in both the Bulmershe Pools. The type-form was much less numerous than the variety. The .specimens also were more tumid and less attenuate than is shown in the figure given in the Siisswa&sorfl., H. 3, p. 36. Occasionally forms were found in which the basal spines were dentate (see PL 1. fig. 7).

4. RHIZOSOLENIA LONGISETA, Zach.

The diatom was found in very small numbers in Whiteknights Pool. It occurs in the plankton of some of the Scottish lakes and in pools on the Continent, but it is an uncommon alga. Three specimens are figured (PL 1. fig. 9) to show variations in size.

5. STEPHANODISCUS HANTZSCHIANUS, Grim. (British F. W. Algre, G. S. West, 1904, fig. 127 A, p. 277).

This diatom also occurred in Whiteknights Pool in very small numbers associated with *Cyclotella Kuetzingiana* and *Synedra Acus.* It has been recorded in the British Isles from Lough Neagh, and is a distinctly rare alga.

6. LAGERHEIMIA WRATISLAVIENSIS, Schroeder. (PL 1. fig. 8.)

The alga occurred in very small numbers in AVhiteknights PODI. It is distinguished from similar species by the position of the spines, which are placed in alignment with the major and minor axes of the cell. It is recorded twice for this English Midlands (Grove, 1920, p. 27), and it is a sporadic constituent of Continental pools, but is not commonly found.

7. CRUCIGENIA TETIIAPEDIA (Kirchn.), W. & G. S. West. (PL 1. fig. 11.)

This organism was found in very small numbers in Whiteknights Pool. Only colonies of four cells were seen. It is recorded from the plankton of Lough Neagh and from that of the Oder.

8. CRUCIGENIA MINIMA (Fitschcn), Brunnthaler. (PL 1. fig. 12.)

This minute species also occurred in very small numbers in Whiteknights. Pool. It resembles *Tetrastrum staurogenieforme,* but differs from it in the complete absence of spines and the smaller size and the looser arrangement of the cells. It has not been recorded previously for this country.

9. RADIOFILUM CONJUNCTIVUM, Schmidle. (PI. 1. fig. 10.)

The alga was found in small quantities in Bulmershe South Pool. The mucous investment is exceedingly delicate and transparent. The median transverse lines of the cell are distinctly seen. Colonies consisting of as many as fifty cells occur, but in most cases the number is about half that. The alga has been recorded for the South of Europe and for Australia, but it has not previously been found in this country.

10. CERATIUM HIRUNDINELLA (0. F. Miiller), Schrank.

Each of the pools had its own form of this very variable) species. The three-horned form occurred in Bulmershe North Pool and in Whiteknights, but the two forms were not absolutely identical. In Bulmershe South Pool the two-horned form was found. In each case the particular form was present without any intermixture with the other.

In conclusion, I wish to thank Mr. J. Kushbrook of Bulmershe Court for his kind permission to collect from Bulmershc Pools, and Mr. Guy Hargreaves of Whiteknights Park, and Mr. Hearst of Foxhill for permission to collect from Whiteknights Pool. I should like also to thank Mr. L. Button and Mr. M. H. F. Sutton for their help regarding the latter pool.

Department of Botany,
Armstrong College,
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May, 1921.

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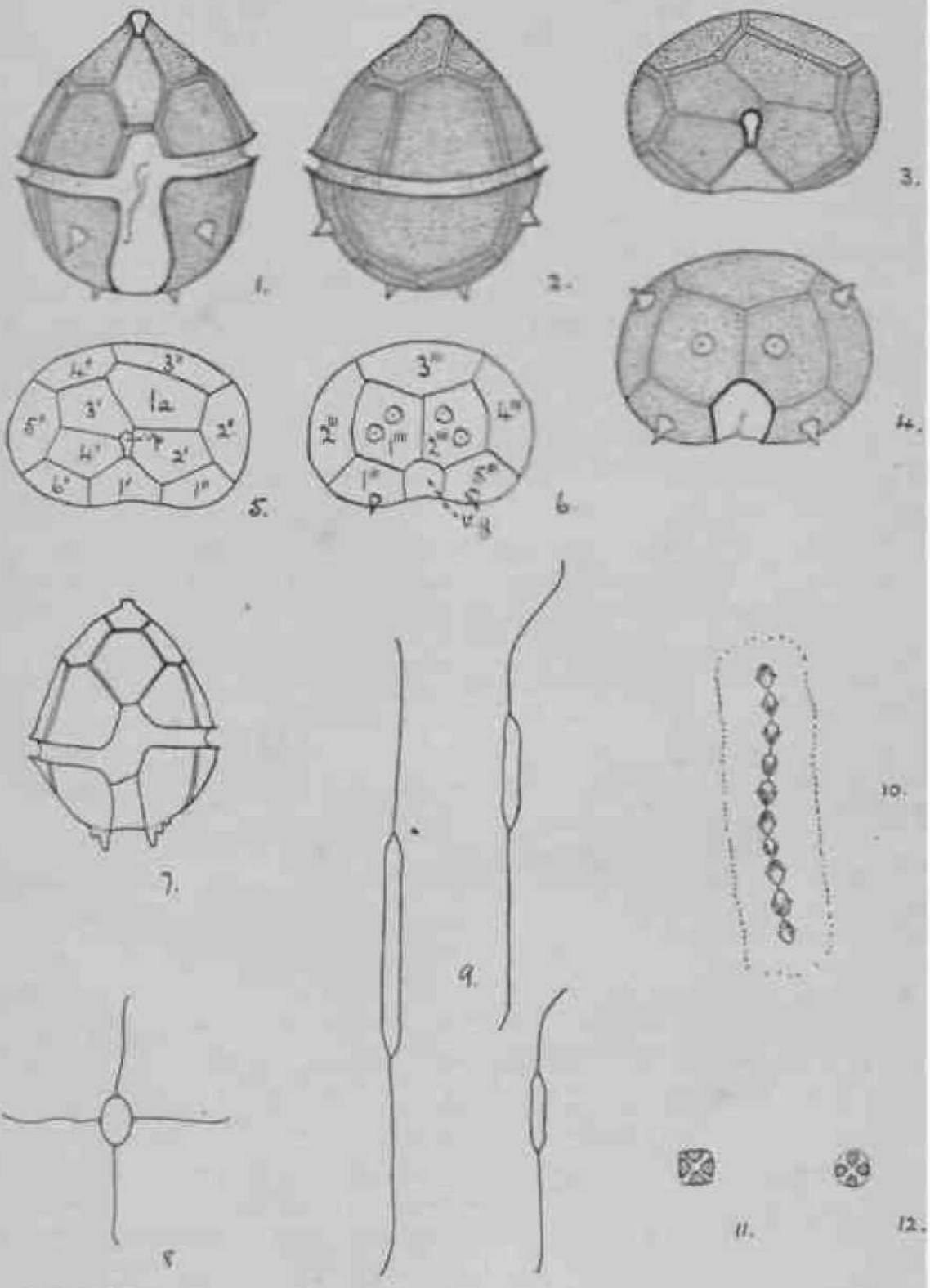

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DESCRIPTION OF PLATE 1.

Fig. 1. *Pendinium Suttoni:* ventral view. X 1200.

2. „ „ dorsal view. X 1200.

3. „ „ apical view. X 1200.

4. „ „ antapical view. X 1200.

5 *k* 6. Diagrams of plates of valves: l'-4', apicals; la, apical intercalary; l"-0", precingulars; ;>., apical pore ; r"-5'", postcingulars ; l""-2"", antapicals; *v.g.*$_f$ ventral groove.

7. *Peridinium bipes*: ventral view of form with dentate spines. X 650.

8. *Lagerheimia wratislaviensis.* X 650.

9. *Rhizosolenia longiseta:* three specimens. X 650.

10. *Radio/Hum conjunctivum.* X 650.

11. *Crucigenia Tetrapedia.* X 650.

12. „ *minima.* *X* 650.

A Systematic Account of the Plants collected in New Caledonia and the Isle of Pines by Mr. R. H. COMPTON, M.A., in 1914.—PART III. Cryptogams (Hepaticae—Fungi). (Communicated by Dr. A. B. RENDLE, F.R.S., Sec.L.S.)

HEPATIC/E.

By WH. H. PEARSON, M.SC, A.L.S.

(PLATES 2, 3.)

[Read 4th March, 1920.]

A CONSIDERABLE number of Hepatics have previously been collected in New Caledonia by Balansa, Buss, Deplanche, tftesse, Franc, Germain", M.& Mmo. I-erat, Sarazin, Savès, and Vieillard ; these have all been named by Stephani, with the exception of three by Bescherelle & Spruce; these are all recorded in Stephani's ' Species Hepaticarum.'

Most of the species published are endemic ; many of these have been collected by Prof. Compton ; and the numerous new species in the following list are also endemic.

They are all closely related either to those of Malaya or Australia. I have no desire to add to the list of new species, but where I have not been able to allocate the plant to any species already described, or to find it to agree with an J of Stephani's species which I have seen, I have described it as new. A am vain enough to think that if any of my supposed new species have MIready been published by Stephani, my full descriptions will enable future students to be better able to identify those published by Stephani, whose descriptions are in some cases very short and vague. I use the relative terms for s'ze of plants and cells as adopted by Dr. Spruce.

I refuse to adopt Trevisun's generic name in place of Spruce's *Acrolejeunea*, and can give good reasons for doing so.

Through the kindness of Prof. Lesage, of Rennes, I have had the opportunity of comparing my specimens with many of Stephanies originals, which has been of great assistance to me; my thanks are due to him; also to Mr. A. Gepp for his valued help in translating my descriptions into Latin and for other assistance.

PLACUOCHASMA BISETULIM St., Sp. Hep. Suppl. vi. (5, 1917.

Obs. Stomata large, surrounded by six large cells; squamae purple; appendages bi-setu!ose.

Endemic.

Jfab. Mont Mou. On stones and mud, by stream. 471).

DUMORTIERA NEPALENSIS (Tayl.), Nees,Nat. Eur. Leberm. iv. 169, 1838.

Hygropyl nepalensis* Tayl. in Trans. Linn. Soc. xvii. (1836) 392, pi- 15. f. 2.

Marchantia trichocephala Hook. Ic. PI. pi. 158, 1837.

Dumortiera hirsuta latior Gottsche, Lindenb. & Nees, Syn. Hep. 544, 1846.

Dumortiera hirsuta trichopus Spruce in Trans. Bot. Soc. Edinb. xv. (1885) 587.

Dumortiera velutina Schiffin. in Denkschr. Math.-Naturw. Cl. Kais. Acad. Wien, kvi. 156, 1899.

Dumortiera calcicola Campbell in Ann. Bot. xxxii. (1918), pi. 8. f. 9.

Obs, Prof. Alexander W.Evans, in his latest paper on the genus *Dumortiera* (Bull. Torrey Bot. Club, xlvi. (1919) 167-188), reduces all the known species of this genus to two, *D. hirsuta* (Sw.) and *D. nepalensis* (Tayl.), the former with a smooth antical surface, the latter with a papillose one ; all Prof. Compton's specimens belong to the latter.

The list of synonyms is taken from Prof. Evans's admirable paper.

Hah. Ermitage Stream. On rocks in spray of waterfall. 180. Mont Canala. High forest, 900 ft. 1138. Moilt Canala. On rocks by stream in deep shade, 1500 ft. 1184.

MARCHANTIA. BERTEROANA Lehm. & Lindenb.; Lehmann, Pug. Plant, vi. (1834) 21.

Marchantia tabularis Nees, Naturg. Europ. Lebenn. iv. (1838) 71 (foot-note).

Marchantia:cephaloscyha Steph. Hedwigia, xxii. (1883) 51. ,

Prof. Alexander W. Evans, in his paper "The American Species of *Marchantia* " (Trans. Conn. Ac. vol. xxi. 1917), has some useful notes on **Exotic *Marchantia.* He reduces *M. tabularis* Nees and *M. cephaloscypha* St.** to synonyms of *Berteroana* Lehm. & Lindenb. I sent him specimens of Prof. Compton's No. 1807, and he writes :—" I am much interested in *Marrhantia* from New Caledonia. I think that it represents *M. Berteroana,* and the occurrence of this species in New Caledonia would not be surprising when we keep in mind its wide distribution in the Southern Hemisphere. It seems to me that the appendages in your plant are not absolutely entire, but tint they show faint crenulations here and there, and I have seen appendages similar to yours in material from other localities. I am afraid my descriptive phrase, as you imply, is a little misleading, I did l.ot mean to suggest, however, that every mirginal cell projected in all cases, but t uit projecting calls could be found on practically all appendages. It would have been better if I had brought out **this** idea more clearly/' The appjn lagcs of Prof. Compton's plant are, generally speaking, quite entire, marginal cells minute, the cupules acutely lobite, each lobe terminating in a

long, straight, or hamate cilium, with the margin of the lobes fringed with short spines ; cupules very large and high, exterior surface papillose. I have not had the opportunity of comparing it with specimens of *M. Berteroana.*

Hub. Mont Panie. Spreading over burnt wood in forest, 1500 ft. 1807.

Distrib. Cape of Good Hope, Transvaal, St. Helena, Australia, Tasmania, New Zealand, Fuegia, Patagonia, Chile.

MARCHANTIA LKCORDIANA St., Sp. Hep. in Bull. Herb. Boissier, vii. (1899) 525.

Medium size; pale yellowish green in colour. Fronds simple, obate, furcate or bifurcate, regular, narrow, plano-convexulous; nnt.cal side fl,t, postical slightly convex, at the middle 20 small cells thick, w. h a few larger ones interspersed. Sto.nata numerous, regularly or irregularly d.s-persed, clear, with no projecting interior cells, 3 tiers high of 4 barrel-shaped cells. Cupules small, mouth wide, spreading, not lobate very sha low, margin dentate-spinulose, teeth 1 to 3 cells long, 2 cells wide at the base, exterior of walls verruculose. Scales oval, entire, or with a few very minute distant teeth; appendages small, purple, reflexed, oonatneted at the base, reniform, orbicular or ovate, apex acute, margin dentate, with 10 to 12 teeth. Kays of mole flowers 7, cuneate, apex retuse.

Dimemions. Fronds 1 to 1* inch long, 5 mm. to 7'5 mm. wide; scales 1 mm. x -5 mm.; appendages 4 mm. x '3 mm., '3 mm. X -25 mm.

Ob. As noled by Prof. Evans, the appendages to the scales afford an excellent character for discriminating the species of *Marchantia.*

In *M. Lecordiam* they are very characteristic. I have had the opportunity of comparing my specimens with the original specimens in the herbarium of the late General Paris.

S J r S L Mou. On old tree stumps, in dense forest, 2200 ft. 450. Mont Arago. Abundant along stream side, in forest, 1000 fct. 14-b.

AKEURA PULCRA Pearson, sp. nov. (PI-2. figs. 1-a.)

Uioica(?), mediocris rubello-brunnea stratificata. Frondes b-pmnatae; pinn* et pinnuUe ascendentes patenti-div,rgentes (70°) vl Rentes (50) digital flabellilbrmesve ; caulis exalatus sectione transversa ovahs b.con-vexus, angulis rotundatis, cell-las 6 crassus et 12 latus, cellulis penphencis 50 minuUs; pinn^ pinnuteque opposite sub-oppos^ve reonmte» b.con-vex«l$_{ffi}$ alat*; alia cellulas 2-3 latis, eoM celhilas 4 crassa et 10 ato Flosculi feminei secus caulem utrinque dispostti, oppos^i, bracteis unmatuns laciniatis. Androecia haud visa.

Di^nnoh, Fronds 1 inch long; stems -6 mm w,d*x;4 mm tlnck ; pinn$_{ffi}$ 3-5 mm. long; pinnuUe 1 mm. to 1-5 nun. long ; pnund. 3o mm. wide x-07 mm. thick; bracts "55 mm. high x'4 mm. (explanatc) wide.

Obs. The genus *Aneura* is not a particularly beautiful one, but this species is peculiarly striking and handsome.

A considerable number of specie3 of *Aneura* are recorded by Stephani from New Caledonia, but none of those described by him agrees with this.

A. elegans is pale green, longer, regularly bipinnate, pinnae 10 mm. long (in *A.pulcra* 3 mm.), stem #9 mm. x #4 mm. (in *A. pulcra* #6 mm. x '4 mm.), angles on both sides acuto (in *A.pulcra* rotundate), pinnae '67 mm.X[f]17 mm. (in *A. pulcra* ·35 mm. x '07 mm.).

A. Leratii is autoicous, stem narrowly winged.

A. multispivata, brownish-green, flaccid, pinnre 1*33 mm. x *02 mm.

A. pembarensis, cross-section narrowly elliptical 1*17 mm. X'025 mm.

A *plana,* flaccid, pale brown, 1-67 mm. x -25 mm.

A. subpalmata, stem 1'25 mm. x [B]33 mm., pinna? 1*33 mm. x '25 mm.

A. valida, coriaceous, 1*33 mm. x "58 mm.

A. venosa, of which only a very imperfect description is given by Stephani (Sp. Hèp. Suppl. vi. 1$J7), has numerous long flugella ; *A.¸ pulcra* has none.

Hab. Ignambi. Matted coating on gneiss boulders in moist surroundings 3000 ft. 1529.

ANEURA VIRIDISSIMA (Schiflfner), St., Sp. Hep. 273, 1898.

Riccardia viridissima SchifiEner in Denkschr. Kais. Ak. Wien, lxvii. (1898) 176.

Dioicous. Medium size; dark green in colour ; csespitose. Stems simple or furcate, undulate, margin irregular ; cross-section narrowly biconvex, 10 cells thick at the middle, gradually decreasing until 2 cells thick at the margin, no wings ; 100 cells wid9 ; cortical cells only slightly smaller than the inner. Oalyptra smooth. No $ seen.

JHmensions. Stems 1 inch long, 5 mm. to 7'5 mm. wide, 1 mm. thick at the middle.

Hub. Igiv.unbi. On rocks by creek, 3000 ft. 1530.

Distrib. Java.

ANEURA PLANA St., Sp. Hep. Suppl. vi. 38 (1917).

Var. MINOR Pearson, n. var.

Sterilis. Mediocris flaccida pallide brunnea irregulariter multi-ramosa,. ramis exalatis pinnatis bipinnatisve; caulis sectione transversâ anguste biconvexus, 1*67 mm. latusxO*25 mm. crassus (cellulas 10 latusX4 erassns),. cellulis periphericis 40 minimis, interioribus magnis hyalinis.

Obs. Agrees with the type (in herb. Général Paris), but is smaller.

Endemic.

Hub. Ignambi. Attached to stones under water, in running creek*. Forest, 2000 ft. 1548-

ANEURA SUBPALMATA St., Sp. Hep. Suppl. vi. (1917) 43.

Dioicous ? Small; dark yellowish-green in colour ; densely imbricate caespitose. Stems irregularly furcate, wingless, on cross-section oblong-biconvex, 5 to 6 cells thick at the middle, 20 cells wide, cortical cells very small, inner large, hyaline ; branches as wide as stem, also wingless; texture very coriaceous ; apices of branches retuse ; immature ? bracts lacerate. Only young ? seen.

Dimensions. Stem *i* to f inch long, 1 mm. to 2 mm. wide, *3 mm. thick,

Obs. Agrees well with Stephani's description in its oblong-biconvex stem, minute cortical cells, large inner ones.

Endemic.

Hub. Ignambi. Forming dense coating over rocks by creek, moist forest, 2000 ft. 1547.

ANEURA COMPTONII Pearson, sp. nov.

Dioica, mediocris pallide luteo-bruunea arete caespitosa. Caulis irregulariter ramosa lobata, lobis magnis et ambitu irregalaribus, antico planus, postice convexulus, sectione transversii linearis fere ad marginem usque sequicrassus, margine tenuiore cellulam 1 crassus, medio cellulas 6 crassus ; cellule peripheries paginse posticas c. 100 parva3, interiores magnse hyalina?, duae intimse maxima; ; testnra firma coriacea; celluloe peripheries paginse anticie parva? leptodermes, cellulse subjacentes magnse oblonga? hyalinse parietibus firmis rubello-brunneis. Pagina postica rhizoideis crebris hyalinis obsita. Calyptra brevis cylindrica clavata, prope basin cellulas 8-10 crassus, cellulis peripheries 150 parvis, apico pnpillis c. 6 niiignis conicis multicellularibus coronata ; braetcae basales 2 ovato-acutse.

Planta mas amentula crcbra brevia crassa gerens, alveolis in pi\ria 3 Qispositis, limbo antico laciniato.

Obs. Looks very like a *Pellia* in size and shape, and might easily be mistaken for that genus.

Although Stephani describes a number of species of *Aneura* from New Caledonia, 1 find none to which this species can be assigned ; the coriaceous texture of the plant is one of its distinguishing characters.

dimensions. Stems 1 to 2 inches long, 2 to 5 mm. wide, '2 mm. thick ; calvptra 3 nun. longx 1*25 mm. thick.

Bab. Mont KoMii. On stones and earth, in spray of cascade, 1000 ft. 755.

ANEURA MACRANTHA Pearson, sp. nov.

Monoicu, mediocris luteo-viridis caespitosa stratificata radiculosa. Prone finna simplex lobata vel fnrcata irregularis, margine integro, sectione transversl plano-cqnvexa, medio cellulas 12 crassa, utrinque sensim attenuate margine cellulam 1 crassa. Squainre ad calyptra3 basin nullre. Calyptra

maxima cylindrica lsevis paulo clavata, medio cellulas 6 crassa, ore parvo, umbilicata.

Androecia ramis binis brevibus sita, alveolis in 3 paria dispositis. Capsulse valvsG bistratse, sectione transversâ collulas quadratas, cellularum interiorum pariete exteriore crenulato, exhibentes. Sporse verruculosse fusco-brunnese. Elateres angusti attenuati pallide lutci monospiri, spirâ 10-plo circumvolutâ.

Dimensions. Fronds 1 to] £ inch long, 5 mm. wide, *'6* mm. thick at the middle; calyptra 10 mm. longxl'5 mm. thick; wall of capsule '03 mm. thick ; spores "02 mm.; elaters '225 mm. long x '01 wide.

Obs. The very large calyptra for this medium-sized plant is exceptional. In the whole of Stephanies 'Species Hepaticarum' he describes only a few with very large calyptra (5 mm. long) ; *A. lonyiflora* St. from Tasmania, 8 mm. long; *A. pulvinata* from Bolivia (Herzog), described as with " calyptra gigantea, 3 mm. long" [Printer's mistake probably!] ; *A. maxima* (•Schiffner) from Java and Sumatra, a plant 10 cent, long and 12 mm. wide having a calyptra 15 mm. long x 2 mm. thick ; my *A. macrantha* cannot bo a small form of this, for it is monoicous with calyptra smooth.

Hab. Ignambi. On rocks by creek, 3000 ft. 1530.

ANEURA LOBATA (Schiffn.), St. in Bull. Herb. Boiss. vii. (1899) 761.

Riccardia lobata Schiffn. in Denkschr. Kais. Ak. Wien, Ixvii. (1899) 178.

Hab. Mont Koghi. From bark and rocks, near stream, 1000 ft. Forest.

METZGERIA LUCENS St., Sp. Hep. Suppl. vi. (1917) 54.

Sterile ; small ; flaccid ; ramose, branches postical; costa delicate, 3 to 4 cells thick, 2 antical and 2 postical cells, narrowly elliptic; antical plane, postical projecting ; oosta, wings, and margin without *seise* ; cells very large.

Dimensions. Stems 1" inch long, 1'5 mm. wide ; costa *'2* mm. wide ; cells '15 mm.x '125 mm.

Obs. Stephani records in Sp. Hep. Suppl. three species without setae, two of which have very large cells, and one of them, *M. marginata* St., has very narrow (#03G mm.X'09 mm.) marginal cells; he does not mention this character in his description of *M. lucens,* although he gives the size of the marginal cells of this species as #027 mm. x "09 mm. Prof. Compton's plant agrees best with the brief description of *M. lucens.*

Endemic.

Hab. Ignambi. On gneiss rocks, in moist air, 3000 ft. 1531.

METZGERIA MARGINATA St., Sp. Hep. Suppl. vi. (1917) 55.

Dioicous ; fronds 1 mm. wide ; setae on costa and margins only ; cells •1 mm.x"075 mm., marginal cells very small ; only young $ seen.

Hab. Mont Arago. Bark of tree, in moist forest, 2000 ft. 1450.

HYMENOPHYTUM MALACCENSE St. in Hedwigia, xxxiv. (1895) 46; Sp. Hep. (1 7.

" Original cells small; they, along with the 2 to 3 adjoining cells, firm , costa very broad, 5 cells thick and 15 cells broad, umer cells large, cortical cells small; 5 row of double cells on each sxde: of costa· Belongs to the *Podomitrium* section, as also does //. *PlyUanthvs* (Hook.), from winch it differs in being smaller, more rigid in texture, ^ T ^ ^ " ? ? *

Hal. Ignambi . On gneiss rocks, in moist air, 3000 ft. Ia31-1532.

HYMENOPHYTITM FITBOATOM Pearson, sp. nov.

Dioica(?), mediocris vcl clatiuscula pallide viridxs «. « t o - . . .Caules basin versus radiculosi; inferne exalati supernc angus to. f ^ ti ™ ^ cative, segment circa 10 latitudine *qualib«s regulanbus xntegns^uce retusil, alls c. 20 cellulas latis, cellulis majuscuhs m^gmsyc *V* ^ ^ oblongo -quadratis leptodermibus, trigonis ^ ^ tica plano-similibus'vel parvulis. Costa sectione transversA oblongo-e^p s crassa convexa, antice convexa postice plana vel convexula, 8-12 eelId. ; costa 15-20 odlnh. lata, cdlulis „eriphericis 50 et intonores « » ^ ^ cursa. fasciculis axialibus 1-2 iuscis e cellulis angustzssxnns ^ ^ -5 an

nimennon. Stems 1 to H inch long ; segments l'2o mm. ^ J *2* mm. wide; costa -3 mm. thickx'6 mm. broad, 2'2o mm.x . mm., cells ·075 mm. × ·05 mm.

Obs. Belongs to the *Umbraculum* section ; differs from *H. flabellatum* (Hook.) in its much larger size, segments one-half as many and not flabelli-form ; cells twice the size, usually elongate, with thin walls and no trigones ; in *H. flabellatum* the walls are somewhat thick with distinct trigones.

Hab. Mont Canala. Covering rocks, near creek, 2500 ft., damp forest· 1211.

SYMPHYOGYNA NEOCALEDONICA Pearson, sp. nov.

Dioica, mediocris, pallide lutea.laxe o » osa. ^ ^ J ^ l ramos emersa posticos Marcos emittens ; costa radiculosa, rhmndexs e cellula fuse, ka 6–8 cellulas crassa ortis, sectione transversal! ongnste ovalis plano-conve: absentes hinc parvæ 10 cellulas lata; al» irregukres hinc e latere m 1 cellulas crassæ, 10–15 lobate, sectione transversal! costem ^ - £ ^ ^ oblong0 uad, t,, cellulas latiB (utraque ala) ; celluto maj» J uamæ crassse lobat0· cellule marginalcs majores quadra to P ^ ™ a J ffaangnst ecylind.ica lacinkt^hcmiis 20-25,3 ^ ^ ^ r ^ ^ ^ ore p L t o cLstricto tenera hyalina 2 cellules crassa, cellulis pexipiieiIOIS , ciliato, ciliis 20, 3 cellulas uniseriatas longxs.

Dimensions. Fronds 1 inch long, 2 to J m m. wide ; costa wide, 2 mm. thick ; cells ·06 mm. × ·07 mm., marginal cells ·08 mm. × ·08 mm. ; involucre 1 mm. long x '75 mm. broad ; calyptra 4 mm. × ·4 mm., 3 mm. x -45 mm., ·5 mm. x -4 mm·

Obs. The only other *Symphyogyna* recorded from New Caledonia is *S. picta* St., which has narrow marginal cells ('027 mm. x'07 mm.) and a thick pyriform calyptra.

S. neocaledonica is distinguished by its large, thick, quadrate marginal cells, which give the plant a distinctly marginate appearance; the calyptra is also long, narrow, and very delicate.

Ifab. Mont Koghi. On stones and earth, in spray of cascade, 1000 ft. 755.

TIIEUBIA INSIGNIS Groebel in Ann. Jard. Buit. Ix. (1890) 1.

Hub. Mont Cuhala. Douse mats on old trunks, in damp forest, 2500 ft. 1207. Ignambi. Dead logs by creek, forest, 3000 ft. 1594.

Distrib. Java, Tahiti.

NOTOSCYPHUS PAitoicus Scliiffn., Hepat. Buit. (1900) 83.

Flab. Mont Mou. On trees in high forest, 3500 ft. G16. Ignambi. On rocks by creek, 3000 ft. 1530. Ignambi. On gneiss- rocks, in moist air, 3000 ft. 1532.

Distrib. Java, Sumatra, Banca, Ceylon, Nilgherries, Luzon, Tonkin.

HAPLOZIA COMPTONII Pearson, sp. nov.

Paroica, parva fusco-viridis laxe caespitosa. Caules simplices radiculoti rhizoideis purpureis. Folia patentia vel erecto-patentia amplexicaulia concava decurrentia dissita vel contigua oblonga integra, cellulis majusculis hexagonis plerumque longioribus quam latis, leptodermibus, trigonis nuUis. Foliola nulla. Bractese foliis similes sed majores, basi saccatae sed antheridia nulla includentes. Perianthium e bracteis dimidio exstans fusiforme cylindricum loricatum 5-plicatum, carinis irregulariter crenulatis, ore parvo setuloso, setis c. 10.

Dimensions. Steins £ inch long, diam. '3 mm.; with leaves 1*5 mm. wide ; leaves 1*25 mm. x *9 mm., 1*1 mm.x '8 mm.; cells '04mm., 0G mm. x "04 mm.; bracts 1*75 mm. xl'25 mm. ; perianth 3 mm.X'75 mm.

Obs. Only a few stems were met.with, but with perianths; the saccate bracts indicate a paroicous inflorescence, but I was not able to meet with any antheridia ; tho narrow perianths bring it near to *Haplozia pumila* (Hook.), but they are more loricate.

Hab. On rocks in stream, forest, 500 ft. 1958.

JAMESONIELLA BALANS^E St. in Hedwigia, xxxiv. (1895) 4C.

Stems 1 inch long ; perianths terminal or with strong innovant postical branches with perianths, sometimes 4 on a stem; leaves subopposite; mouth of perianth ciliatc.

Endemic.

Hub. Mont Mou. On trees in high forest, 35U0 ft. GIG.

PLAGIOCHILA COMPTONII Pearson, sp. nov.

Dioica, elata, fusco-viridis laxe csespitosa. Caules ramosi ramis diyergentibus. Folia subopposita patentia (50°) vel erecto-patentia (30°) oblongo-ovata vel oblongo-triangularia, margine antico (inferiore) decurrente integro vel dentibus paucis distantibus armato, raargine postico (supenore) curvato paulum ampliato ad caulis medium attingente, interduni ad basin reflexo, dentes magnos 7-15 gerente; apice trnncato 2-3-dentato ; oellate parvul* vel mediocres, subrotundat*, pachydermes, trigonis nulhs. Bracte* late ovatje margine inferiore denticulato, superiors dentes magnos c. 15 gerente. Perianthium bracteis immersum parvum oblongo-quadratum complanatnm, ore lato dentibus tequimagnis 35-40 ornato. Andrcecia haud visa.

IHmensions. Stems 2 to 3 inches long; leaves 2'5 mm. X *IS* mm.; cells •03 mm.; bracts 2'5 mm. X 1'5 mm.; perianth 2-25 mm. x l-o mm.

Ob,. I have compared this species with a great number from Asia-Oceania-tropica,but find none like it, the nearest being *P. Belangenana* Lmdenb., from which it differs in cell structure and in the small hidden pemntb.

It has been referred by one authority to P. *nutans St.*; but I have had the opportunity of comparing it with the original, from winch it ,s quite different.

Hub. Ignambi. Rising from rocks. Moist forest, 2000 ft. Io46.

PLAGIOCHILA LACIXIATA Pearson, sp. nov.

Dioica, elatiuscula fusco-brnnnoa c^spitosa. ('auhs parum ramosus, ram» ..scendenlibus. Folia subopposita vel alterna contzgua patenti-d ve, gent a (70°) oblongn, margine antico (inferiore) recto vel parum curvato, mbjio iecurrente, n^rgint postico (superiore) curvato ad cauhs medium attingonte' apicem versus pLidentato; apice truncate 2-4-dentato; cdluto med.ocres subrotundate p'achydermes, trigonis nullis. Brae to* oblongo-ova *^rmuginibus ambobus laciniatis, laciniis longis ligulat.s snnplicibus b^dis e perianthium circumvestientibus. Peranthium late brev.terque obcon.cum ore laciniis longis fimbriato.

Dimensi™. Stems 1^ to 2 inches long, diam. '2 mm.; with eaves 4 mm. wide; leaves 2 mm. x 1 mm., 2'5 mm. x 1 mm., 3 mm. x 25 mm.; cells •035 mm.; bracts 2-75 mm. x 15 mm.; perianth 1* mm. x I'D mm., lacing 1 mm. to 1-5 mm. long; processes 3 mm. X "3 mm., 1-5 mm. X 2 mm.

Obs. Specimens of *P.fructicosa* Mitt. Bootang, Himalaya' coll liev. L Dural, det. Schiffner (ex Herb. Levier) come nearest to it, but have a narrower leaf with fewer and coarser teeth, perianth with shorter and fe« T h y ' this species should be placed in section *Brevifolia* by Stephani I cannot understand.

Hob. Ignambi. Rising from rocks. Creek-side, moist forest, 2000 ft. Io46.

LOPHOCOLEA LEVIERI Schiffn. Hepat. Buit. (1900) 182.

Paroicous. Small, corticolous. Stems simple or slightly branched; leaves entire, retuse, bidentato or pluridentate ; underloaves free or slightly connate on one side, bifid to below the middle, with a small exterior tooth on each side ; involucre and perianth relatively large ; bracts dentate ; bracteole dentate.

JHmensions. Stems \ to £ inch long, diam. *2 mm.; With leaves 1*5 mm. to 2 mm. wide ; leaves 1"5 mm. x '75 mm., 1 mm. x '75 mm., "8 mm. X "6 mm-; perianth 2'25 mm. X 1 mm.

Obs. Lophocolea Levieri^ named by Schiffner in honour o£ one of the most accurate and generous of Italian cryptogamic botanists, is recorded from Java and Sumatra ; the New Caledonia specimens agree in every particular with Schiffiner's description, except in being rather smaller.

Lophocolea Levieri is the only paroicous species belonging to this genus recorded from Asia and Oceania by Stephani, in his list of 2G7 species.

Our native *L. heterophylla* (Schrad.) is described as monoicous, whereas it is usually p.iroicous. *L. Levieri* might well be regarded as the Eastern representative of *L. heterophylla,* as the range of variation in its leaves is from entire to paucidentate.

Hah. Mont Mou. On stones and mud in stream, 800 ft. 444. Mont Mou. On bark. 478. Mont Koghi. From bark and rocks, near stream, 1000 ft. Forest. 801. Mont Arago. On old fronds of a filmy fern. Moist forest, 1000 ft. No locality. 804.

Java, Sumatra.

(JHILOSCYPHUS ARGUTUS Nees, Syn. Hep. 183 ; St., Sp. Hep. (1906) 215.

Leaves oblong-quadrate, apex rotundate, with 5-8 small teeth, marginal cells small; underleaves connate on both sides, bifid with 1 large marginal tooth at each side, sometimes 2. Androociu on short branches.

HaU. Mont Koghi. From bark and rocks, near stream, 1000 ft. Forest. 801.

Asia tropical and subtropical ; Pacific Is. Australia and New Zealand subtropical.

(JHILOSCYPHUS BEESLEYAXA Pearson, sp. nov.

Dioica, mediocris olivaceo-brunnea crcspitosa. Caulis simplex vel parum ramosus. Folia alterna imbricata horizontalia vel patenti-divergentia oblongo-quadrata vel ovato-quadrata, margine antico (inferiore) parum curvato decurrente, postico (superiore) curvato ; apex quam basis triplo augustior truncatus late lunulato-retusus bidcntatus segmentis divergcntibiis acutis; cellulrc majusculse subrotundatse trigonis magnis. Foliola cum foliis ambobus anguste coalita, quam caulis 4-5-plo latiora, magna, ad medium vel altius bifida, sinu lato, segmentis acuminatis utroque lacinias 2 mannas curvatas extrorse gerente. Androocia ramis brevibus posticis dis^osita.

Dimensions. Stem 1 inch long; diam, of stem '2 mm.; with leaves 4 to 5 mm. wide; leaves 2 mm. longxl-4 mm. wide at base and -4 mm. at apex ; 2*25 mm. x 1*4 mm. at base and "4 mm. at apex, 2 mm. x 1*25 mm. at base and '4 mm. at apex ; cells "05 mm.; underleaves 1 mm. highxl-25 mm. broad; segments -75 mm.

Obs. I cannot refer this to any of the few (12) bidentate *Chiloscyphi,* recorded by Slephani from tropical Asia and Oceania.

I associate it with the name of my friend Mr. Hy. Beesley, who has given me a great number of Exotic Hepatics which have been very useful in the examination of the present collection.

Hob. Ignambi. On rocks by creek, 3000 ft. 1530.

CHILOSCYPHUS ?

Obs. Fragments of a *Chiloscyphus* which I cannot refer to any described species, but too imperfect to name. Leaves opposite, quadrate or oblong-quadrate, apex shallowly bidentute, segments small, acute; underleaves narrowly connate with both leaves, quadrifid to the middle or below. Androecia small, catkin-like.

Hab. Mont Koghi. From bark and rocks, near stream, 1000 ft. Forest. 801.

CHILOSCYPHUS OOMPTONII Pearson, sp. nov. (PI. 2. figs. 6-19.)

Dioica, parva luteo-brunnea laxe crespitosa. Caulis simplex vel interdum ram a in emittens, a fronte compressus, sectione transversâa 8 cellulas latus C cellulas altus, cellulis peripheries c. 20 interiores simulantibus, usque ad apicem radiculosus, rhizoideis pallide brunneis in fasciculos c. 10 filorum rectorum dispositis et e foliolorum basibus ortis. Flagella nulla. Folia-sub-opposita horizontalia vel parum erecta patula imBricata recurvata irregulari-formia oblongo-quadrata ovatave, apice truncato vel acnto vel bidenticulato; margine antico (inferiore) ad caulis medium attingente 3-5-dentato, ad angulum basalem decurrente acuto e caule fere latitudinis dimidio libero ; margine postico (snperiore) dentem magnum et auriculain rohmdatam com-pressam, sectione transversâ anguste ellipticam, gerente. Textura flaccida ; eelluloe majusculro rotundatae pachydermes, trigonis niagnis; cuticulâ papillosâ. Foliola cum foliis utrinqne cellularum ponte angusto coalita, quam caulis 4-5-plo latiora, c. 3-plo latiora quam alta, late subquudrata, margine superiore curvato 4-5-dentato, utrinque auricula compressâ rotundatâ coronata. Inflorescentia feminea postico-lateralis magna; bracteoD perianthii parti inferiori adnataj in 3 paria dispositse ; paris infimi ovato-quadratw, apice truncato, dentatie, utriculum subevolutum gerentes ; paris intermediati oblongo-quadratje laciniato-dentata?, ad {- plus minus bifidse, sub-bracteolâ late ligulata dentata undulatft ; paris intimi tenerro adinodum leptodermes ovatro Iaciniata3 undulatae, bracteolâ oblongo-quadratâ laciniato-dentatâ.

Perianthium inferne tubulare 4 cellulas crassum obovatum, bracteis iminersum, trigonum alatum, alis irregularibus augustis vel latis (1-6 cellulas latis) margine crcnulato ; superne alis longis iiuiltis (9), perianthio adnatis, fere e basi ad apicem percurrentibus, irregularibus undulatis, interdum apice liberis lingniformibus, ornatum ; os perianthii latum 3-lobatum, lobis quibusquc lacinias c. 10 lon^as (6-10 cellulas longas) gerentibus. Calyptra tenera archegoniis 8 rubellis vel basin versus vel sparsim ornnta. Capsula ovalis leptodermis pariete unistrato ; pedicellus inferne sectioiie transversA cellulas peripliericas 18 quadratas (8 cell, in diametro), sectione longitudinali cellularnm quadratarum pallide brunnearum ordines 35-40, exhibens. Sporse numerosissimse minutissimse rotundatse laeves pallide rubello-brunnese margine pallidioredistincte (tamefi perfecte mature). Elaterea pauci dispiri, spins plus minus 15-plo circumvolutis.

Inflorescentia mas postico-lateralis seu vere postica ; amenta brevia e bractearum 4-5 paribus dense imbricatarum composita secunda ovalia ventricosa,lobo bifido, segmentis acutis, lobulo pauluin mitiore; aiitheridia splierica solitaria ; bracteola ovato-acuta bidentata.

Dimensions. Stems £ to 1 inch long; diam. of stem "225 mm.; with leaves 2 mm. wide; leaves I mm. long x *75 mm. wide; cells '04 mm.; underleaves *8 mm. widex3 mm. high ; lowest bracts 1'25 inin.X'6 mm. ; bracts 1-5 mm.xl mm.; perianth 2 mm. X 1*5 mm. upper portion; arcliegonia -225 mm.x'05 mm.; pedicel 1 mm.x-02 mm.; capsule '75 mm.x •5 mm.; spores '015 mm.; elateis *1 min.x'015 ram.; male bracts, lobe •5 mm.x'3 mm., lobule '4 mm.X'3 mm.; raale bracteole *3 nim.X'2 mm.; aiitheridia '15 mm.

Obs. This is a very remarkable species, neur to *C. cymlaliferus* (Hook, f. & Tayl.), Gottsche, Lindenb., & Nees, from which it differs in many characters. I am surprised that none of our authorities has raised this species to full generic rank, as it has several characters separating it from *Chiloscyphus.*

Hah. Mont Koghi. Dense mat on upper surface of fallen log. Forest, 3000 ft. 740.

ZOOPSIS RIGID A Pearson, sp. nov.

Dioica, parva hyalina, inter hepaticas repens, flagella postica aphylhi radiculosa ecostata, c cellulis elongatis composita, emittens; rhizoideis numerosis in filorum fere senorum hyalinorum fasciculos congregatis. Caulis simplex, vel ramos posticos paucos interdum attenuatos emittens, planoconvexus vel biconvexus, paginft, anticâ planâ vel parum convexâ (sectione transversâ) 4 cellulas latâ, cellulis 2 interioribus late oblongo-quadratis, cellulis marginalibus pachydermibus (trigonis nullis), interne quadratic, externe conicis vel rotundutis liberis eminentibus,in paria approximatis (sinu angusto interjecto), et apicibus setas singulas minutas orectas vel hamatas striolatas gerentibus; paginâ postieâ convexa (sectione traiisverssi)4 cellulas

lata, cellulis 2 interioribus minutissimis costam obtegentibus et 2 lateralibus (intramarginalibns) qnadratis vel oblongo-quadratis.

Inflorescentia feminea ramulo postico brevi orta; bractese e cellulis teneris oblongiscomposite lanceolate acuminate. Perianthia et androecia baud visa.

Dimensions. Stems £ inch long, "5 mm. wide, "2 mm. thick; costa #05 mm. wide; middle antical cells 1*5 mm. xl mm., marginal cells 1 mm.; setae "075 mm. long ; bracts #4 mm. long.

Obs. Differs from *Z. setulosa* Leitgeb in being more robust and rigid ; in the marginal cells having a narrow sinus between two of them, not a largo gap; seta? usually longer and narrower ; pericluetial bracts small and very delicate, composed of narrow elongate delicate cells, quite different from the stem cells ; in *Z. setulosa* the cells of the bracts are large, similar to the cells of the stem.

Hub. Ignambi. On gneiss rocks, in moist air, 3000 ft. 1531.

NOWELLIA BORNEENSTS (De Not.), Schiffner.

Dioicous. Minute, 3 to 4 cells wide, pale yellow in colour; creeping amongst other hepatics. Stem simple or with few postical branches, radiculose, rhizoids single, long, hyaline, with suckers. Leaves distant, alternate, often secund, semi-amplexicaul, erect, usually parallel with the stem, bifid to the middle or below, segments setaceous, 4 to 8 uniscriate cells long, 2 cells wide at the base, hamato-incurved or spreading, proceeding from the angles of the lobe, lobe 4 cells wide at the mouth, cucullate, inflated, keel smooth, arcuate ; cells small, quadrate, walls thin, no trigoncs. No underleaves. Inflorescence $ on short postical branches ; bracts broadly lanceolate, bifid to about the middle, segments acuminate, serrate. Androecia on short postical branches, 3 to 4 pairs of perigonial bracts, closely imbricate, oval, lobe acute, lobule similar, almost equal in size ; antheridia oval.

Dimensions. Stems £ to \ inch long; diam. of stem "05 mm. ; \uth leaves '3 mm. wide ; leaves, lobe "15 inm.x 1 mm., '15 mm.x'15 mm., setae *1 mm. to '2 mm.] o n g ; cells -02 mm.; perigonial bracis '2 mm. x-125 mm.; antheridia -075 mm. x '05 mm.

Obs. One of the smallest and most beautiful of hepatics; De Notaris's figures are fairly good and enable the species to be recognized.

Nowellia curvifolia (Hook.) from Japan, of which I have seen specimens (Mt. Yokagura, Tosa; coll. Sliutai Okamura), agrees in every particular with our native species.

Sab. Mont Koo-hi. On upper surface of fallen log. Forest, 3000 ft. 740.

NOWELLIA LANGII Pearson, sp. nov. (PI. 2. figs. 20-34.)

Dioica, parva pallide brunnea dense crespitosu. Caules repentcs radiculosi, rhizoideis plurimis hyalinis srepe hapterophoris, simplices vel postice

pauci-ramosi, 5 cellulas lati, sectione transversâ cellulis periphericis 10, iaterioribus 5x5. Folia secunda amplexicaulia ascendentia, lobo palmato* late lanceolate laciniato-ciliato, lobulo votundato lsevi sed carinâ papillis 4 prominentibus prope lobum exornatâ ; cellulis majusculis anguste oblongo-quadratis ptiulum pachydermibus, trigonis nullis. Foliola nulla.

Inflorescentia feminea ramulo postico brevi orta ; bractese ovales acute serrulate fere ad medium bifida?, segmentis lanceolatis acuminatis ; bracteola bracteis similis. Perianthium ultra bracteas dimidio emersum lineare acute trigonnm e cellularum elongatarum (sectione transversâ 120) strato unilamellato eompositum, ore lato setis (2-3 cellulas longis, ad basin 2 cellulas latis) c. 50 ornato.

Androecia e ramis longis tenuibus orta; bractese in paria fere 10 disposita?, quam folia minores inflatse ovales, ad £ vel £ bifidae, segihentis acutis, parum dentate.

Dimensions. Stems ^ to 1 inch long ; diam. of stem '1 mm.; with leaves •5 mm. wide; leaves, lobes-with cilia • 7 mm. longx*6 mm. wide, lobule •15 mm. x -15 mm.; cells '075 mm. x -025 mm. ; papillae on keel "025 mm. X •025 mm. ; bracts 1#5 mm. x"75 mm., segments *G mm.; bracteole 1*75 mm. x-6 mm.; perianth 3 mm.x-5 mm.; setae at mouth \l mm.; perigonial bracts *3 mm.X'2 mm., segments *1 mm.

Obs. Hitherto only three species belonging to this genus were known—our native *A*^{T}. *curvifolia* (Hook*.), *A\ bomeensis* (Do Not.) from Malayn, and *X. Wrightii* (G.) from Cuba.

The genus was named by Mitten after old John Nowell, a Lancashire working-man botanist; my friend the late Dr. Carrington had a great regard for him ; his accurate knowledge of mosses and hepatics was only equalled by his generosity and kindly nature,

JS\ Wrightii (Grottsche) from Cuba, Dominica, and Guadeloupe is undoubtedly near to this species ; it is, however, a smaller plant of a purple-rosy colour, with leaves less ciliatc, with cells smaller and more quadrate, and devoid of the 3 to 4 large papillae on the keel, although some of the keels are slightly papillose ; bracts shorter and broader, less serrulate ; perianth smaller and broader in proportion (1'75 mm.X'5 mm.) ; mouth with fewer and more delicate setre.

Hab. On rotting wood, Maxwells Hill, Perak, Malaya (Prof. W. H. Lang). Ignambi. On rocks by creek, 2000 ft. 1530.

MASTIGOBRYUM MARGINATUM St., Sp. Hep. (1908) 449.

Ofo. The remarkable character of this hepatic is that the underleaves have a limbus of several cells deep, composed of thin-walled cells, quite different from the others; Stephani describes the nun-gin of leaves as minutely crenulate, I should say "minutely denticulate-serrate on the upper margin, entire or almost so on the lower," leaves tridentate, under-

leaves reflexed, three times broader than the stem, much broader than high.

Endemic.

Hah. Mont Koghi. On upper surface of fallen log. Forest, 3000 ft. 740.

LEPIDOZIA CHiETOCARPA Pearson, sp. nov. (PI. 2. figs. 35-51.)

Dioica, parva corticola. Caulis fusco-rubello-brunneus, ramis et foliis pallide-brunneis, radiculosa; rhizoideis cinereo-albis in filorum 4-8-norum (naptera magna gerentinm) fasciculos congregatis, rhizoideis rameis haptera pauciora et minora gerentibus; flagella pauca aphylla radiculosa emittens ; sectione transversS, cellulas 4 angustas latus, cellulis peripheric is magnis 12, mterioribus 8 x 8 ; regulariter pinnatus, ramis lateralibns dissitis alternis we sequilongis. Folia horizontalia vel ascendentia oblique inserta, usque ad basin 3-secta (raro 2- vel 4-secta), cruribus subulatis rectis cellulas unisonatas 10-12 longis ; folia ramea bicruria quam caulina longiora, cuticulft striolatft. Foliola transverse inserta quam folia minora 3-4-cruria—cauliua parva 3-4-cruria, cellulis longis, ramea longiora patentia.

Lnnorescentia fcminea e ramulo postico brevi orta ; bractese ad § laciniatolobatae, disco cellulas 2-4 alro, 8 lato ; perianthium magnum oblongo-obconicnm, cellulis clongatis unistratis compositum, ciliis multis longis simplicibua vel bicruribus vestitum, ore lato longe eiliato.

Androecia intercalaria ramis posticis brevibus orta ; bracteao perigoniales pana 4-5 dispositse dense iinbricatsa secundse bicrures, disco cellulas 3-4 alto, 4-5 lato ; antheridia solitaria ovalia.

dimensions. Stems f inch long, diam. 1 mm. to "125 mm.; with leaves 1*25 lni". wide ; stem crnra '7 mm. long ; cells *1 mm. long x *02 mm. broad ; underleaves '25 mm. high X"3 mm. wide ; branch underleaves crura -7 mm. |°n^-; bracts 1/25 mm. high, disc '4 mm. high ; bracteole 1*25 mm. long x f lnm- wide, disc -4 mm. high ; perianth 1*75 mm.x '75 mm., cilia at mouth nun. to #75 mm.; perigonial bracts *3 mm. long, disc *1 mm. wide, segments -15 mm. long ; antheridia "08 mm. x'06 mm.

Ohs. This is a very remarkable species, the delicate perianth being clothed with numerous long cilia.

Hab. Mont Koghi. On upper surface of fallen log. Forest, 3000 ft. 740.

IRICHOCOLEA COMPTONII Pearson, sp. nov.

oterilis ; mediocris vel elatiuscula tristc viridis dense crespitosa lanosa. Caulis flaccidus teres, diametro cellulas 15 lato, cellulis peripheric is quam mterioribus minoribus et fuscioribus, nudus bipinnatus, pinnis patentibus (50°) vel erecto-patentibus (30°) alternis ; pinnulis alternis, utrinque 3-4 dispositis, sub-83quilongis. Folia p.'iulo oblique inserta alterna, caulina patentia, ramea arete imbricata, G-lobata, disco brevi cellulas 2 alto 24 lato, lobis basi cellulas 4 latis irrogulariteret longe pinnatis, cruribus et lateralibus

et anticis et posticis; cellulis majusculis oblongo-quadratis striolatis. Foliola 4-fida, disco cellulas 1-2 alto 12 lato, lobis basi cellulas 4 latis pinnatis, cruribus longis.

Dimensions. Stems 1 to 2 inches long, diam. "3 mm. to -4 mm.; with leaves 15 mm. wide ; leaves, disc -1 mm. to '2 mm. high x #4 mm. to '6 mm. broad, lobes *6 mm. longx*2 mm. wide at base, crura #3 mm. to "4 mm. long ; cells '06 mm.X'04 mm.; underleaves, disc '2 mm. high.

Obs. Although this species agrees with Stephani's description of the disc (•2 mm. high x -4 mm. broad) and 6-lobate leaf-Form of *T. lerifolia,* the leaves are striolate, the plant not rigid but flaccid, and dull green in colour ; the crura proceeding from all round the lobes give it a woolly appearance, which is noticeable in the dried specimens of the plant.

Hah. Mont Mou. On stones and mud, in stream. 800 ft. 442.

TRICHOCOLEA GENICULATA Pearson, sp. nov.

Dioica, mediocris vol elatiuscula pallide brunnea, ramis jnnioribus pallidioribus, dense crespitosa. Caul is a front® compressus, sectione transversa cellulas interiores 20x20 transverse paulo elongatas, cellulas peripherícas parvas 50 exhibens, paruphyllosus, rigidus bipinnatus, pinnis alternis dissitis horizontalibus vel paulo ascendentibus, pinnulis in paria 5 dispositis, oppositis sensim decrescentibus. Folia geniculata erecta transverse vel paulo oblique inserta, caulina dissita arete adpressa 4-lobata, lobis fimbriatis, disco cellulas 4-5 alto 20 lato, cruribus capillaceis oppositis omnino lateralibus brevibus (cellulas uniseriatas 7-10 longis) sub-sequilongis (apicali paulo longiore); cuticulâ dense striolattl; cellulis majusculis quadratis vel oblongo-quadratis pachydermibus, trigonis nullis. Folia ramca arete imbricata. Foliola transverse inserta 2-3-lobata, lobis ciliatis sub-sequilongis, disco cellulas 2 alto.

Planta mas tenerior ; andrcecia e caule vel e ramis tenuibus orta ; bractese perigoniales in paria 4-5 dispositse saccate, disco magno cellulas 4 alto ; antheridia solitaria ovali-rotundata e stipite longo orta.

Dimensions. Stems 1 to 2 inches long, diam. "3 mm. ; with leaves #5 mm. wide ; crura of leaves '4 mm. long ; colls of disc *04 mm., *05 mm., of crtira *07 mm.x'025 mm.; undcrleaves, disc '4 mm. high; perigonial bracts •7 inm.x a35 mm.; antheridia "25 inin.X'2 mm.

Obs. Distinct from any of the few *Triehocolew* recorded from Asia-Oceania. *T. breviseta* St. (New Guinea) and *2\ striolata* St. (Luzon) have nude stems. The geniculate stem-leaves and the short subequal crura distinguish this species at once from any *Triehocolea* from Asia-Oceania.

Hab. Ignambi. On rocks by creek, 2500 ft. 1592. Ignambi. Rising from rocks. Creek-side, moist forest, 2000 ft. 1546.

BALANTIOPSIS NEOCALEDONICA Pearson, sp. nov. (PI. 3. fi$_{gP}$. 1-8.)

Sterilis; mediocris pallide viridi-brunnea caespitosa. "baulis simplex vel pauci-ramosus radiculosus, rhizoideis robustis pnrpiireis. Folia contigua

alterna paten ti-diverg en tin transverse inscrta conduplicata oblongo-ovalia vel qblongo-quadrata, margine integro, interdum lobi margine superiore (postico) dentibns 1-2 magnis anna to, apice 3-5-dentato, lobulo antico erecto quam lobo 4-plo minore oblongo-quadrato, usque ad medium et ultra 3-C-laciniato, segmentis lanceolatis ; cellulse mediocres oblongo-quadratse leptodermes trigonis nullig, marginales longse angustissimse; cuticnla Isevis. Foliola dissita caulí sequilata, usque ad medium et ultra bifida, segmentis divergentibns simplicibus vel furcatis lanceolalis acuminatis.

Dimensions. Stems 1 inch long, diam. '1 mm. to *15 mm.'; with leaves l'2o mm. wide; leaves, lobes 1 mm. x #5 mm., lobule *4 mm. high x "3 mm. broad; cells '04 mm. x *03 mm., "05 mm. x -03 mm. ; marginal cells '075 mm. x '015 mm. ; underleaves '4 mm. x 1*5 mm. broad at base.

OOs. This is the first species of the genus recorded from Asia-Oceania, the tew other species being chiefly found in New Zealand and the Southern Hemisphere.

Balantiopsis angustifolia St. from Chili, of which I have seen specimens, has narrower leaves with different cell-structure, cells only half the size.

•*Balanliopsis diplojriiylla* (Hook.) has larger antical lobules, lobes with more teeth, the upper (postical) margins toothed to the base, cells witli large trigones, underleaves larger with laciniate segments.

Hah. Ignambi. On gneiss rocks, in moist air, 3000 ft. 1531.

IUDULA LACERATA St., Sp. Hep. iv. (1910) 155.

Leaves irregularly laciniate, lobule narrowly rectangular, twice as long as broad, trigones large.

I have met with the male plant, which Stephani does not describe. Steins more delicate, leaves less lacerate, androecia on short branches, 4 to 5 perigonial bracts, smaller than the leaves, lobe acuminate, lobule almost equal in size, bracts swollen.

Endemic.

Hah. Mont Koglii. On upper surface of fallen log, forest, 3000 ft. 740.

IUDULA FABMKRI Pearson, sp. nov. (PL 3. figs. 9-19.)

Dioica (?), parva pallide olivacea stratificata. Caulis pinnatus -ramis brevibus patenti-divergentibus vel patentibus. Folia arete inibricata alterna patenti-divergentia semi-rotundata acuta apiculatave, lobi margine inferiore fere recto vel parum curvato, superiore curvato ampliato, caulem transeunte vel obtegente ; lobulus quam lobus 3-4-plo minor subquadratus, ad caulis medium attingens, angulo libero obtuso, parum emarginato sinn acuto, superne complanatulns inferne inflatus, carkiâ arcuatâ, la;vi; cellula3 paivulge vel mediocres subrotundatje pachydermes, trigonis nullis.

Inflorescentia feminea in caule vel in ranio terminalis innovationibus binis suffulta; bractearum lobus anguste ovalis integer acutus ; lobulus quam lobi diinidium paulo major ovali≤, apice rotundato emarginato interdum bis vcl

ter inciso ; perianthium ultra bracteas parum emersum longe obconicum, ore lato fimbriato segmentis cellulas uniseriatas 5-15 longis.

Dimensions. Steins 1 inch long, diam. f2 mm. to "25 mm. ; with leaves 2-5 mm. wide; leaves, lobe 1-25 mm.X'85 mm., lobule -4 mm.x'l mm-, lobe 1-1 mm.X'9 mm., lobule "4 mm.x'4 mm.; cells B03 mm. ; bracts, lobe 2mm.xl mm., lobule 1·25 mm.x-75 mm.; perianth 2*25 mm.xl mm.; fimbrisG at mouth '05 mm. to *1 mm. long.

Obs. There are only 13 species enumerated by Stephani belonging to the Acutifolia section of *Radula,* to which this belongs.

It is remarkable in having the free angle of the lobule emarginate ; only two such species are recorded by Stephani—*R. Delessertii* St. from the Mascarene Islands, which is described by Stephani as with apex of lobule slightly emarginate, and *R. sinuata* G. from Brazil with apex of lobule narrowly and deeply emarginate.

I have pleasure in associating with this unique species the name of Prof. Farmer, who has named several of the species in this collection. His breakdown in health prevented him from completing the work, which 1 much regret, although it has given me the opportunity of studying an exceedingly interesting set of plants.

Hab. Ignambi. On rocks by creek, 3000 ft. 1530.

RADULA VIEILLARDII Gottsche ex St. in Hedwigia, xxiii. (1884) 150 ; St., Sp. Hep. iv. (1*10) 226.

Dioicous. Small, pale brown in colour, epiphytic. Stems irregularly branched. Leaves approximate, lobe horizontal (90°), oblong, antical (upper) margin covering the stem, lobule patent (50°), roundish-snbquadrate, with apex obtuse, rarely acute, tumid at the base, extending to the middle of the stem, upper portion complanate ; texture delicate, cells medium size (•03 inm.-'O4 mm.); cuticle slightly papillose. Bracts very large ; lobe oblong, erect. Perianth tubular, cylindrical, or narrowly clavate, slightly papillose, mouth entire.

Male plant more delicate, catkins numerous, C to 10 pairs of bracts, lobe spreading, apex obtuse, lobules closely imbricating.

Dimensions. Stems ^ inch long, diam. *'2* mm. ; with leaves 1*75 mm. wide ; leaves, lobe '8 mm. x "65 mm., lobule '4 mm. x '4 mm ; cells '03 mm , •04 mm. ; perianth 3 mm. x "8 mm.

Obs. The strikingly large bracts and the spreading lobes of the male bracts readily distinguish this species from others.

Stephani says (in Hedwigia, 1884, p. 150) that he has never seen the plant ; and there are several discrepancies between Gottsche's description in Hedwigia and his own c Species Hepaticarum.'

Stepi ani says perianth clavate; I find it to be equal in breadth the whole length or narrowly clavate : also he says leaves with large trigones; I see none.

Endemic.

Hab. **Mont Arago. On old fronds of a filmy fern. Moist forest, 1000 ft. 1447.**

RADULA NIGRA Pearson, sp. nov.

Dioica (?), mediocris fusco-brunnea vel nigra laxe csespitosa. Oaulis ngidus ligneus dichotomus. Folia imbricata concavula oblonga', lobo patenti-divergente (70°), margine antico (superiore) caulem obtegente; lobulus erecto-patens (30°) magnus, qnam lobus 3-4-plo minor, rotundato-quadratus altior quam latus, canlem fere obtegens, angulo libero obtuso vel i'otiindato> inflatus, carinii arcuatâ. Textura firmissima, cellulis quadratis 4-5-6-gonis, trigonis parvis.

Inflorescentia feminca immatura in caule ; alioqui sterilis?.

Obs. **So far as I know, no other *liadula* like it lias been described from New Caledonia or the Far East.**

Dimensions. **Steins 1 to J£ inch long, diam. '2 mm.; with leaves 2'25 mm. "ide ; leaves, lobes 1*25 mm. x *9 mm., lobule *6 mm. high x "4 mm. broad, '6 mm. x -5 mm.; cells '025 mm.**

Bab. **Mont Koghi. From bark and rocks, near stream, 1000 ft. Forest. 801.**

PLEUROZTA CALEDONICA (Gottsche), St., Sp. Hep. iv. (1910) 238.

•*Physiotium caledonicum* Gottsche ex Jack in Hedwigia, xxv. (188G) 81, tab. 8.

Obs. **The segments of the leaves in Mr. Compton's specimens are longer and more acute; the leaves are also papillose; this is not mentioned in Jack's or Slephani's descriptions.**

Endemic.

Hub. **Mont Koghi. Drooping outwards in large masses from living trunks in scrubby forest, 3200 ft. 741.**

FRULLANIA (Galeiloba) BESCHERELLEI St., Sp. Hep. iv. (1910) 45C.

Dioicous. Medium size, dark brown in colour ; corticolous. Stems pinnate or bipinnate ; radiculose; lhizoids proceeding from base of underleaves, few, tufted, dark purple ; branches often curved, sometimes attenuate. Leaves imbricate, concave, ovato-oblong to orbicular, apex rotundate, antical margin roundly appendiculatc ; lobule cucullate, erect or slightly divergent, stylus minute, 5 or 6 uniseriate cells long ; cells smallish to medium, with irregular walls; trigones small and indistinct. Underleaves sub-rotund, °ften a little longer than broad, slightly decurrent, margin often reflex at the base and channelled in the middle, undulate, irregular, to one-third bifid, segments obtuse, connivent, sinus orbicular, margin reflexed. Androbcia on short branches, oval ; G pairs of bracts, closely imbricate ; lobe oval, apex rotundate ; lobule smaller, oval, apex obtuse.

Dimensions. **Stems 1 to 1£ inch long; diam. of stem '15 mm.; with leaves**

1-25 mm. wide ; leaves, lobes 1 mm. x *9 mm., '6 mm. x -475 mm., lobule •2 mm. high x '175 mm. broad; cells '03 mm.; interleaves "25 mm. x '25 mm.; perianth 1*25 mm. x "75 mm.; androecia 1/5 mm. x 1 mm.; perigonial bract, lobe #75 mm. x*5 mm., lobule '6 mm. x -3 mm.

Obs. I have had the opportunity of comparing my specimens with the original, named by Stephani, with which they agree in eveiy respect.

At once distinguished from any other species by the remarkable orbicular sinus; the segments are connivent or nearly so, with their inner margins slightly reflexed. I have seen nothing like it anywhere else.

Var. EXPLANATA Pearson, var.nov. Lobulis explanatis; stylo minfctissimo cellulas 4 uniseriatas longo.

Hah. Port Ngea. Creeping on tree-roots and rocks. *Acacia spirorbis* woods. 26. Woods near Port Despointes. On stones and bark on the ground. 175. Ermitage Stream. On trunk fallen across stream. 194.

Distrib. Tahiti.

FRULLANIA (Homotropantha) COMPTONII Pearson, sp. nov.

Dioica (?), data, rubello-brunnea laxe coespitosa. Caulis geniculatus irregulariter bipinnatus, pinnis longis, pinnulis brevibus curvatis. Folia horizontaliter inserta (90°) imbricata concava late ovata apiculata, margine inferiore (postico) recto vel curvulo, superiore (antico) curvato ad basin rotundaio caulem transeunte vel amplius; lobulus minutus clavatus compressus dependens papillosus ; stylus minutus cellulas uniseriafas 2-3 longus; cellula3 parvulse nodulosae, trigonis magnis. Foliola quam caulis 3-4-plo latiora approximata subrotundata, sa?pe longiora quam lata, fere ad £ bidentata, segmentis acuminatis, sinu rotundato.

Inflorescentiafeminea ranmlis brevibus orta; bractearum lobus lanceolatus acuminatus laciniatus, lobulus quam lobus dimidio minor linearis laciniatus ; bracteola oblongo-ovalis laciniata ad medium vol ultra bifida, segmentis lanceolatis.

JHmensions. Steins 2 to 3 inches long, diam. "2 mm. ; with leaves 2 mm* wide ; leaves, lobe 1*5 nim.Xl mm., 1 mm.x[a]75 mm., lobule '2 mm.xl mm-, •15 mm. x '075 mm.; cells "025 mm.; underleaves '75 mm. x '75 mm., 6 inm. x '6 mm., G mm.X'5 mm. wide, segments *15 mm.; bracts, lobe 1*5 mm. x [m]6 mm., lobule -1 mm. x *2 mm. ; bracteole "75 mm. x '5 mm., segments •45 mm.

Obs. Differs from *F. papilliloba* St. from New Caledonia in having leaves usually apiculalo, large trigones, *\ory* small lobule, segments o£ underleaves acuminate.

From *F. Kehdingiana* St. in having broadly ovate leaves, underleaves not five times broader than ihe stem, nor coriliform with broad acute segments.

From *F. pallidissima* St. in having a very small lobule, underleaves not cordiform and much smaller.

From *F. utriculata* St. in having very small lobule, underleaves not broadly reniform (twice as long), bracts laciniate, not entire.

-Hah No locality. 1730.

' FRULLANIA (Diastaloba) MICROSCOPICA Pearson, sp. nov. (PI. 3. figs. 20-34,)

Monoica, minuta, pallido rubello-brunnea, supra muscos et hepaticas repcns. Caulis prostratus parce radiculosus irregulariter r<imosus. Folia horizontaliter oblique inserta patula imbricata alterna semi-ovata vel ovata vel falcato-ovata, margine denticulato ciliato vel fimbriato, margine antico (superiore) curvato ampliato caulem transeunte, postico inferior© recto vel curvulo, apice obtuso vel acuto vel apiculato; lobus ssepc hyalinus ; lobnlus fusco-brunneus a caule dissitusobliquus comparate maximus lobo saquilongus clavatus; stylus comparate magnus triangularis apice obtuso vel acuto ; cellulse minutissiiiiiB quadrate vel oblongo-quadratee, trigonisnullis ; cuticula tenuiter papillosa vel hevis. Folia parva cauli roquilata oblonga, usque ad medium ct ultra bifida ; segmentis subulatis, sinu angusto.

Inflorescentia fominea sessilis vel e ramo brevi orta ; bractearum lobus lanceolatus acuininatus minute crenulatus j lobulus quam lobus fere £ minor lineari-lanceolatus acuminatus; bracteola lineari-lanceolatii, usque ad £ bifida, segmentis acuminatis, sinu angusto; perianthium pyriforme obovatum triquetrum, postice obtuse et late carinatum, antice planum, carinis laevibus.

Androecia intercalaria *i* braoten perigoniales in paria 4-5 dispositae arete imbricate ; lobus ovalis acutus vel apiculatus, lobulo consimilis sed minor.

Dimensions. Stems j inch long, diam. "05 mm.; with leaves '4 mm. wide ; leaves, lobe -3 mm. x ·2 mm., '*25* mm. x '2 mm.,-25 mm. x -15 mm. ; lobule •15 mm. x -075 mm. ; stylus '075 mm. X -05 mm. ; underleaves 1 mm. X •05 mm.; cells '01 mm., '01 mm. x-0125 mm.; bract, lobe ;4 mm.x •175 mm., lobule -3 mm. x '075 mm.; perianth '55 X ·325 mm.; pengomal bract, lobe '225 mm. X '15 mm., lobule *'2* mm. X '1 mm.

Obs. This is by far the smallest *Frullania I* have ever seen; and no species to my knowledge approaches it; the lobes of the leaves are often hyaline, while the lobules, which are relatively very large, are dark brown.

The plant is in perfect condition, with ? and <J abundant; so it is of its normal size and not a branch of a larger species.

Stephani notes after his description of *F.perversa* from the Philippine Is. (Sp. Hep. vol. iv. p. 639, 1911):—"This plant is one of the smallest known Hepatics, only *Microlejeunea* comes near it/'

F. microscopica differs from it in many particulars.

IJab. Mont Mou. On trees in high forost, 3500 ft. 616.

ACROLEJEUNEA COMPTONII Pearson, sp. nov.

Dioica (?), mediocris f usco-rubello-brunnea corticola. Caulis irregulariter dichotomus firmus. Folia arete imbricata patenti-divergentia (70°) sul>-

opposita concava, margine incurvato, semi-rotundata, margine antico (superiore) arcuato ad basin truncato caulem obtegente, postico (inferiore) recto vel parum curvato, apice rotundato interdum obtuso; lobulus quam lobus 4-plo minor oblongo-quadratus, 2-plo latior quam altus, margine libero recto integro, angulo acuto vel acuminato, snperne complanatus, inferne inflatus, carinâ panlo arcuatâ, lscvi ; eellulse parvulse rhomboides parietibus irregularibus, trigonis parvis. Foliola imbricata, margine snperiore inflexo, late breviterque cuneata decurrentia quam caulis 4-5-plo latiora, apice recto vel parum retuso, basin versus medio canaliculata.

Androecia in caulibus primariis intercalaria; bractese perigoniales qnam folia paulo minoreSjinflatre, lobo ovali rotundato, lobulo J minore ovali obtuso.

Dimensions. Stems 1 inch long, diam. '2 mm.; with leaves 1*5 mm. wide; leaves, lobe 1 mm. x '75 mm., lobule \5 mm. x '25 mm.; cells '02 mm.x '015 mm.; underleaves '5 mm. high x *6 mm. broad; male bracts, lobe •75 mm. x '5 mm., lobule #5 mm. x ·3 mm.; antheridia '15 mm. x *1 mm.

Obs. Although no fertile stems have been met with, the other characters separate this plant from the other *Acrolejeunece* recorded by Stephani from Asia-Oceania. *Acrolejeunea cucullata* (Nees) would appear to be the nearest, but this has leaves broadly ovate, apex twice narrower than base, lobule with free angle obtuse or bi-angular, underleaves sub-rotund.

Hob. Mont Mou. On trees in high forest, 3500 ft. 616.

LOPHOLEJEUNEA MUENSIS St. in Hcdwigia, xxxv. (1896) 110.

Var. MICROLOBA Pearson, var. nov.

Monoica. Caulis irregnlariter pinnatus ; folia late ovata, apicibus obtusis (folia ramea acuta), ad basin anticum truncato-rrotundata, trigonis parvis; lobulus parvus quam lobus 6-7-plo minor, triungularis inflatus, angulo libero acuto; foliola quam caulis 3-plo latior. Inflorescentia feminea in ramo longo terminalis, innovationibus nullis; bractere oblongo-elliptieso acute dentatse; bracteola subrotundata integra. Androecia in ramis brevibns terminalibus.

Dimensions. Stems 1 inch long, diam. 0*1 mm.; with leaves 1'5 inn), wide ; leaves *9 mm. x "6 mm., lobe *9 mm. x '6 mm., lobule *15 mm. x '15 mm., underleaves #3 mm. x '3 mm.

Obs. The few stems met with of this *Lopholejeunea* differ from Stephanies description of *L. muensis* from New Caledonia in the smaller size of leaves •9 mm. x '6 not 1*5 mm. x 1*17 mm., the much smaller lobules 6 to 7 times smaller than the lobes, not 3 times smaller, underleaves 3 times broader than stem, not 5 times ; but as it agrees in its inflorescence, its olive colour, irregular pinnate stems, leaves broadly ovate, antical base truncato-rotundate, branch leaves acute, bracts oblongo-elliptic, acute, margin near apex irregularly dentate, it is probable that Mr. Compton's specimens are only a variety

of it; if further specimens distinguish it, I propose the name of LOPHOLEJEUNEA MICROLOBA for it.

Endemic.

Sab. Mont Koghi, from bark and rocks, near stream, 1000 ft. Forest. 801.

BRACHIOLEJEUNEA MACROBRACTKOLA Pearson, sp. nov.

Dioica (?), mediocris pallide brunnea corticola prostrata. Caulis irregnlariter pauci-ramosus. Folia horizontalia (90°) vel patenti-divergentia (70°) arete imbricata sub-opposita concava semi-rotundata, margine antico (superiore) arcnato caulem obtegente, postico (inferiore) fere recto vel paulo curvato ; lobulus quam lobus fere 4-plo minor ovalis superne complanatuS inferne inflatus, margine minute mamillato, mamillis 3-6 unicellulatis, carinû arcuatâ lsevi; cellulse mediocres oblongo-quadrata?, cellulse marginales minores quadratse. Foliola approximata quam caulis 3-4-plo latiora, sub-reniformia. vel orbicularia, cellulis marginalibus minoribus.

Inflorescentia feminea terininalis innovationibus binis suffulta ; bractearum lobus ovalis, apice obtuso ; lobnlus similis fere sequimagnus ; bracteola maxima ultra perianthium emersus late cuneata. Perianthium inter bracteas immersum oblongo-ovatum 10-plicatum, carinis obtusis lsevibus.

Androecia baud visa.

Dimensions. Stems 1 inch long; diam. of stem '15 mm.; with leaves 1'5 mm. wide; leaves, lobe 1 mm. x -5 mm., '9 mm. x '6 mm., '75 mm. x '6 mm., lobule -4 mm. x -25 mm.; cells '03 mm.; interleaves '4 mm. high x *6 mm. broad, '4 mm. x *5 mm.; bracts, lobe 1 mm. x #5 mm., lobule "9 mm. x -5 mm. ; bracteole 1/3 mm. x 1'3 mm.; sub-bra cteole *V2* mm. x 1*2 mm. ; perianth 1-5 mm. x '75 mm.

Obs. No *Brachiolejeunea* recorded from Asia-Oceania approaches this species.

*ff*b. Casuarina,* near ground, very dry conditions. 91. Mont Koofhi. On upper surface of fallen log. Forest, 3000 ft. 740. Ermitage Stream. On trunk, fallen across stream. 194. Mont Arago. On old fronds of a filmy fern. Moist forest, 1000 ft. 1447.

DREPANOLEJEUNEA COMPTONII Pearson, sp. nov.

Dioica (?), nrinnta hyalina supra muscos hepaticasque repens. Caulis simplex vel furcatus, ramis paucis cellulas 3 latis, radiculosus, rhizoideis paucis hyalinis. Folia erecta (10°) vel erecto-patentia (30°) alterna dissita ; lobus ovalis vel ellipticus acutus vel ovali-acuminatus, apice reflexo, margine superiore (nntico) ad caulis medium vel paullo ultra, inferiore (postico) ad caulis medium, attingente ; lobulus paulo minor ovalis inflatus, carinâ paulo arcuata l»vi; cellulse minutae quadratae vel oblongo-quadratae leptodermes, trigonis nullis. Canlis appendiculis (an foliis imperfectis ?) numerosis parvis triangulàribus instructus. Foliola bicruria, cruribus divergentibus^cellulas 4 uniseriatas longis, disco humili cellulas 2 alto.

Dimensions. Stem \ inch long, diam. -04 mm. to '05 mm.; with leaves •225 mm. wide; leaves, lobe '2 mm. X '1 mm., '25 mm. x '1 mm., '15 mm. X •1 mm., lobule '15 mm. x '075 mm., *125 mm. x '075 mm.; cells '02 mm. X '02 mm., '03 mm. x '015 mm.; underleaves, setae '075 mm. long.

06s. In the list of *Drepanolejeimea* from Asia and Oceonia-tropica, m Stephani's *i* Species Hepaticarum' there is none to which this minute species can be assigned; it is the smallest member of this genus that T have met with.

Hah. Mont Koghi. On upper surface oE fallen log. Forest, 3000 ft. ,740.

DREPANOLEJEUNEA MICROCARPA Pearson, sp. nov.

Dioica, minuta pallide- vel fusco-brunnea foliicola radiculosa, rhizoideis cinereo-albis. Folia patenti-divergentia (70°) vel erecto-patentia (30°) alterna dissita vel contigua, saepe unilatoralia, contorta semi-ovata subrectangularia acuta vel acuminata uncinata dentata ; folia ramea ssspe iutegra; lobulus magnus, quam lobus dimidio minor vel jam vero exiguior, inflatus involutus, carinâ arcuatâ lsevi vel paullo papillosâ ; cellulse parvulas quadratic 4-5-6-gonse, trigonis parvis sed evidentibus, ocellis paucis parvis, cuticulâ laevi vel minute papillosâ. Foliola minuta ad medium et ultra bifida, segmcntis divergentibus cellulas 4 uniseriatas longis, disco cellulas 2 alto x 4 lato.

Inflorescentia feminea ramo brovi terminalis innovatione singulâ sufEulta ; bractearum lobus late lanceolatus acutus vel acuminatus denticulatus, lobulus 2-3-plo minor lanceolatus vel linearis integer vel paullo denticulatus; bracteola ovalis ad £ vel £ bifida, segmentis acuminatis inconspicue denticulatis, sinu acuto ; perianthium parvum pyriforme 5-carinatum, carinis lsevibus, rostellatum.

Androecia intercalaria vel e ramis brevibus orta ; bractese perigoniales arete imbricate, lobus rotundatus vel minute acutus, lobulus paullo njinor, carinâ papillosâ vel lsevi.

Dimensions. Steins \ inch long, diam. '05 mm. ; witli leavos "4 mill.? •5 mm. wide; leaves, lobe *3 mm. x *2 mm., lobule '15 mm. x '1 mm. ; cells •025 mm.; underleaves '1 mm. x "05 mm.; bracts, lobe "45 mm. x *2* mm., •45 mm. x '175 mm., lobule '35 mm. x '1 mm., '3 mm. x '05 mm.; perianth •4 mm. x '3 mm.; perigonial bracts *2 mm. x "175 mm.

Obs. Its nearest ally is *D. daetylophom* (Nees), from which it differs in its dentate leaves, not spinose ; small but distinct trigones ; bracts and bracteole denticulate, not spinose ; and the minute perianth '4 mm. x .3 mm., not •83 mm. x '59 mm., with keels smooth, not spinose.

D. uncinata St. is autoicous, leaves lanceolate, perianth obovate, "83 mm. x *58 mm.

Hab. Mont Mou. On trees in high forest, 3500 ft. 616. Mont Koghi. Upper surface of fallen log. Forest, .3000 ft. 740.

LEPTOLEJEUNEA VITREA (Nees), St., Sp. Hep- v. (1913) 389.
Jungermannia vitrea Nees, Enani. Hep. Jnvan. 56.
Lejeunea vitrea Nees, Syn. Hep. 402.-

Dioicous. Minute, hyaline or pale grey in colour, creeping on other hepatics. Stom irregularly branched, 2 to 3 cells wide. Loaves, lobe erecto-patent (30°), approximate, oval-acute, upper portion serrate, antical (upper) margin extending to the middle of stem, base narrow, lobule patent-divergent (70°), 4 timos smaller than the lobe, oval, twice as long, as high, involute, free angle acute, tumid, keel arcuate, smooth ; cells smallish to medium size, 4-5-6-sided quadrate, ocelli irregularly disposed or linear, 3 to 6 largo. Underleaves3 times broader than the stem, broadly quadrate^ cells high by 3 broad, with 4- to 6-celled uniseriate crura proceeding from the middle or upper angle, sometimes 1 or 2 minute teeth below the crura.

Inflorescence $ on short branches; bracts, lobe lanceolate-acuminate, entire, or with 1 or 2 teeth, lobule similar but smaller ; bracteole hmceolate-acute, bifid to below the middle, entire. Perianth obovate, cornute, horns lo«g, obtuse, margin entire.

Male plant more delicate, catkins long, 4 to 6 pairs of bracts, closely imbricate.

-*Dimensions.* Stems \ inch long, diam, '075 mm.; with leaves 1 mm. wide; leaves, lobe *9 mm.X'4 mm., lobule '35 mm.X'2 mm.; cells'03 mm., ocelli '14 mm.x '035 mm.; underleaves '4 min.x'1 mm.; bracts, lobe '5 mm. X'15 mm, lobule '4raș.x'l mm.; bracteole '3 mm.x'15 mm., segments '15 mm.; perianth '6 mm.$_x$-4 mm.

w*.] have had the opportunity of comparing my specimens with those undor this name collected by Balansa in New Caledonia and determined by Stephani; they entirely agree with them.

tiab. Ermitage Stream. Epiphyllous on Fern and *Freycinetia,* etc. 145. Java, New Guinea, Philippine Islands.

JJEPTOLEJEUNEA DOLABRIFORMIS Pearson, sp. nov.

i)ioica, parva brunnca vel albescens supra folia repens. Canlis irregu-lan*er bipinnatus cellulas 2 latus. Folia contigua patula alterna parum concava vel plana suboblongo-quadrata, margine inferiore (postico) recto vel parum curvato, suporiore (antico) recto vel ad basin versus curvato et cau?em aliquantum obtegente, apice truncato vol parum hamato et acuto, margine integro; cellule parvulae quadratae pachydermes, trigonis nullis, °cellis lmeariformibus 3-6-cellularibns vel 'irrcglariter dispositis,- lobulus ovatus paullo longior quam altus invohitus, angulo libero ácuto, qiiam lobus 4*5-plo minor, interdum nullus. Foliola late ct breviter cuneata bisecia cruribas valde divergentibus horizontalibus vel paullo ascendentibus cellulas 5 uniseriatas longis.

Tnflorescentia feminea ramo brevi posifa vel sossilis. Bracte* parvse, margine integro; lobus anguste oblongus; lobulus similis sed minor. Bracteola ovato-lanceolata, ad J plus minus bifida, segmentis et sinu acutis, intcgra. Perianthium oblongo-triangulare apice lato, 5-angulatum, angulis superne late alatis, alis triangularibus acutis, cornubus nullis.

Androecia sessilia vcl in ramis brevibus posita, sphaerica ; bracteas in p»[ria] 3 dispositae ovales, apice rotundato.

Dimensions. Stem £ to \ inch long, diain. *05 mm.; with loaves 'S mm. wide ; leaves, lobe '5 mm.X'3 mm., lobule '15 mm.X'l mm.; cells '025 mm» ocelli '06 mm.x'035 mm.; undorleaves '35 mm. wide, with setse '075 nun-high ; bracts, lobe '325 mm.X'l mm., lobule '25 mm.x-05 mm.; bracteole '3mm.x°l mm*, segments '15 mm.X'05 mm. at base; perianth 5 mm.X '3 mm. wide at apex ; amentula '3 mm. x '3 mm.; bracts, lobe '2 mm. X *15 mm., lobulo [f]15 mm.X'l mm.

Ohs. Leptolejeunea rhombifolia St. from New Caledonia has leaves with acute apex, entire or paucidentate, 1*25 lnm.x '58 mm., lobule large, 3 time? smaller than lobe ; perianth pyriforin, *9 mm. x '58 mm.; bracts, lobe, and lobule irregularly dentate.

Hab. Ermitage Stream. Epiphyllous on Fern, *Freycinelia,* etc. 145.

EULEJEUNEA PTERIDIS Bescherelle & Spruce in Bull. Soc. Bot. Fr. xxxvi. (1889) p. clxxxvii.

Lejeunea pteridis (Besch. et Spruce), St., Sp. Hep^v. (1915) 787.

Monoicous. Small; pale green in colour, creeping amongst other hepatics and mosses. Stem slightly branched. Leaves oblong, subfalcate, apex rotundate, narrow at base of insertion ; lobule minute or wanting, oblong, free angle toothed. Underleaves oval to subrotund, bifid to below the middle, segments acute, sinus wide, obtuse. Bracts small, half size of perianth, entire, lobe oval, apex obtuse, lobule similar but smaller; bracteole oval, bifid to below the middle, segments obtuse, sinus acute. Perianth obovate to cuneate-pyriform, beak long. Androecia with 4 to' 5 pairsof bracts, keel of bracts papillose.

Dimensions. Stems £ inch long, diam. '075 mm.; with leaves '1 *nun.* wide; loaves, lobe *6 mm. X [f]4mm., lobule *1 mm. x '\ mm.; lobe '5 mm. x '4 mm., lobule *1 mm. x [f]075 mm.; underleaves *'15* mm. x "1 mm.; bract, lobe •4 mm. x•*2* rain.; bracteole *25 mm. x *175 mm.; perianth '5 mm. x "325 mm.

Obs. I have had the opportunity of comparing this with original specimens named by Dr. Spruce, from New Caledonia, collected by Balansa; and it agrees well with it.

Endemic.

llab. Mont Koghi. On upper surface of fallen log. Forost, 3000 ft. 740. Mont Mo i. On bark. 478.

EULEJEUNEA DENUDATA Pearson, sp. nov.

Stenlis. Mediocris pallide viridis laxe csespitosa. Caulis firmus, celltilas 3 latus, remote et longc bipinnatus radiculosns, rhizoideis usque ad apicem aispositis, fasciculatis, divergentibus. Folia dissita vel contigua alterna patenti-divorgentia (70°) semi-ovata vel semi-rotundata vel falcato-ovata Integra, margine antico (inferiorc) brevissime decurrente vel recto, postico (superiore) arcuato, ad canlis medium attingente, basi angustâ, apice rotuudato ; textura finna; cellulse mediocres quadrala) vel oblongo-quadratae 4-5-6-gonse, trigonis nullis, qusedam majores, folia tamen baud conspicue ocellata ; lobulns plerumque nullus, in ramis quibusdam tamen minutus ovalis tumidus. Foliola parva, cauli arete adpressa, quam caulis Paulo lafciora, ovalia vel subrotundata, ad £ bifida, sinu acuto velrotundato, segmentis triangukribus acutatis, saepe nullis.

Audroecia in ramis brevibus posita. Bractese in paria 4 dispositrc ; lobus rotundatus, lobulus similis sed minor.

•*Dimensions.* Stems £ to 1£ inch long ; diam. of stem *1 mm.; with leaves •25 mm. wide; leaves, lobe -65 mm. x '475 mm., *6 mm. x *5 mm., lobule 5 nun. broad X 1 mm. high ; cells -03 mm., "04 mm. x '03 mm., -04 mm.; nnderieaves '15 mm. high x-1 mm. broad; pcrigonial bracts -175 mm. x "A75 mm.

Qbs. This is a remarkable *Lejeunea* ; the distantly branched stems, texture of the stem and leaves, the absence of lobules on the larger forms give it somewhat the appearance of a *Calypogeia,* to which genus it had been referred by one authority".

It does not agree with the description of *L. aloha* St., Sp. Hep. v. (J915) j from New Caledonia, which name had already been appropriated by Leande Lacoste, Hep. Jav. 1856, 72, Tab. 13, and from which it is very Afferent, according to the description and figures.

//ai. Mont Koghi. From bark and rocks near stream. Forest. 801. Ignambi. Attached to stones under water in running creek. Forest, 2000 f r.

MICKOLEJJSUNEA BRUNNEA Pearson, sp. nov.

Dioica, "linuta rubello-brunnea, supra muscos et hepaticas repens, radiculosa, rhizoideis paucis hyalinis. Cnnlis simplex vel parcc ramosa, cellulas latus, rigidus. Folia erecta, cauli parallela, alterna dissita vel contigua; obw ovalis vel rotundatus, apice rotnndato, margine antico (superiore) ad cauhs medium attingente'; lobulus plus minus § minor, apice uni-dentato, onto saepe incurvato, parte liberâ paulo involute, carinfi, rotundatâ papillosâ ; Cellulse mjnutsB quadratse, parietibus firmis, trigonis nullis. Foliola parva, quam caulis paulo latiora, orbicularia, ad medium pins minus bifida, segmentis obtusis. Bractearmn lobus obovatus, apice rotundato; lobulus J minor anceolatus ; bracteola obovata, ad J bifida, sc^gmentis acutatis.

dimensions. Stems £ inch long; diam. of stem '04 mm.; with leaves minute '25 mm. wide ; leaves, lobe *2 mm. x '15 mm., lobule '15 mm. x

•125 mm.; cells '015 mm., keel cells -02 mm.; underleaves -05 mm. X *05 mm.; bracts, lobe -2 mm. X #125 mm., lobule "125 mm. x '05 mm.; braoteole •2 mm. x '125 mm., segments '075 mm.

Obs. The constant reddish-brown colour distinguishes it at once from all other *Microlejeunete* I have seen.

Differs from *M. albicans* (Nees) in its colour and other characters given by Stephani, but ngrees with the description of this species given by Evans in his Hawaiian Hepatic* (Trans. Conn. Sc. vol. x. p. 445,1900), except in the colour.

Hah. Mont Mou. On trees in high forest, 3500 ft. 616. Mont Koghi. On upper surface of fallen log. Forest, 3000 ft. 740. Ignambi. On rocks, by creek, 3000 ft. 1530.

LKPTOCOLEA COMPTONII Pearson, sp. nov. (PL 3. figs. 35-4(3.)

Monoica, parva pallidissime viridis vcl alba, supra muscos et hepatica repens. Caulis'cellulas 3 angustas latus,pinnatus, ramis brevibus. *ioW* imbricata ; lobus patenti-divergens (70°) ovalis semi-oblongus vel obovatns, margine antico (snperiore) arcuato canlein obtcgente, postico (inferior©; recto vel curvato, apice rotundato ; lobulus quam lobus 4-pIo minor ovalis vel ellipticus, 2-plo latior quam altus, tumidus, margine snperiore involuto, angulo libero obtuso, carinâ arcuatâ Isevi. Textura tenerrima; cellulse mediocres quadratse vel oblongse 4-JMJ-gonse leptodermes, trigonis minutissimis. Foliorum niargo integer e cellulis nngustis hyalinw, quse per instrumentum microscopicum oculis percipi vix possunt, compositus.

Flores feminese crebrie, in ramis brevibus torminalibus positse, vel innovationc singulii floriferâ suffultse; bractearum lobus ellipticus integer, «d instar foliorum hyalino-marginatus, apice obtuso ; lobulus fere J minor late lanceolatus, apice obtuso. Perianthium late pyriforme compressum, apice obcordato, antice planum, postice obtuse carinatum, marginibus integris.

Androecia in ramis brevibus sita; bractese in paria 4 dispositse; lobns ovalis, apice rotundato; lobulus similis sed minor.

Dimensions. Stems £ inch long, diam. '06 mm. ; with leaves 1'25 mm-wide; leaves, lobe 1 mm. x '7 mm., a9mm.xa6 mm., '7 mm. x'55 mm-"7 mm.x%45 mm., lobule *3 mm.x'175 mm., %3 mm.x-15 mm.; cells •03 mm. x "05 mm., "03 min. x '04 mm., hyaline fringe cells '03 mm. long? x -01 nun. wide ; bract, lobe "65 mm. X *3 mm., lobule '4 mm. X '175 mm. 5 perigouiul bract, lobe '3 mm X'2 mm., lobule '2 mm.X'15 mm.

06s. There is no *Leptocolea* listed by Stephani from Asia-Oceania ner this; the beautiful hyaline fringe of narrow cells on the leaves is a striking character.

Leptocolea caledonica (Gottsche) has falcato-elliptic leaves (1'33 mm. X •3 mm.), lobule bidentate, bracts lanceolate or narrowly Ungulate (1 mm. X •9 mm.), and no mention is made of any hyaline fringe of the leaves by Gottsche or Stephani.

Leptocolea cordifiora St., also from New Caledonia, has denticulate leaves.

Leptocolea limbata St., from the Philippine Is., is a much larger plant, fuscous brown, leaves ovate-elliptic, with Inrgo trigones, lobule apiculate, perianth obconical.

&«b. Ermitagc Stream. Epiphyllous on Fern, *Freycinetia,* etc. 145.

LEPTOCOLEA CRENULATA Pearson, sp. nov.

Dioica (?), minuta hyalina foliicola. Caulis cellulas 2-3 angustasjatus parce ramosus radiculosus, rhizoideornm fasciculo ad lobuli cujusque basin °rto. Folia patula horizontalia (90°) vel pakmti-divergontia (70°) sipproxiuiata ovalia semi-ovalia subfalcata, ad basin angusto inserta, apice rotundato obtuso (folia ramea acuta), margine antico (supcriore) arcuato, ad caulis medium attingente, minute denticulato, postico (inforiore) recto vel paulum curvato minute crenulato; lobulus quam lobus fere 4-plo minor, ovalis "icurvatus tumidus, angulo libero acuto, carinâ arcuatâ lam; cellula3 parvulse quadrataG, basales majores elongate leptodermes, trigonis nullis; foliorum quorumdam cuticula minute papillosa.

Inflorescentia feminea in ramo brevi sita, innovatione singulïi suffulta ; oractese quam folia minores lanceolate acutse minute denticulatse ; lobulus quam lobus \ minor linearis acutus. Perianthium obconicum compressum, a«tice planum vel superno obscure carinulatum, postice obtuse carinatum, l'aro a(l apicem versum acutulum; carinse superne paulo alat83; margo Jninute denticulatus.

Androecia haud visa.

Dimensions. Stem ± inch long, diam. '05 mm.; with leaves 1 mm. wide; leaves, lobe -6 mm. x -4 mm., -6 mm. x '325 mm., lobule-25 mm. x '175 mm.; branch-leaves, lobe -45 mm. x *25 mm., lobule '2 mm. x '1 mm.; cells '025 mm.; bracts, lobe -4 mm. x -2 mm., lobule -3 mm. x -075 mm.; perianth •6mm.x -4 mm.

Obs. There are no species of *Leptocolea* recorded from Asia-Oceaniatropica with which thi P *L. p difl* St also from New Caledonia, with which this agrees. *L. cordiflora* St., also from New Caledonia is the nearest, but differs in several characters.

Hab. Mont Arago. On old fronds of a filmy fern. Moist forest, 1000 ft. 1447.

COLURA SUPERBA (Mont.), St., Sp. Hep. v. (1916) 941.

Lejeunea superba Mont, in Ann. Sc. Nat. 3me Sér. x. (1848) 115.

Leaves remotely dtntate, papillose ; few stems only met with, without trace of inflorescence ; these agree exactly with those in the Manchester Museum from New Caledonia under this name, determined by Dr. Spruce.

/ia&. Ermitage Stream. Epiphyllous on Fern and *Freycinetia,* etc. 145 ? 1492.

Tahiti.

MEGACEROS CALEDONIOUS St., Sp. Hep. v. (1916) 951.

Monoicous; walls of capsule without stomata ; involucre with upper portion ruguloso; spores '03 mm.; elaters abundant; androecia very numerous and aggregate.

Rob. Ermitage Stream. On stones in stream bed. 152. Mont Mou. On stones and mud by stream. 479. Mont Canala. On vertical clay stream banks, 900 ft., in open country. 1241. Ignambi. Rocks by creek, 3000 ft. 1593.

MEOACEROS MONOSPIRUS St., Sp. Hep. v. (1916) 953.

Monoicous; smaller than *M. caledonicus* St.; involucre smooth, 7mm-long ; capsule 25 mm. long, walls without stomata; spores *027 mm.; elaters monospirous; androecia few.

Hab. Tonine. Encrusting rocks in stream. Forest, 500 ft. 1958. Mont Oanala. Oa rocks in stream. High forest, 900 ft. 1139.

ASPIROMITUS PARISH St., Sp. Hep. v. (1916) 968.

Monoicous; small size ; involucre short, smooth ; capsule stomatifcrous ; elaters numerous : androecia few.

Hah. Faompai. On clay soil. Forest margin, 1000 ft. 1883.

ANTHOCEROS LERATII St., Sp. Hep. v. (1916) 989.

Monoicous; <? near to the $. Fronds 6 cells thick at the middle ; cortical cells smaller and darker; capsule wall stomatophorous ; no elaters.

Hab. Mont Mou. On stones and mud in stream, 800 ft. 444.

DENDROCEROS JAVANICUS Nees, Syn. Hep. (1844) 582; St., Sp. Hep. v. (1917)1010.

Anthoceros javanicus Nees, Enum. Hep. Jav. pi. 1, n. 1.

Dendroceros granulatus Mitt, in Seem. Fl. Viti. (1865) 419.

Costa two to three times broader than thick; involucre tuberculate ; capsule papulose; spores black, minutely asperous ; elaters pale yellowish brown, with single broad ribbon.

Dimensions. Fronds \ to 1 inch long ; cells "04 mm.; involucre 1 centim. long; capsule *5 mm. long ; spores '04 nunij elaters '2 mm. long x '01 mm. broad.

Hab. Ignambi. Bark of fallen tree. Forest, 2500 ft. 1687.

Asia and Oceania-tropica.

DENDROCEROS CALEDONICUS St., Sp. Hep. v. (1917) 1012.

Hab. Mont Mou. On dead twigs in forest; rare. 617.

EXPLANATION OF THE PLATES.

PLATE 2.

Aneura pulcra **Pearson, sp. nov.**

Fig. 1. Frond, half nat. size.
2. The same, X 5.
8. Cross-section of stem, X 25.
4. Cross-section of pinna, X 25.
5. Bract, X 25.

Chiloscyphus Cmnptonii **Pearson, sp. nov.**

Fig. 6. Plants, *6* a»<l ? > half nat. size.
7. Portion of stem, antical view, X 12.
8. The same, postical view, X 12.
9,10. Leaves, X 12.
11. Cross-section of utricle, X 25.
12. Portion of leaf, X 145.
13. Underleaf, X 25.
14. 15. Bracts, x 12.
16. Bractoole, X 12.
17. Perianth, explanate, X 12.
18. Male bract and bracteole, X 12.
19. Antheridium, X 25.

Noiuellia Lanyii **Pearson, sp. nov.**

Fig. 20. Plant, half nat. size.
21-24. Leaves, X 25.
25. Portion of leaf, X 145.
26. Papillce on keel, X 145.
27. 28. Bracts, X 12.
29. Bracteole, x 12.
30. Perianth, X 8.
31. Cross-section of perianth, X 12.
32. Setae at mouth of perianth, X 25.
33. 34. Perigonial bracts, x 25.

Lepidozia chatocarpa **Pearson, sp. nov.**

Fig. 35. Plant, half nat. size.
36. Stem, X 5.
36-38. Leaves, x 25.
39, 40. Rranch-leaves, X *'25.*
41. Portion of one of the crura, X 145.
42. Underleaf of stem, X 25.
42 a. Underleaf of branch, X 25.
43. Portion of bract, x12.
44. Bracteole, X 12.
45. Perianth, X 12.
46-47. Portions of perianth with cilia, X i}5.
48, 49, 50. Perigonial bracts, X 25.
51. Antheridiuni, x 25.

PLATE 3.

Balantiopsis neocaledonica Pearson, sp. nov.

Fig. 1. Plants, half nat. size.
2. Portion of young stem, antical view, X 25.
3. The same, postical view, X 25.
4. Leaf, X 25.
5. Portion of leaf, x 145.
6. Marginal cells, x 145.
7. 8. Underleaves, X 25.

Radida Farmeri Pearson, sp. nov.

Fig. 9. Plant, half nat. size.
10. Portion of stem, antical view, X 8.
11. The same, postical view, X 8.
12-14. Leaves, X 12.
15. Free angle of lobule, X 25.
16. Portion of leaf, X 145.
17. Bract, X 8.
18. Perianth, x 8.
19. Portion of mouth of perianth, X 60.

Frullania microscopica Pearson, sp. nov.

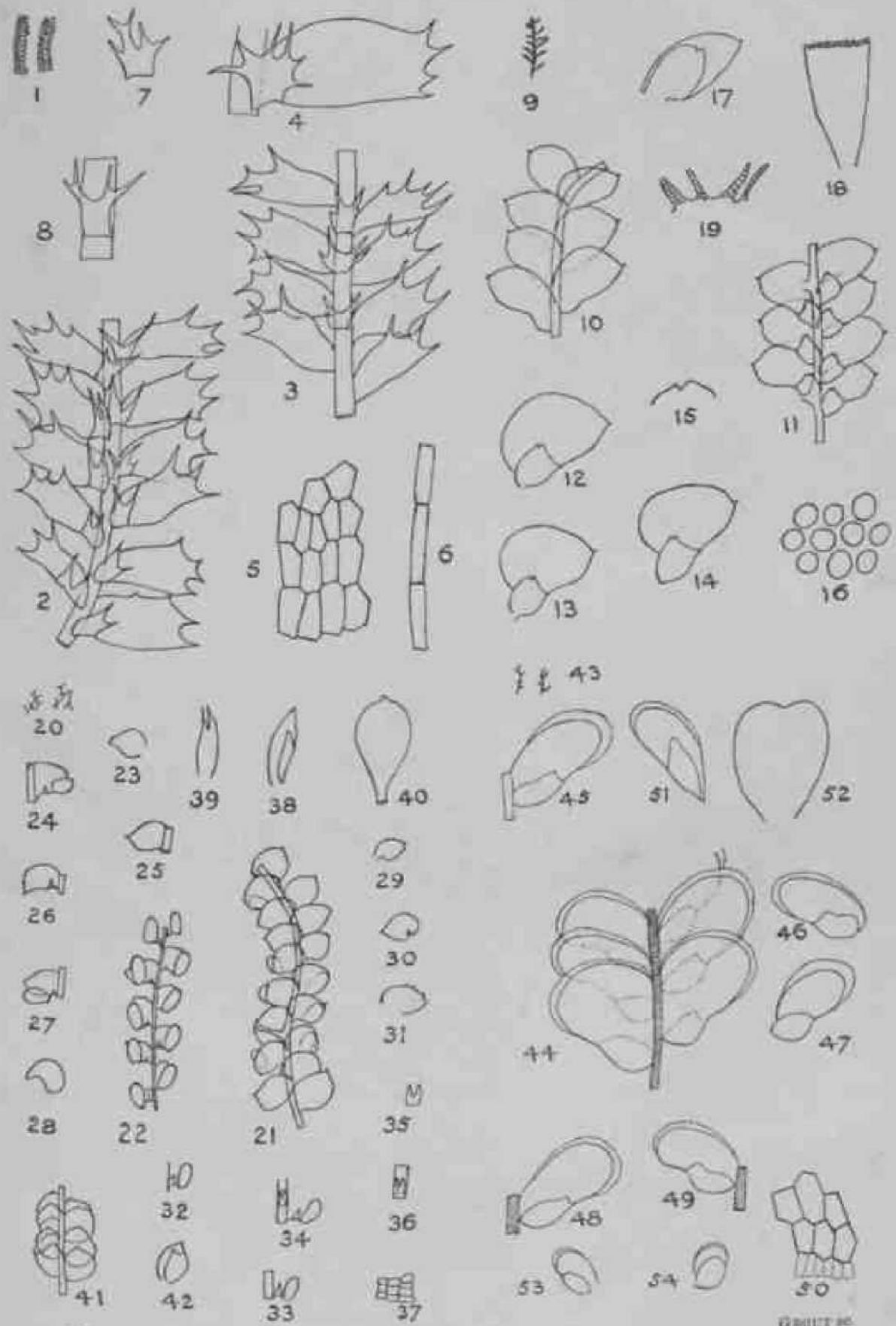
Fig. 20. Plant, half nut, size.
21. Portion of stem, antical view, X 25.
22. Portion of stem, postical view, x 25.
23-31. Leaves, lobes, x 25.
32, 33. Lobules with styli, X 25.
34. The same, with underleaf, x 25.
35, 36. Underleaves, X 25.
37. Portion of leaf, X 145.
38. Bract, x 25.
39. Bracteole, X 25.
40. Perianth, X 25.
41. Andrcecia, X 25.
42. Perigonial bract, X 25.

Leptocolea Comptonii Pearson, sp. nov.

Fig. 43. Plant, nat. size.
44. Portion of stem, postical view, X 25.
45-49. Leaves, X 25.
50. Portion of leaf, showing margin, X 145.
51. Bract, X 25.
52. Perianth, x 25.
53. 54. Perigonial bracts, X 25.

M. DIXON & W. PURDIE nov. del. GROUT sc.

NEW CALEDONIAN HEPATICÆ.



M. DIXON & W. H. PEARSON del.

NEW CALEDONIAN HEPATICÆ.

MARINE ALG/E.

By A. GEPP, M.A., F.L.S.

OHLOROPHYCEJE.

ENTEROMORPHA COMPRESSA Grev. Baie Ouémo ; on angiosperms. 112.

OHIETOMORPHA NATALENSis Hering. Baie Ouémo ; on rocks at low-tide mark. 114.

DiCTYosPHiERiA FAVULOSA Decaisne. Baie Ouémo; on rocks at low-water mark. 109.

•POLYPHYSA PENICULUS Ag. Baie Ouémo ; on rocks at low-water mark. 110.

HALIMEDA OPUNTIA Lamour. Baie Ouémo ; at low spring-tide mark. 722.

HALIMEDA TUNA Lamour. Baie Ouémo ; at low spring-tide mark. 723.

CODIUM SPONGIOSUM Harv. Baie Ouémo ; washed up. 120.

PILEOPHYCE.E.

TURBINARIA ORNATA J. Ag. Baie Ouémo ; washed up. 103.

CYSTOPHYLLUM MURJCATFM J. Ag. Baie Ouémo ; washed up. 124.

DICTYOTA FURCRLLATA Ag. Baie Ouémo ; washed up. 127.

OPHACELARIA FURCIGERA Knotz. Baie Ouémo; epiphytic. 106.

OPHACELARIA TBIBULOIDES Menegli. Epiphytic on floating *Tvrbinaria.* 122 (in part).

RHODOPHYCEJ].

GRACILARIA CONFERVOIDES Grev. Baie Ouémo; on stones just below low-tide mark. 119.

CHAMPIA COMPRESSA Harv. Epiphytic on stems of *Turbinaria.* 123.

ACANTHOPHORA OBIENTALIS J. Ag. Baie Ouémo; on stones just below Io*-tide mark. 117.

CHONDKIA DASTPHYLLA Ag. Baie Ouemo; on stones below low-tide *m******, 118.

LEVEILLEA JUNGERMANNIOIDES Harv. Baie Ouemo ; epiphytic on floating *Turbinaria.* 122 (in part).

CERAMIUM CLAVULATUM Ag. Baie Ouemo, on shell &c. just below low tide mark. 111.

FRESHWATER ALG/E.

By NELLIE CARTER, D.SC.

(PLATE 4.)

Introduction.

THE following is a list of freshwater algæ observed in collections made by R. H. Compton in New Caledonia in 1914. The algal flora of this island has not previously been investigated, although a certain amount of work has been done on some of the neighbouring islands. A consideration of the following works is important in dealing with the algal flora of New Caledonia :—

BORGE, O.—Anstmlische Süsswasser Chlorophyceen. Bihang till K. Sv. Vet.-Akad. Handl. xxii. No. 9,1896.

BORGE, O.—IJber tropische und subtropische Süsswasser Chlorophyceen. Ibid. xxiv. No. 12,1899.

GUTWINSKI. R.—De Algis a M. Raciborski anno 1899 in Iusula Java collectis. Bull. Akad. des Sciences Cracovie, 1902.

MASKELL» W. M.—Contributions towards a list of New Zealand Desmidieae. Trans. N. Zeal. Inst. xiii. 1881.

MASKELL» W. M.—On the New Zealand Desmidieae. Additions to Catalogue and Notes on Various Species. Ibid. xv. 1883.

MAJJ»BKBLL, W. M.—Further Notes on the Desmidieje of New Zealand. Ibid. xxi. 1889.

MOBIUS, M.—Australische Siisswasseralgen. Flora, 1892.

NORDSTEDT, O.—De Algis aquae dulcis et de Characeis ex insulis Sandvicensibus a Sv. Bei W*n 1875 raportatis. Lund, 1878.

NORDSTEDT, O.—Freshwater Algre collected by Dr. S. Berggren in New Zealand And Australia. Kougl. Sv. Vet.-Akad. Haudl. xxii. 1888.

SCHMIDLE, W.—Einige Algen aus Sumatra. Hedwigia, xxxiv. 1895.

SCHMIDLE, W.—Susswasseralgen in " Die Flora der Sanioa-lnseln." Engler's Botan. Jahrbuch, xx iii. 1896.

The collections proved to be very rich in diatoms, and the Cyanophycese also were very interesting, yielding one new genus, and two other species new to science. The filamentous Chlorophycese were fairly abundant, but unfortunately they were mostly in a sterile condition, and so could not be specifically determined. Dcsmids were not numerous, the genera *Closterium* and Cosma/*ium* being best represented. On the whole the collections were made either from running streams or from subaërial habitats. This explains the relative abundance of diatoms and filamentous Chlorophycese on the one hand, and of Cyanophycese and other subaërial algae on the other, and the comparative scarcity of such algse as Desmids which require still water and permanent boggy conditions.

A number of ubiquitous species were present in the collections, but some of the species observed have hitherto only been recorded from one or other

of the neighbouring islands. For example, the interesting primitive lichen described by Schmidle from the Samoa Islands as *Scytonema Hiron* occurred in well-deveioped masse3 on tree-trunks in New Caledonia. Another lichenised alga, *Trentepohlia dialepta*, originally described from New Guinea, also occurs in New Caledonia. The discovery of *Closterium compacted** described by Nordstcdt from New Zealand, was also of interest. The investigation has added considerably to our knowledge of the distribu ion of various algse, since many species only hitherto known from localities veiy remote from New Caledonia occurred in the collections.

A list of localities is given below:—

132. *Bate Ommo.* Irregular gelatinous masses on sandy soil; pale bluish-green when wet, black and shrivelled when dry. Abundant in coastal woods and m the °Peili f m

151. *Ermitage Stream.* Bright green spongy masses and small brackets projecting no twigs and branches over stream.

1*6. *Ermitage Stream.* Large bluish-green masses attached to stones a few inches be o the surface in stream pools. Serpentine rocks.

193. *Ermitage Stream.* Subaerial; orange-yellow filaments in pendent tufts on deaa trunks over stream; uncommon.

338. *Bairn des Lacs.* Mixture of gatherings from shallow rain pools, free floating ana attached to leaves. Serpentine; 800 ft.

384 *Rhibre du Car&naye.* Alga attached to rocks and plankton squeezed out. Serpentine ; 800 ft.

528. *Mont Mou.* Green filamentous on rocks in stream. Cretaceous; 800 ft.

532. *Mont Mou.* Subaerial, brown filamentous, forming mat over trees. Damp g"1 y forest; 600 ft.

612. *Mont Mou.* Bright orange-red incrusting rocks in slight shelter. Serpentine; scrub area; 2500 ft.

757. *Mont Koghi.* Orange filamentous, forming covering to serpentine rocks in a stream-course.

808 I
8091 I *Miv. Dumbea.* Squeezings of submerged algje in rock pools of river. Serpentine; 200 ft.

810. *Riv. DumUa.* Red mud from small clear pool along stream. Serpentine; 200 ft.

811. *Ms. Dumbea.* Soft incrustation of mud and algae on dripping rocks by stream. Serpentine; 250 ft.

851. *Mont Lore.* Bright yellowish-green filamentous, mucilaginous; and squeezings. From pool in littoral zone, at mouth of small stream.

852. *Mont Dore.* Dull sage-green, mucilaginous, sparse growth; and squeezings. Pool in littoral, at mouth of small stream.

864. *Pic la.* Stiff gelatinous nodules, incrusting rock in a trickle of water. Brownish-green. Serpentine; 500ft.

865. *Pic la.* Dense mat of dark green filaments on a nearly vertical surface of wet serpentine soil by stream. 500 ft.

879. *Baie Kuakul* Bluish-grey, woolly coating in rock crevices; dry serpentine scrub; 1000 ft.

1045a, *b,* & c. *Mont Humboldt.* Small creek; serpentine; 350 ft.
1045 «. Soft, brownish, filamentous, not markedly gelatmous, attached to stones in
1045 *b.* DensfbJowIi, rather gelatinous mats attached to roots or wet rocks.
1045 *c.* Nodular incrustation on wet rocks; dark slaty colour.
1181. *Mo,* Canala.* Large, rounded, black, ill-smelling mat on tree-trunk >n **mart** forest,

1242. *MaTcLa.* Bright green filamentous attached to roots of ***jMm,*** and other plants in sluggish stream. Mica-schist clay; 900 ft.

1356.
1357.
1358. *Canala.* Mica-schist alluvium at sea-level.

1859 1350. Filamentous, dark green, on dead shoots of

1357. SqueeTgs of * » . sp. in stagnant pool, covered with duckweed and dead leaves.

1358. Dead leaves with alga attached, from same pool as i.» r.

1359. Sneezings of ** sp., from slowly — u

1427. ^on^ra/zo. Small, transparent, brownish-green blobs on roc* stream. Forest region; mica-schist; 1000 ft. Surface covered with

1887. *Paompai.* Water from small rock pool in course of creek, golden-brown film. Shales; 300 ft.

1986. *Ouendjam Forest.* Squeezings from Po<am^<0» leaves and stems stream. Hornblende; 600 ft.

2411. *Ri* large stagnant rock pool; probably with Serpentine; 400ft.

SYSTEMATIC.

PLAGELLATA.

DINOBRYON SERTULARIA Ehrenb. Plaine des Lacs. 338

DINOFLAGBLLATA.

Spociesof *Gleno^in,* (Ehr.nb.) Stein ™ * » ^ Ehrenb. occurred i" No. 809, hat since i,, every instanc only the J J P^ ^ left the scaped manners remained, it was not possible to identity however, probably *Glenodinium uliginosum* Schill.

CTAN0PHYCE5J.

CHROOOOGCAC^EiE.

n /Tr... N *M-ic* River Dumbea; in rock,pools.

• CHROOCOCCUS TURGIDUS (Klitz.) Nag. wivei

809- Europe, India, Malaya, America..

CHR. SCHIZODERMATICUS West. River Dumbea; incrusting dripping rocks near river. 811. Europe, Africa, America.

CHR. MINUTUS (Kiitz.) Nag. River Dumbea; in washings of filamentous alga) in rock pools. 808, 809. Europe, Asia, Africa.

CHR. coHiERENS (Br6b.) Nag. River Dumbea; in gelatinous incrustation on dripping rocks near river. 811. Europe, India, America.

SYNECHOCOCCUS CRASSUS Arch. Plaine des Lacs ; amongst other alg# in shallow rain pools. 338. Europe.

S. PARVULUS Nag. Mont Humboldt; forming a film on the outside of a colony of *Rivularia* sp. 1045 a. Europe.

GLCEOCAPSA MAGMA Kutz. No locality. 89. Also another specimen with neither number nor locality. Europe, India, S. Africa.

G. MONTANA KUtz. Specimen of unknown locality. 1092. Europe.

G. POLYDERMATICA Kiitz. River Dumbea ; in gelatinous incrustation on dripping rocks near river. 811. Mont Humboldt; in similar habitat 1045 *c*. Europe, America.

G. MURALTS Kiitz. River Dumbea ; on dripping rocks near river. 811. Europe, W. Indies.

G. GRANOSA (Berk.) Kiitz. River Dumbea ; on dripping rocks, near river. 811. Mont Humboldt; on dripping rocks. 1045 *c*. Europe, America.

G. iERUGiNOSA (Carm.) Kiitz. Mont Humboldt; on dripping rocks. 1045 *c*. Europe, Java.

GLOSOTHECE CONFLUENS Nag. River Dumbea ; in gelatinous incrustation on dripping rocks. 811. Europe, Africa, America.

G. PALEA (Kiitz.) Forti. River Dumbea; in gelatinous incrustation on dripping rocks. 811. Europe.

G. RUPESTRIS (Lyngb.) Born. River Dumbea ; in gelatinous incrustation on dripping rocks. 811. Mont Humboldt; in nodular incrustation on wet rocks. 1045 c. Europe, America.

G. VIBRIO, sp. nov. (PI. 4. fig. 1.) Collulis minimis, cylindraceis, curvuHs, diametro 2-5 plo longioribus, singulis vel binis vel interdum ad 32 in famines ovales consociatis, contentu pallide cseruleo, tegumento liyalino homogeneo. Long. cell. 2-5 *fi;* crass, cell. 1-1-5/A ; long. fam. 10-26/A; crass. 6-16 *fi*-

Canala; subaerial, forming a thin mucous film with *Mastigoroleus obtusa,*

*P- «oy., and *Rosaria ramosa,* sp. et gen. nov., on trees. 1181. River Dunabea ; amongst other Oyanophycese in gelatinous coating on wet rocks near stream. 811. Nearest to *G. violacea* Rabenh., from which it differs in the greater diameter of the cells, and the formation of larger colonies, with unstratified sheaths.

OSCILLATORIACEJJ.

OSCIUATORIA VIOLACEA (Wallr.jHass. Canala; in washings of *Azolla* iron, roadside ditch. 1359. Europe, America.

LYNGBYA DISTINCTA Schinidle. Mont Oanala; epiphytic on various aquatic objects. 1242. Sandwich Islands.

SYMPLOCASTKUM CUSPIDATUM Forti *(Symploea cuspidatum* W. & *Q.* S. West), forming *Symphca-Vike* tufts over Bryophytes. 587. England, W. Indies..

NOSTOCHACEiE.

NOSTOO COMMUNE Vauch. Baie Onóino; on sandy soil. 132. Ubiquitous.

N. SPHAERICUM Vauch. Mont Arago; with Hepatics on rocks near stream. Europe, Australia, America.

N. MACROSPOBUM Menegh. Forming a thin incrustation on rocks. (Probably this epecies, but identification uncertain because the alga had been dried For a long time and could not be satisfactorily restored.) No number nor locality.

SOYTONEMACEJl.

SCYTOKEMA SUBTILE Möb. Baie Kuakné; forming bluish-grey woolly coating in rock crevjces- 379. The alga only differed from the one described by Jlöbius in that it occurred as a definite stratum, not as isolated filaments amongst other algse. India, Australia.

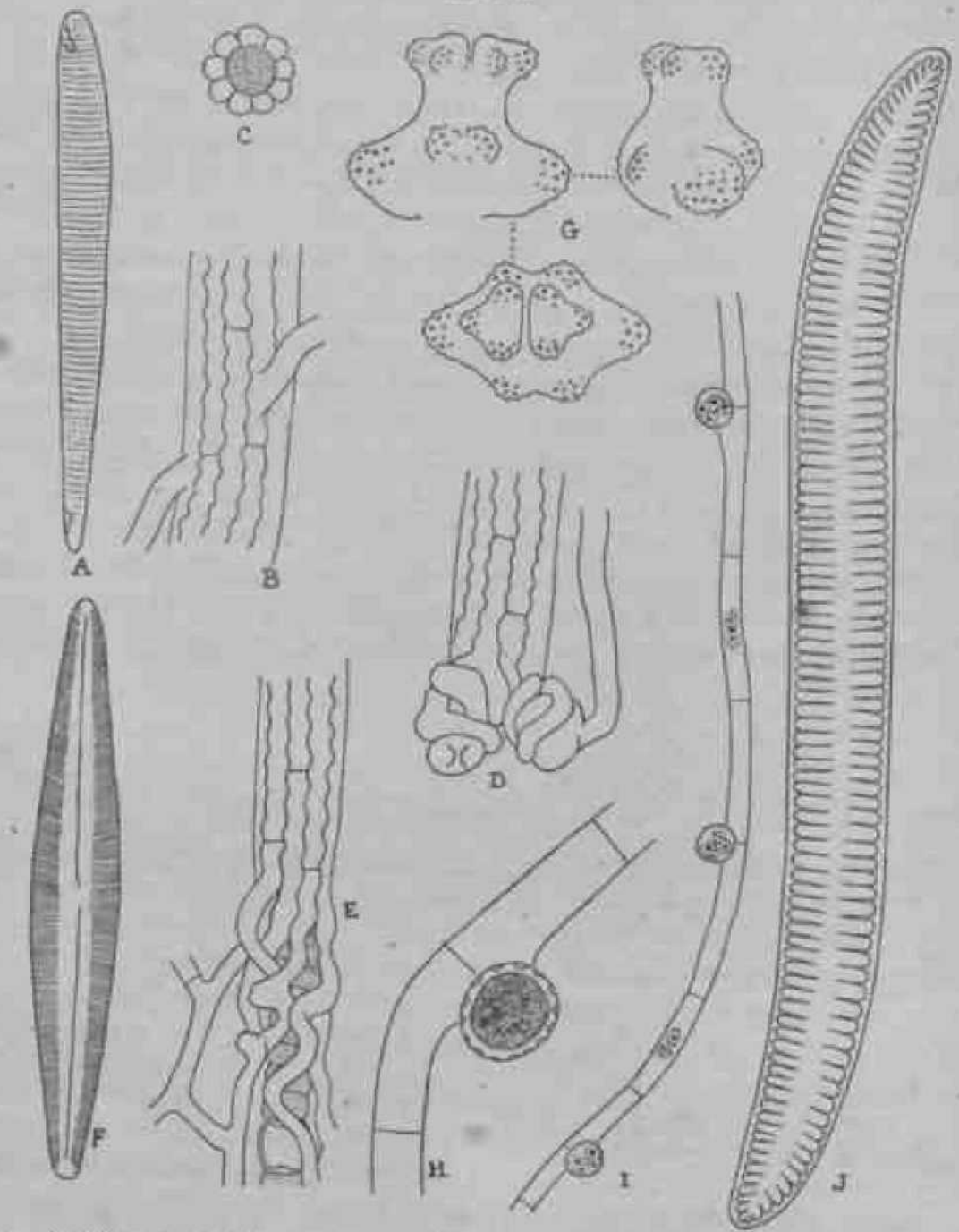
S. AMPLUM W. & Gr. S. West. Forma trichomatibus gracilioribus. Crass. fil. 16-22/t; crass, trich. 1-5-2*/1;* long.cell. 20-29*Hi* Mont Humboldt; on wet rocks and in rock pools. 1045 a, 1045 *b,* 1045 c. River Dumbéa; in small clear pool. 810. Pic La; forming a mat on nearly vertical surface of wet serpentine soil near stream. 865. W. Indies.

8. VABIUM Kiitz. With *CepMeuros virescens* on leaf. 563. Only a very little Present. Europe, Ceylon, Malaya, America.

S. HIERONYMI Schinidle, Flora Samoa-Inseln, 1896, p. 254. (Text-fig. X> P-E.) With mosses on tree-trunks. 1087. Samoa Islands. This alga> first described by Schuiidle from the Samoa Islands, is really a

componnd org Hiiisin. ih<* **alg* being efotttj lEttrfftwi with** n fungus to form a lichen-like ihnll«*, **TII** .W_w I **Itfabtfp** ii W«K frrmmp large masses several square inches in **Mtent,** (U›d a few mms. h ^1 over mosses and tree-trunks. The thallus is blutit-grtwn in colour, u»a ^o-m> r., oonsUl .if a basal mat of anastomosing threntls fmro **alt** pun*!,! ^Li-li unw nttm-.rous tapering tufts

FIG. 1.



A. *Perouia erinacea* Bréb. & Arn., × 1423. B–E. *Scytonema* [illegible] *mymi* Schmidle, × 510. F. ? *Cymbella* sp., × 610. G. *Euastrum intermedium* Cleve, f. *scrobiculata*, nov. f., × 510. H–I. *Zygnema pectinatum* Ag., var. *decussatum* Kirchn. forma: H, × 350; I, × 142. J. *Stenopterobia intermedia* Lewis, var. *crassior*, var. nov., × 510.

Hfa

about 2 or 3 mm. high. Microscopic examination shows that it consists of a felt of *Scytonema* filaments bound together by anastomosing fungal hyphse. The erect tufts also consist of a number of parallel *Scytonema* filaments closely adherent to each other, bound together and completely surrounded by a loose mat of hyphas. The undulating lines in the sheath of the alga figured by Schmidle and thought by him to be due to the peculiar structure of the sheath itself, were very conspicuous also in the New Caledonian specimens, and after careful observation it was proved beyond doubt that these undulating lines are caused by the hyphse of the fungus, which are placed side by side round the algal filament to form a complete sheath. Further, the horizontal lines joining the undulating longitudinal lines are the septa of the hypha?. The alga with its sheath of fungal hyphse is seen in optical transverse section in toxt-fig. 1, C. The undulathig arrangement of the hyphse along the alga is most remarkable, and it is difficult at first to believe thnt the undulating lines are really due to a fungus, until at intervals irregularities may be observed, in which the hyphse forming the sheath of the alga may separate from each other, and become apparent.as ordinary hyphse branching off into the ordinary free mycelium (text-fig. 1, D & E). At intervals also, the undulating hyphse on the alga can be seen giving rise to branches, some of which may join up with the mat of mycelium which surrounds each bundle of algal filaments (text-fig. 1, B). The loose hyphaj forming the sheath of the *Scytonema* filament are wavy ; the mycelium which is free from the alga consists of normal straight hyphse. It is difficult to find a reason for the undulating nature of the hyphse surrounding the alga, unless that by the hyphse being thus dovetailed into each other a stronger union is effected by them, and a firmer sheath results. It is noteworthy in this connection that the fungus sheath persists with violent retainment long after the enclosed *Scytonema* filament has disappeared, and finally breaks as a whole, transversely without the hyphse showing any signs of separating from each other longitudinally. No trace of the fungal hyphae actually penetrating the algal cells was observed. *Scytonema Wronymi* seems to be a most interesting case of lichen formation.

SCYTONEMA DENSUM (A. Br.) Bornet. River Dumbéa; in small clear pool. 810. Europe, America.

S. ALATUM ((form.) Borzi *(Petalo)1kna alatum* Berk.). Forma trichotatibus gracilioribus, cellulis diametro circiier 3-plo longioribus ad apicem subquadratis. Mont Humboldt; on wet rocks or roots. 1045 *b.* Pic la ; on Wet serpentine soil. 865. Europe, America.

TOLYPOTHRIX BYSSOIDEA (Harv.) Kirchn. Specimen without locality. 88. Europe, Borneo, W. Indies.

STIGONEMACEffi.

MASTIGOCOLBUS OBTUSUS, sp. nov. (PL 4. figs. 7-9.) M. filis insequahbus, ramosissimis; ramis biformibus, his brevibus crassis, apice obtusus, longis flagelliformibas, ssepe ramosis; trichomatibus quam fili»n t^P^° angustioribus vaide irregularibus et crassitudine insequalibus ; ce...ulis irregularibus subquadratis vel diametro longioribus, contentu pallidei aeru- gineo; tegumento crasso insequali, hyalino, hinc inde constricto, 'bi^ue lamellislatius divergentibus prsedito, alibi homogenco; ramulis flagollifonm u tenuiter et solide vaginatis nee manifesto septatis, heterocystis nullis. ^ia m, fil. 25-38 *fi;* crass, tricb. 4-U/t; long. cell. 9-30/*; long. ram. flagelH- form. ad 800*(i;* crass. 2-7^.

Mont Canala; forming a thin, slimy, almost invisible film together with *Glceothece Vibrio* and *liosaria ramosa* over excrescences on trees. 1181. This species is sufficiently distinct from the only other species of the genus by virtue of its thick hyaline sheath, and the irregular form of the cells an filaments. Futhermore, unlike *Mastigocolens testarum* Lagerh., its whip-*1'k® branches, which may themselves be branched, are provided with a shea throughout their whole length, and although the contents of these slender branches may be distinctly septate at the base, for the greater part of their length, septa cannot be distinguished. The complete absence of lietero- cysts is another noteworthy feature, and one which necessitates a revision o the generic description.

MASTIGOCOLEUS Lagerh., char, emend.

Fila libera irregulariter ramosa; articuli praeter ramigeros unica cellula constantes. Rami biforines, partim cylindrici, partim flagellifonnes in piluin attenuate Vagina continua. Heterocystse singular sa?pe pedicellate rarissime binre, terminales vel laterales, nunquam inteicalares; interdum nullse. Multiplicatio hormogoniis (et cellulis chroococcoideis?). Spoi'8[0] ignotse. Contentus cellularum homogeneus.

ROSARIA, gen. nov.

Planta filis vere ramosis, cellulis moniliformibus uniseriatis, ramis rainulis- que quaquaversus divergentibus, diametro filo subsequalibus, apicem versus leviter attenuatis, vagina plerumque nulla, heterocystis nullis.

ROSARIA RAMOSA, sp. nov. (PI. 4. tigs. 2-6.) R. filis longis ramosis plerumque evaginatis, ramis longioriKus ramulisque prseditis, cellulis ferm« sphgericis membrana solida nee mucosa, contentu pallide serugineo luceinq^e magnopere refringente, nonnullis magnis guttulis oleosis instructo; hetero- cystis nullis. Diam. cell. 13-19 *p;* long. cell. 19-22 *fi.*

Mont Canala ; forming a very thin mucous film together with *Glosothece Vibrio* and *Mastigocoleus ramosus* over excrescences on the bark of trees. 1181. This is a peculiar and beautiful alga which looks like a string of

glistening pearls under the low power of the microscope. As regards its systematic position, it seems nearest to *Hapalosiphon,* differing chiefly in the absence of heterocysts, its irregular branching, and in the usual absence ot the thin, firm sheath commonly present in that genus. Its branching is sparse and irregnlar, the branches arising in all directions, and branches ot the second order being quite frequent. The branches make practically a right angle with the parent branch, and all the cells, both of the main axis and the branches, are similar to each other, becoming simply more slen«.er towards the apex. Hie alga has striking characters which distinguish it from all others. It has a peculiar form of apical growth by the budding of the apical cell, and the continued growth of this small portion budded ott until it is large enough to be cut off as a distinct cell (PI. 4. ngs. 4, »;. Very rarely a gelatinous sheath is present, or it may be represented by an almost invisible diffluent colourless mucus surrounding the nlamenft. Sometimes it apparently becomes firm and yellowish, and in this condition it ofteahas a peculiar radiating structure which recalls the structure of the mucous sheath in certain filamentous Desmids (PI. 4. fig. 6). Iho absence of heterocysts is peculiar, aud in view of the fact that the significance, rf these cells is ,ti/not 1)roperly understood, it is noteworthy that the alga associated with *Rosaria ramosa,* namely *Masti9ocoleu*obtu*us,™s* also destitute of heterocysts, although in the other species of the genus *MaHigocoleus* heterocysts are present.

FISCHERELIA AMBIGUA (Nag.) Gom. Specimen without locality. 90. Europe, India, Sandwich Islands, America.

STIGONEMA HORMOIDES (Kutz.) Born, at Eta. Specimen without locality. 1092. Europe, Australia, America.

coll. 8 a.

Plaine des Lacs ; in shallow rain pools. *iM-* iae ms infrequent; they were about 1 mui. in length, unbranched, and weie probably in an imperfect state of development.

RIVULARIAC&E.

KIVCLARU H*HATITES (DO.) Ag. Pic La, inciting rocks in trickle of water. 864. Europe, America.

BACILLARIEiE.

MELOSIRACEJE.

Hnotnu ITALICA Kutz. Mont Humboldt; with Blue-green .]g» on stones iu rock pools. 1045 *a.*

CYCLOTELLA MENEGHINIANA Ktitz. Canala; in washings of *Azolla* from roadside ditch. 1359.

TABELLARIA<JE,E.

TABELLAMA FLOCCULOSA Kiitz., var. VENTRICOSA Grun. River Dumbéa ; amongst filamentous algae. 809. Ouendjam Forest; in washings from *Potamogeton* in slowly running stream. 1986.

DIATOMELLA BALFOURIANA Grev. Long. 9-14/A; lat. 3-4*5/A. C[1]. 4, figs. 11-13.) River Dumb&i; amongst filamentous algse. 809. Mon t Humboldt; with Blue-green algae in rock pools. 1045 a. The specimens agreed very well with the original figures of Greville(Ann. Mag. Nat. Hist. vol. xv. 1855, t. 9, figs. 10-13), but differed somewhat from those of later authors. For whereas this diatom is usually figured as linear-elliptic in *lie valve view, and slightly tumid in the middle, Greville's figures show an exactly linear-elliptic valve view without any trace o£ a median swelling* The New Caledonian specimens also were oval to elliptic in the valve view according to the size of the individual, without any median tumidity, The specimens further showed the presence in the valve view o£. a conspicuo us median slit in the internal septum connecting longitudinally the three \undowb (PI. 4. fig. 12). These slits do not seem to have been noted previously, }'e t it is strange that they should have been overlooked, since they are very con- spicuous in the valve view. The raphe is a much more delicate structui e which could not be confused with the slit, which it overlies. The raphe is only seen when the valve, without the septum, is separated from the frustu le (PI. 4. fig. 11). The diatom was particularly abundant in 1045a.

DENTICULA ELEGANS Kiitz. Plaine des Lacs ; in shallow rain pools. 338. River Dumbéa: amongst filamentous algje in rock pools. 809. Mon t Humboldt; amongst Blue-green algre in rock pools. 1045 *a.* l\iver Ngoye > amongst filamentous algae in rock pools. 2411.

FRAGILLARIACEJ:.

SYNEDRA ULNA Ehronb. Ermitage stream ; in pools. 176. Mont Dore; in pool, littoral zone, at mouth o|^mall stream. 852. Mont Canala; amongst filamentous algae in sluggish stream. 1242. Canala : in washing[8] o£ *Azolla* and *Lemna,* and amongst other algoe in streams and pools. 1356, 1357, 1359. Ouendjam Forest; in washings of *Potamogeton horn* slowly running stream. 1986.

S. ACUS Kiitz. Canala ; in washings of *Azolla* in roadside ditch. 1359. Mont Dore ; in pool in littoral zone. 852.

MERIDI0NACEJ1.

PEHONIA BRIKACEA Breb. et Am., forma. (Tex^fig. 1, A.) Forma valvis a front* visis non apice rostrato-capitatis, pseudoraphe vix conspicua. Ouendjam Forest. .1986. Very abundant amongst other diatoms in slowly running stream.

EUNOTIACEiK.

EOMOTIA. PBJtauwA Ehrenb. Oanala ; in stagnant pool. 1358.

E. LiMABw Gran. Uiviere du Carcnagc; amongst filamentous *tigfB.* 384. Phune des Lacs ; in shallow rain pools. 338. Ouendjam 1 orest j in slowly running stream. 1986.

E. IMPRESSA Ehrenb. Plaine des Lacs.; in shallow ruin pools. 338.

E. PECTINALIS Knit. Oanala; in washings of *Lemna* sp. 1357. Ouendjam Forest; in slowly running stream. 1986.

E. SOLEIBOLU Kubenh. Mont Humboldt j in rock pools. 1045 *a.* Only [a] single example of this species was noticed.

E. VENTRALIS Ehr6n1, Ouendjam Forest; in slowly running stream. 1986.

E. BICAHTATA Grun. Kivière du Carénage; amongst other *tip* i* stream. 384.

AOHNANTHACEJ1.

Aoa»AKTH»j JUCBOCEïHALA Kfitz. River Dumbea ; amongst filamentous [al]g»- 808, 809. Mont Humboldt; amongst Blue-green algæ in rock pools. [1]045a. Europe.

A. HUKGARICA Grun. (Oanala; in washings of *Le,nna* .p. 1357. Europe.

A- TRINOWS Am. River DomMi; amongst filamentous alg* in rock Pools. 808,809. Europe.

A. LAXCEULATUM Gnu, Oaendjam Forest; in slowly running stream. ^86. Europe, Australia, New Zealand, India, America.

A• WLAXA Gru,,, va, SMiTBlAK^rev. Ouendjam Forest, in slowly runiwng stream. 1986. New Hebrides, Africa.

OOCCONEIDAOE.E.

C!OCOOKEISVLAOENXULAEhrenb. Canala; on dead[leaves,» pool. 1358. ^ O«endjara .Forest; in slowly running stream. U»>- uro-le Zealand, America.

NAVICULACEiE.

NAVICULA NOBILIS Ehrenb. River Dufnbea ; amongst filamentous algae in rock pools. 809. Europe, America.

N. VIRIDIS Kiitz. River Dumbéa. 809. Ouendjam Forest; in slowly running stream. 1986. Europe, Australia, America.

N. MESOLEPTA Ehrenb., var. THERMES (Ehrenb.) Van Heurck. Ouendjam Forest. 1986. Europe, New Zealand.

N. LEQUMEN Ehrenb. Plaine des Lacs; in shallow rain pools. Ouendjam Forest. 1986- Europe, India, Australia, New Zealand, America.

N. RADIOSA Kiitz., var. TENELLA (Bréb.) Van Heurck. Plaine des Lacs. 338. River Dumbéa; amongst filamentous algae in rock pools. 808, 809. Ouendjam Forest. 1986. Europe, Japan, Africa, America.

N. RHYNCOCEPHALA Kiitz. Ganala; in pool. 1358. Europe, Australia, S. Africa, America.

N. BREVICOSTATA Cleve. Oanala; in pool. 1358. Europe, India.

N. SEUIANS Bréb. PJaine des Lacs. 338. River Dumbéa. 809. Mont Humboldt; with Blue-green algas in rock pools. 1045 a. Europe, Australia, New Zealand.

N. EXILIS Gran. Plaine des Lacs. 338. Mont Humboldt. 1045 a. Europe.

N. IRIDIS Ehrenb., var. AMPHIRHYNCHUS (Ehrenb.). Canala ; in stagnant pool. 1358. Ouendjam Forest; in slowly running stream. 1986. Europe. Australia, N. America.

N. PUPULA Kiitz. Ouendjam Forest. 1986. Europe, Japan, India. Australia, New Zealand, S. Africa, S. America.

N. CONFERVACEA (Kiitz.) Grun. Mont Canala; iii sluggish stream. 1242. Canala; in pool and in ditch, 1358, 1359. India, Sandwich Islands, Australia, Jamaica.

STAURONEIS PHCENICENTERON Ehrenb. Ouendjam Forest; in slowly running stream. 1986.

VANHEURCKIA RHOMBOIDES Bréb. Plaine des Lacs ; in shallow rain pools. 338. Var. SAXONICA Rabenh. *{Navicula crassinervia* Bréb.). Plaine des Lacs. 338. Europe, India, Australia, New Zealand, America.

V. VIRIDULA Bréb. Plaine des Lacs. 338. Europe.

MASTOGLOIA GREVILLEI **W. Sm.** River Dumbea; amongst submerged alg® in rock pools and amongst Blue-green alg* in gelatoous layer incmsting dripping rocks. 809,811. Europe.

PLEUROSJGMA ELONGATE **W. Sm.** Canala; abundant amongst filamentous alg* in fairly swift stream, and in pool. 1356, 1358. Europe, Chma, Malaya, America.

GOMPHONEMACEJJ.

GOMPHONEHA INTRICATE **Ktttz.** Plaine des Lacs^ 338. °TM^} Forest; abundant in slowly running stream. 1986. \wt. VIBRIO (VanHeurck. Ouendjam Forest; abundant. 1986. Europe, America^

G. SUBCLAVATUM **Grun.** Mont Canala; in sluggish stream. 1_42. Uanala; in washings of *Azolla* from roadside dvtsh. *UM*- Europe, Australia, New Zealand, Sandwich Islands, America.

COCCONEMACEJ:.

CTMBELLA OBTOSA **Greg:** Plaine dos Lacs; in shallow rain pools. 338. River Dumbea. 809. Ouendjam Forest; in slowly running sti earn. 1986. Europe, America.

C. TUMIUA **Breb.** Mont Canala; in *f*uggish stream. 1242. Canala; in «ashi$_{ngs}$ of *Azolla* in roadside ditch. 135[9]. Ouendjam Forest; in slowly running stream. 1986. Europe, China and Japan, India, Australia, New Zealand, America.

CmounAGreg. Canala; in pool. 1358. Europe, Malaya, Australia, New Zealand, America.

«. CESATZX **Grun.** River Dumbéa; amongst filamentous alga, 808. Europe, Canada.

jC*MB$_{EUAsp.}$ (Text-fig. 1,F.) R^DU1^, S £ Sm Z tH

bold*- 1045 a. Ouendjam Forest. 1986. Ihis »a ^ ^ f esetin great abundance in several of the.col£m[s]. In 1045 *a* ried exceedingly ~rming auxospores in great numbers^ the, ^u'tuk. tt. it ossibly a in size. The' valves are practically#n.metrical^d « P ^ N(^-fa, but a few of the median •fate on ^ ^ ^ otlier side, father distant and more distinct pnnctum than those but have not been B«*ause of this asymmetry I have referredI it to ^t'area and the fine abl* to decide on its exact identity. The broad axd» . ·a· The strise st^tion with its linear-lanceolate form are quite cha.acten.tic. are punctate, and there are about 16 in 10/*.

AMPHORA OVALIS Ktttz. Ouendjam Forest; in slowly running stream. 1986. Var. GRACILIS (Bhr.) Van Heurck. Mont Dore ; in pool in littoral zone. 852. Europe, Australia.

EPITHEMIA ARGUS Kiitz. Rivière du Carénage. 381. River Dumbéa. 808, 809.

E. ZEBRA (Ehr.) Kiitz. Mont Canala; in sluggish stream. 1942. Canala; in pool and ditch. 1358, 1359. Ouendjam Forest; in stream. 1986. Var. PORCELLUS Grun. Canala. 1358.

E. REICHELTI Fricke, Schmidt Atlas, t. 251, f. 28-32. Mont Canala. 1242, 1356. Ouendjam Forest. 1986.

RHOPALODIA GIBBA O. Müll. Mont Canala. 1242, 1359. Onendjai Forest. 1986.

R. VENTRICOSA O. Müll. Canala. 1357,1358.

NITZSCHIACEJE.

NITZSCHIA TRYBLIONELLA Hantzscli. Ouendjam Forest. 1986.

N. SIGMA W. Sin. Canala. 1358.

N. LINEARIS (Ag.) W. Sm. Mont Mou ; in stream. 528. Mont Dore; in pool in littoral zone. 852. Canala. 1358.

N. AMPHIBIA Grun. Ouendjam Forest. 1986.

SURIRELLACEiE.

SURIRELLA BISERIATA Breb. Ouendjam Forest. 1986.

S. LINEARIS W. Sm. Canala. 1356. Ouendjam Forest. 1986.

S. SPLENDIDA Kiitz. *(S. robustu* var. *splendida* Van Heurck). Mont Dore ; in pool in littoral zone. 8 5 ^ ^

STENOPTEROBIA INTERMEDIA Lewis, var. CRASSIOR, var. n. (Text-fig, *h* ' ^ Var. valvis mnlto brevioribus et pro rationo crassioribus, utrinque subcuneatis, striis ut in typo. Long. 265/A ; lat. 19 *fx.* Riviere du Carenage-384. Frequent.

CYMATOPLEURA SOLEA (Breb.) W. Sm. Ouendjam Forest. 1986.

CHLOBOPHYCE^-

PALMELLACEJ1.

Q u o o n n <UGAS (Kutz.) Lagerh. Canala. 1359. Europe, India, America.

AUTOSPORACEJS.

OocmisPARVAW.&G.S-West. River Dumbea. 809. Europe.

1359. Ubiquitous. Var. ALTEBNANS (Relosch) Borge. flame des Lacs. 338.

S. OBLiQOirg (Tarp.) Kuttz. Canala. 1359. Ubiquitous.

SOBASTROM SHNULOSUM **Big.** Uanala. 1359. Europe, India, New Zealand, America.

HYDRODIOTYACEJ3.

.PKDUSTB^THTBAsCEhrenbORaUs. Canala. 1359. Plaine des Lacs. 338. Ubiquitous.

CLADOPHORACEiE.

RHIZOCLONIUM HiEHoaLVPHlotm ». With *NiUlla hyalina.* No. 63b.

ULOTRICHACE*!.

TT . J T „= qq« Var.vABiABiLis(K.utz.;

ULoiHBixsuBTiusKiitz. Plaine des Lacs. **»•

Kircbn. Plaine des Lacs. 338.

GBUBTOPHOBACTA

STIGKOCLONRTM FABCTUM Berth. Mont Oanaw. 12 rin —jant whicb had ™? abundant as an epiphyte on the hairs of a flqwe 8 F ith r ge. ^many evidently fallen into the stream aad become covered* j turgid ^ <*** the apical cells of ffae short erect branches :. « ^ Pollen, apparently just ahout to produce ^oogoiudia. «erm j

PHOTODEBMA VIBIDB Kuttz. Mont Oanala. 1919 Eoiphytic on hairs ot faUen s a W g e d plant. 1159. E P l * | ° u *Nitella* sp. f e s h w Alg. 1904,

ENDODEBMA POLYMOBPHA G. S. TO. ^ t f . ^ i , , I!! hl'irs of fallen P- 283. t. 464, f. 19. Mont Canala. 1242. Ep.pJ£o « Emerged plant. 1159. On Jtoffa sp. W-k W » . naller on tbe . '^ plauL were more compact and the cells " ^ ^ rf jfrfl. >p. .ha»s 0£ the plant than those growing on the huge .^.g formation ^ 1242. ln H59. There were occasional evidences of zoogonidm

TRENTEPOHLIACEJ:.

TRENTEPOHLIA AUREA (L.) Mart, Mont Mou ; incrusting rocks in slight shelter. 612. Europe, America, New Zealand, Sumatra.

T. VILLOSA (Kiitz.) De Toni. Brmitage Stream; in pendent tufts on dead trunks over stream. 193. Not common. Brazil, West Indies, Sumatra.

T. DIALEPTA (Nyl.) Hariot, Schmidle, Alg. aus Neu-Guinea, 1897, p. 306. Ermitage Stream; bright green spongy masses arid small brackets projecting from twigs and branches over stream. 151. New Guinea. The thalli were somewhat smaller than those described by Schmidle from New Guinea, being at the most 3 cm. in diameter, and the plates only 1 mm. thick. The tunoval hyphse in the wall of the alga were clearly visible with fairly high magnification, and occasionally spores were produced in connection with the hyphæ. Apothecia, however, were not present, neither was the alga itself fruiting.

?T. POLYCARPA Nees & Mont. Mont Koghi; forming an orange filamentous covering to serpentine rocks in a stream-course. 757. (Probably this species, but owing to absence of reproductive celte, exact identity uncertain.;

CBPHALEUROS VIRESCENS 0. Kuntze *(Mycoidea parasitica* Cunn.; *Strigula complanata* Fée). 563. On leaves. America, India, Java.

APHANOCHiETAaEjE.

APHANOCHJETE HYALOTHECE Hansg., var. MUCICOLA Schmidle in Weit. Beitr. Alg. Rheineben &c. 1895, p. 67. (Janala; from washings of *Azolla* sp= in ditch. 1359 On *Ihjalotheca dissiliens.* The plants bore large oval oospores, but no antheridia were observed. Germany.

COLEOCHÆTACEÆ.

(JoLEOCHiETE ORBicuLAius Pringsh. Mont Oanala. On hairs of fallen plant in sluggish stream. 1242. Europe, America, New Zealand.

ZYGNEMAUEJE.

MOUQEOTIA SCALARIS Hass. Plaine des Lacs; in shallow rain pools. 338. Europe, America, Australia. ^ ^

Sterile species of *Mougeotia* odflfed in Nos. 338, 384, 809, 1356, 1359, 1986,2411. ^ ^

ZYGNEMA PEOTINATUM (Vauch.) Ag., var. DECUSSATUM (Vauch.) Kirchn. Forma conjugatione laterali. (Text-fig. 1, H & I.) Crass, fil. veg. 13-16 /* ; diametro 5-plo longioribus; diam. zyg. 30-35 *ft.*

Plaine des Lacs; in shallow rain pools. 338. Rivière-du Carénage; on rocks in stream. 384. Europe, America. This alga agrees almost

exactly with *Z. rhynclmerm* Hansg., differing only in the scrobiculate middle wall of its zygote. In this latter character it is nearer to *Z. pectirmlum,* and for this reason has been referred to the variety *decussatum* of that species, which it resembles very much in its slender filaments and longer cells. Ihe sygospores, however, were usually formed in the conjugation tube by lateral conjugation instead of by scalariform conjugation, as is usual in that species. The latter form of conjugation occurred very occasionally, and only as a great exception. Lateral conjugation in typical *Z. peettnatum* has, however, already been reported by Fritsch & Stephens in Trans. Roy. Soc. South Africa, vol. ix. 1921, p. 53, fig. 24.

Sterile species of *Zygoma* occurred in Nos. 338, 384,1356, 198b.

SPIROGYBA OOMMUNIS (Hass.) Wittr. Mont Canala ; in sluggish stream. 42.

^Sterile species of *Spirogyra* occurred in Nos. 176, 384, 528, 852 (with unripe zygospores), 1242,1356, 1359.

DESMIDIA0EJ3.

GONATOZYGON MONOTSNIUM De Bary. Canala; in washingsi of i*1zolla* from slowly running water in ditch. 1359. Europe, America, 11» J.a, Malaya.

Var. HLOSELLUM Nordst. Canala ; in fairly swift stream amongst *Spirogyra* SP- 1356. Ireland, Brazil.

G. KINAHANI (Archer) Rabenh. Riviere du Oarénage; amongst algæ attached to rocks 384. Europe, America, Malaya. J™ £ * * £ £ noidibus numerosissimis. Long. cell. 660 , ; lat. 18/.. Uivww du Urenage. 384.

CYLINDROCYSTIS BBEBISSONII Menegh. Plaine des Lacs j in shallow rain pools. 338. Rivière duCarénage. 384. Europe, Indm, Malaya, Australia, New Zealand, E. Africa, America.

NETRIUM DIGITUS (Ehrenb.) Itzigs. & Rothe, Plaine des Lacs. 338. Europe, China and Japan, India. Malaya, Austral.^ New Zealand ^-e. Var. CONSTBICTUM W. & G. S. West. Rmere du Ca.enage. 384. F

PKK1UM MABOABXTACKUM (Ehrenb.)JrJ. O-fj 1 / ^ £ £ £ running stream. 1986. Europe, j A N e w Zealand, L. Atnca„A The specimens were much more rounH at the **«f»**£™tal, and were provided with a large, conspicuous terminal vacuole at each end.

P. MINUTISSIMUM Nordst. (PI. 4 fig. 15.) Plaine des Lacs. 338. Europe, Burma, Siain, Madagascar, S. America. The specimens were slightly longer and narrower. Long, 17 μ ; lat. 8 μ. Zygospores were not uncommon.

PLANTS FROM NEW CALEDONIA.

CLOSTERIUM PSEUDODIANÆ ^ Canala! in things of ^.off. s,.. from roadside ditch.
1359. Europe, Ceylon, Madagascar, E. Africa.

C.
1359. VE IT KUt r'u • oanala; in Wasllin Ss of ^ ° » « "P- from roadside ditch.
Africa. ^ China aUd Japa,,, India, M a V , New Zealand, Africa,

C. LEIBLEINII Kütz. Ouendjam Forest * in slowly running stream. 1986.
Europe, Japan, India, Australia, Africa, America.

C. MONILIFERUM (Bory) Ehrenb. Ermi^ S t w w . 17S. Canala> stream, in stagnant l, and in ditch 135G, 1357> «»»! Euro e,china and Japan, Ceylon, T ? ? Zealand, Africa, A ierica » - Fo -» aINTEBMEDIA Gutw. Canala ; ,!!
; in ditch. 1359. Europe.

C. EHRENBERGI M T g l 1 - Can «la; ^ ^eam and ditch. 1356,1359.
Ouendjam F t v ° Wty ninnin « Stream 19 8fi Europe, China nul
Japan, Ind ? ' m m, Malaya, New Zealand, Africa, America.

C. ACEROSUM (Schrank) Ehrenb. Ouendjam Forest ; in slowly running stream. 198 . Siberia, China and Japan, India, Malaya, Australia, New Zealand! A ^ L T

C. PERACEROSUM F. Gay. Canala ; in washings of *Azolla* in ditch· 1359.
France, W. Africa.

C. KUTZINGII Bréb. Canala ; in pond and in ditch. 1357, 1359. Europe, India, Malaya, Australia, New Zealand, C. Africa, America.

C. COMPACTUM Nordst. Plaine des Lacs; in shallow rai» I - * - 338.
New Zealand.

PLEUROTÆNIUM MAXIMUM (Reinsch) Lund. Plaine des Lacs. 338.
Europe, Ceylon, Malaya, Africa, America. Forma celluli< sracnioriboii
Long. cell. 720 μ; lat. 30 μ. Canala; in ditch. 1359.

P. BAHIUNDATUM W. & ft H W«t n ,
Aaetraiia. The form was simi 7 « f ^ 5 in ditoh_ 1359, Mada gascar, wasserchlorophyceen, 1 8; V ' ^ u o "f ^"*' ^ B o ^ . t ^ " "- ^ does rot show any a ical , 'i , , t. ?'. 3, 40), The ori ginal «gn«> ^ W«st

could usually be distinguished. T h T I "Ot Cons picuoBS, bnt
smaller than that figurfd by Wesf ^ of the Semice11 waS also

P. SUBGEORGICUM ^S^ 1905 p 117 Canala in dite)
1359. United Stat ipic - - »
were sometimes quite distinct· Wer6 DOt constantly present, but

TETMEMORUS LiKYis (Kiite.) Ralfs. Plaine des Lacs; in shallow rain pools. 338. Europe, Malaya, Australia, New Zealand, America.

EITASTRUM DENTICIJLATUM (Kirchn.) Gay. Plaine des Lacs. 338. Europe, China, Malaya, Australia, New Zealand, Africa, America.

anf' PECTINATTM Breb. River Dumbeá ; amongst other aigro in rock pools. 338. Europe, America.

S. E. INSULARE (Witfcr.) Roy. Plaine des Lacs. 338. Northern Europe, m, United States.

E. INTERMEDIUM Cleve, forma SCROBICULATA, n. f. (Text-fig. 1, G.) Canala; in ditch. 1359. The alga was not common. In form it is very near *Eu. intermedium*, differing chiefly in its scrobiculate cell-wall and larger lateral lobes. It is very similar also to *Eu. Eorientate* W. B. Turn. (Freshw. Alg. E. India, p. 79, t. 10, f. 34, t. 11, f. 26), but differs in the polar lobe, which in Turner's species, as in *Eu. insigne*, is 4-lobed, whilst in *Eu. intermedium* it is 2-lobed.

MICRASTERIAS DECEMDENTATA Näg., foniiR). Ciinala; in ditch. 1359. The specimens were numerous and very variable, all intermediate stages between two extreme forms being present. One of these forms was identical with that figured by Schmidle (Siisswasseralgen aus Australien, 1896, p. 310, t. 9, f. 18), and also by Playfair as *M. truncate* (Oorda) Breb., var. *decemdentata* Playfair (Some Sydney Desmids, 1908, p. 608). The other form was figured by Playfair *{ibid.* t. 9, ff. 8-9) as *M. truncata* var. *laticipiformis* Playfair. The dimensions of the specimens from C.mala were : long. 88-110 M; lat. 108-116 *fi.*

^OSMARIUM LI:NDELLII DeJp., forma. Rivière du Carénage. 384. Rare. The cells were small and very depressed, being slightly broader than long. Long. 47 M; lat. 56 ^ s crass. 27 *fi.*

UOSMARIUM PHASEOLUS Breb. Plaine des Lacs ; in shallow rain pools. 338. Europe, India, Australia, New Zealand, Africa, America.

0. ASPH^IROPHORUM Nordst. Plaine des Lacs; in shallow rain pools. 338. Europe, New Zealand, United States.

C CONTRACTUM Kirchn. Plaine des Lacs. 338. Europe, Malaya, Australia, Africa, America.

Vs. HAMMERI Reinsch. Plaine des Lacs. 338. The form of the cells was similar to Unit figured by Borge (Alg. erst. Regnel. Exp. 1903, t. 3, f. 17) from Brazil.

COSMARIUM TRILOBULATUM Reinsch. Plaine des Lacs. 338. Europe, New Zealand, Africa, Brazil.

C. SUBTUMIDUM Nordst., var. KLEBSII (Gutw.) W. & Gr. S. River Dumbéa ; amongst other alg» in rock pool?. 809. Europe.

C. ARCTOUM Nordst. Plaine dos Lacs. 338. Europe Now Zealand.

C. MENEGHINII Bréb. Plaine des Lacs. 338. Mont Canala; in slugg stream. 1242. Ubiquitous.

C. DIFFICILE LiHk. "River Dumbéa ; amongst other algre in rock poo - 809. Europe, United States.

0. CUCURBITA Bréb. Biviire du Carriage. 384. Europe,' Singapore, Australia, Africa, America.

C. TURGIDUM Bréb. Canala; in washings of *Azolla* sp. in ditch. 1359. 638. Europe, Japan, Australia, New Zealand, Patagonia.

C. SUBTURGIDUM (W. B. Turn.) Schmidle. Canala ; in ditch. 1359 (am forma MINOR Schmidle). 638. India, Malaya, Australia, Africa.

C. QUADRIFARIUM Lund. Plaine des Lacs. 338. (Form® *hexasticha* (Lund.) Nordst. and *octasticha* Nordst.) Europo. fVylon, Java, New Zealand, S. America.

C. WITTROCKII Lund. River Dumbéa. 809. Plaine des Lacs. 338. Europe, Siam, Patagonia.

C. PUNOTULATUM Bréb. Canala; in ditch. 1359. Europe, China and Japan, India, Malaya, Australia, New Zealand, Africa, America.

C. BINUM Nordst., var. ANGUSTATUM, var. n. (PI. 4. fig. 10.) Var. cells diametro fere duplo longioribus, semicellulis truncato-pyramidatis, cre111s hiteralibas inferioribus singulis tamtam granulis prsedilis, superionbnB emarginatis. Long. cell. 54/t; lat. 29 /i. River Dumbéa. 808, 809.

C. CUCURBITINUM (Bisset) Liit^ (*Penium cucurhitinum* Biss.), vilV# SUBPOLYMORPHUM Nordst. Rivière du Carénage. 384. Austria, New Zealand.

C. CRUCIFERUM De Bary. Plaine des Lacs. 338. Eurone, New Zealand, Africa, United States.

COSMARIUM DOCIDIOIDES Liitk. *(Penium minutum* (Ralfs), Cleve), forma MAJOR Lund. Rivifere du Oarénage. 384. Europe. Var. GRAOILE Wille. Plaine des Lacs. 338. Europe, Africa, America.

STAURASTRUM ORBICULARE Ralfs, var. DEPRKSSUM Roy & Biss. (PI. 4. % 14.) Canala; in ditch. 1359. Europe, China and Japan, Siam, Australia, New Zealand, Madagascar. The specimens were typical in size and form, but the cell-wall often showed a slight thickening, usually at the angles and sometimes at the apex of the semi-cell as well.

8. ALTERNANS Breb. Canala s in ditch. 1359. Europe, India, Siam, Australia, New Zealand, Africa, United States.

S. ISFLKXVM Breb. Hiver Diunbéa. 809. Europe, Japan.

(HYALOTHBCA DISSILIENS (Sin.) Breb. Oanala; in ditch. 135!). Europe, (!hina, India, Malaya, Australia, Africa, America.

H. NEGLBCTA Racib. Plain* des Lacs. 338. British Isles, Ceylon, United States, Guiana. The specimens were very large. Long. cell. 5o /*; 'at max 15 '
'at. max. 15 *p.*

DissMmnTM BAILEYI (Half*) De Bary, var. UNDULATUM (Mask.) Nor.lst. ('anala ; in ditch. 1359. Java, Australia. .

(EDOGONIAUEJ:.

BULBOCH^TB BLATIOR Pringsh. Plaine des Lacs. 338. Europj^India, Australia. Sterile species of *Bulbochde* occurreJ in Nos. 812 and *65S.*

CEDOGONIUM OBLONGUM Wittr. Plaine des Lacs. 338. Europe, India, Australia.

(EDOGONIUM sp. Plaine des Lacs. 338. This species was fruiting, but the oospores were very young. It is monoecious, and is peculiar in that the oogonium opens with a pore which is distinctly beneath the median p«rt. Thus it does not seem to be identicUKth any described species. It differs from *0. inversum* Wittr. in being moncecious and in open.ng w.th a pore, and from *0. eryploporum* Wittr." in the more inferior position of the pore and

" la s S ^ : ^ occurred i n *o, 33, 384, G38, 8,,, 852, 1242, 1359, and J986.

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EXPLANATION OF PLATE 4.

Fitf. 1. *Glccothece Vibrio,* sp. now, X 810.

Figs. 2-G. *Rosaria ramosa,* sp. et gen. nov. Fig. 2, X 78; figs. 3-G, X 510.

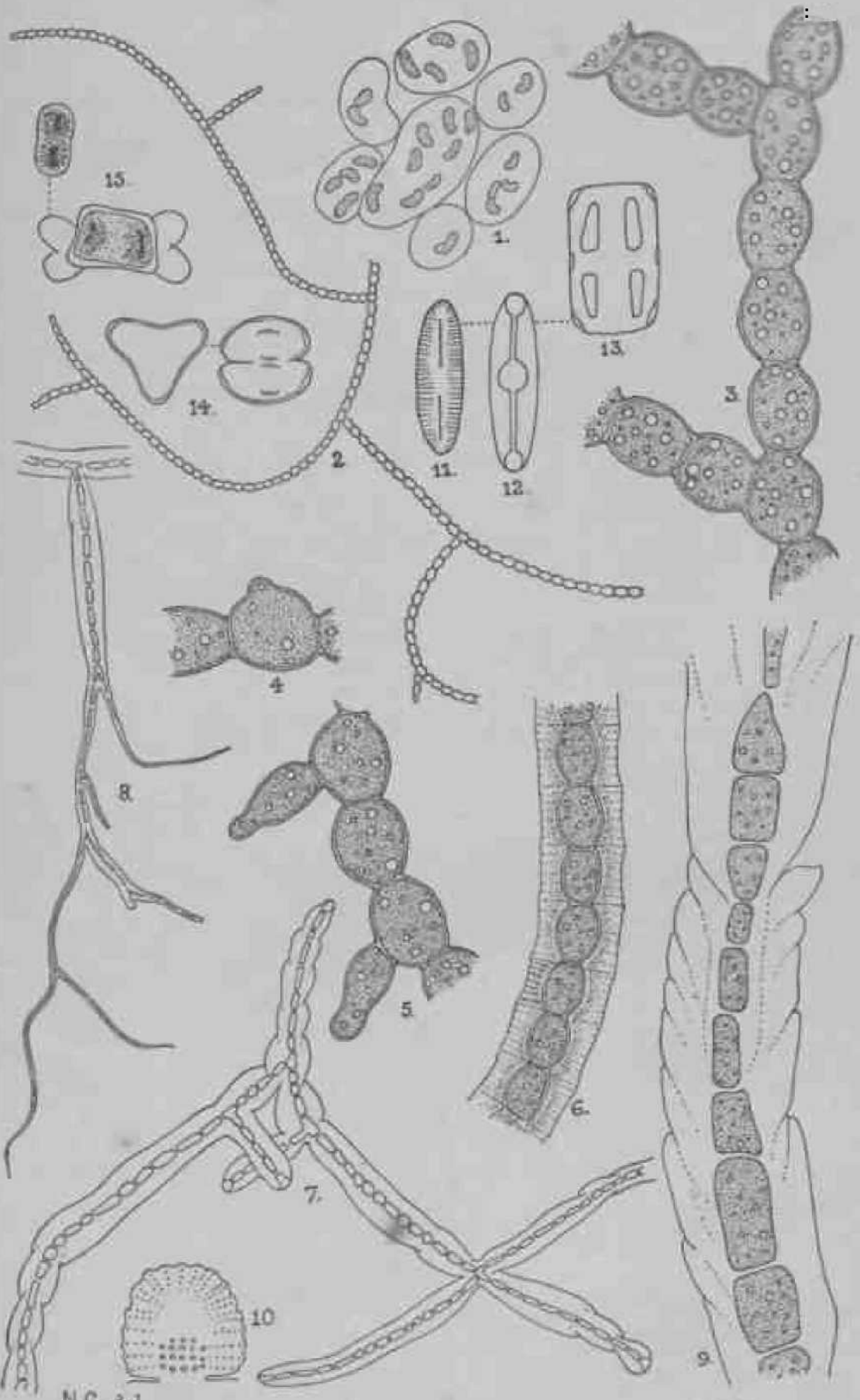
7-9. *Mastifjocoleus obtusus,* sp. nov. Figs. 7 & 8, X 92 ; fig. 9, X 310.

Fig. 10. *Cosmarium binvm* Nordst., var. *awju&tatwn,* var. nov., X 510.

Figs. 11-13. *Diatomella Balfouriana* Grev., X 1423.

Fig. 14. *Staurastrum erliculare* Kali's, var. *dejn'essum* Roy, X 510.

15. *Peniuni minvti&simum* Nordst., X 510.



N.C. del

FRESHWATER ALGÆ FROM NEW CALEDONIA.

CHAROPHYTA.

By JAMES GROVES, F.L.S.

(PLATK 5.)

NITELLA PSEUDO-FLADELLATA Braun in Braun & Nordstedt, Fragm. Monogr, Charac_ 54 (1««2) ? Dumbea ; muddy ditch ; on serpentine rock ; 100 ft. April 1914. 812 (part).

n the *itakii* *b*sbusen c of ofi ie- fruifuifcT Tc anan *onlonlefcrefcrt* hthis isd oduhutff *ffllll(ot* oxVxV *p seudo*, F. «ta, itself an indefinite species which has never been properly diagnosed. U) 1Om balm's remarks in the 'Fragmented it is evident that he was by no eans satisfied as to the identity of the several plants which he had placed *nnd** the name.

^. COHPTONII, sp. nov. (PL 5.)

kect. Arthrodactyke homoeoclema? maorodaetylas flabellatie glceocephalae monoica.

Ca Ulis teQUiS C, 4oo M crassM, Ramuli nod nonnaliter 8, 3-4-plicato furcati, ° ° lnfi«io fere semper sterili. Radius primarius ramuli totam longitudine TM d midio ^q^ans. Radii secundarii 6-8 ; tertiarii 5-7, omnes vulgo ite % um furcati; quarternarii 5-6, quorum 1-2 srope iteruin furcati; quinarii 4–6 / IiaJil ultimi bicellulaH olongati tenues (crass. 40-50/i) leviter incurvat *h* cellulii inferiore ad apicem plus minusve angustata, cellula superiore elon a o-con câ acutâ —>85 μ longâ, ad basem c_ 25/A *mLM&*, fer f -3s m niUCo involuti» Vorlicilli oj capitulas rotundas parvas ssepe formantes. °gonui et antheridia ad fureas secundas et tertias posita. Oogonia solitaria ovoi l CCa »ad basem aliquatenus, versus apicem insignitor, angustala, c. 400-J u /* Jo nga (coronula exclusa), 300-325/1 latn, convolutiones c. 10 exhi-nte s. Coronula persistens, c. 35 /* alta, 50/A lata. Oospora ellipsoidea, c. 300 μ longa> 250 ^ Iata» 190 /* crassa? atroiusea, liras prominentes c. 8 exhibens ; membrana subtiliter granulata. Antheridium diametro c. 250 *fi.*

Dum b, éa muddy ditch; on serpentine rock; 100 ft. April 1014. 812 (part). B a i e g a .,* on ni;ca·sc i 1;st alluvium ; sea-level. July 1914. 1401.

A small, slender, dark-green plant, apparently not more than three or four inches high. The outstanding points of difference between the other species of the group and JY. *Comptonii* may be summarised as follows :—*N. batrachosperma* Braun differs in the' branchlets being only twice furcate, with the lowest node fertile and in the much smaller antheridium ; iV. *minuta* Alien, 10 tIle iower cell of the ultimate rays being rounded at the apex and the ^P er cell remarkably narrow, and in the fewer (6) and more pronounced ridges of the oospore; *i\\ leptosoma* Nordst., in the branchlets being only t y ice furcate, with the lowest node fertile, and in the fertile whorls being di sposed »i short, interrupted spikes; iY. *intermedia'sordst.*, in the uniformly

lax fruiting whorls, the branchlets not more than tl.rice furcate, with the lowest node fertile; *X. Amgrayana* Braun & Nordst., in the fewer (5-6) usually not more than twice furcate branchlets and the smaller (170**) antheridia ; *A\ pseudo-Jlabellata* f. *mucosa* Nordst., in the branchlets being only twice or thrice furcate, the broader nearly spherical oogonia, the larger warted oospores showing fewer ridges, and the larger antheridia ; -X «w *Jormis* Nordst., in the short branchlets, only twice furcate with stout ultimate lays, and m the much larger antheridia (350,*).

NITELLA HYALINA Agardh, Syst. Alg. 126 (1824), emend. Kiitzing, rnyc vieim. Job (1845).

Tiare, near Paita; pools and eddies in stream; on Triassic rock; 250 ft. march 1914. C38. Forming dense dark green masses in a stream at laom ; on serpentine rock; 200 ft. December 1914. 2292.

N. GE INC A BraUn, Cbai,ac_ Austral_ & Antarct_ in Hooker,s JoUrnl BohM^nsli)). ♂ & ♀.

Isle of Pines; rooting in mud in a small stream at the entrance to a cavern, Omaguj on emerged coral rock. Nov. 1914. 2279.

A form with tapering, acute, ultimate cells to the rays, resembling those of i>. *tasmamca* but with small-stalk"ed capitula. The sterile branchlets are furcate with fairly long secondary rays.

CHARA

346 (mo) AUSTRAUS R> Brown,Prodr_FL Nov_HolK & Ins_VanDiem_K

J ^ ^ f ^ ^ e ad la, Mont U^TM^1 on mica-schist; 800 fl. June 1914. 1159. The female plant.

C. onoromiB Braun in Linna*, xxv. 708 (1852).

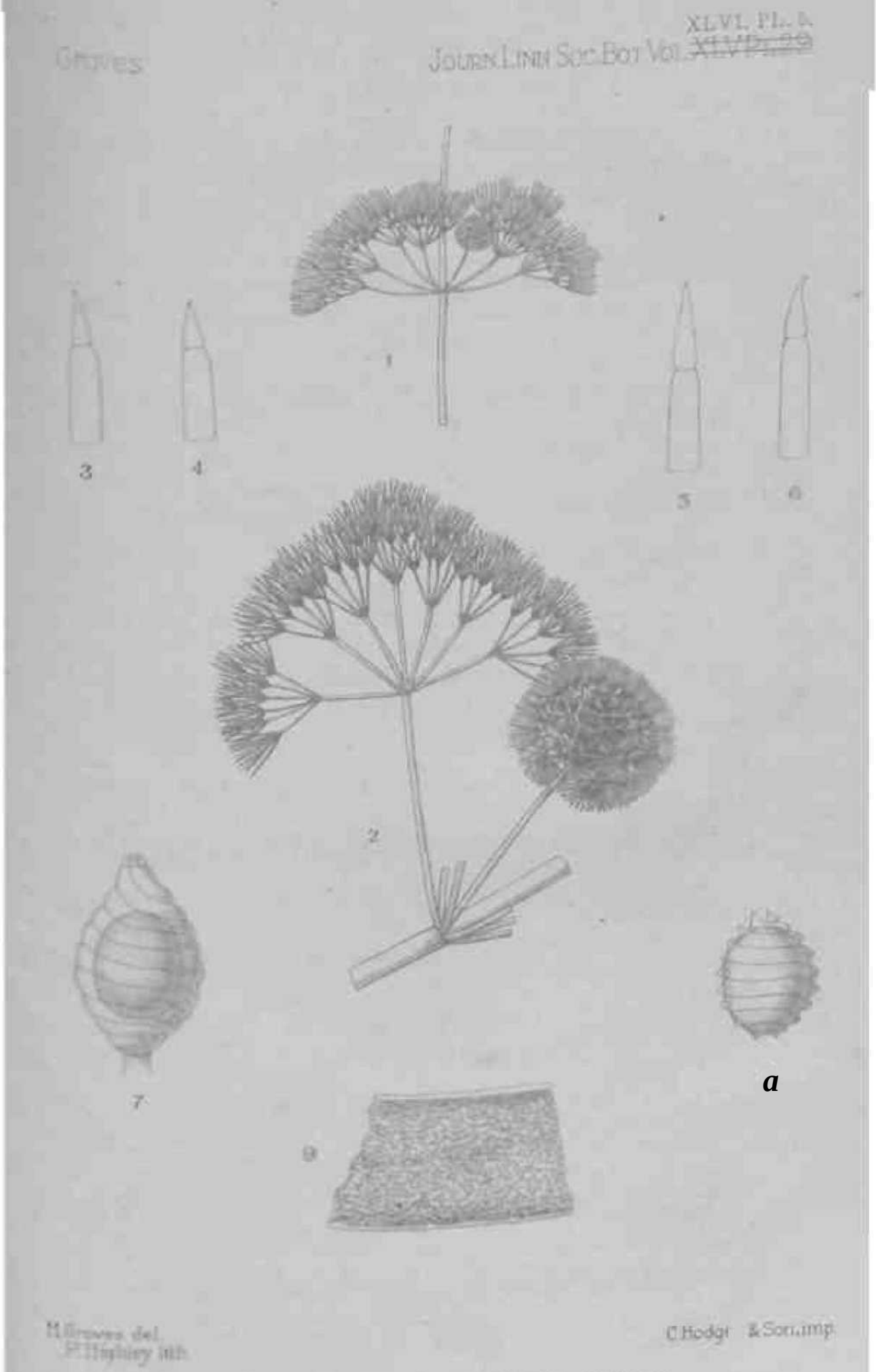
Noumea, Valley of Montravel; in a m&U stagnant weU •, on Triassic conglomerate; 50 ft. Jan. 1914. 16.

EXPLANATION OF PLATE 5.

Nitella 0mpt6mi,Bp. nov..

Fig. 1. Whorl, x 3.
2. Single branc capitulum enveloped in mucus, × 6.
Figs. 3-6. Ultimate dactyls, × c. 150.
Fig. 7. Oogomum, x c. G5.
8. Oospore, x c. G5.
9. Membrane of oospore, x 480.

%*• 1-8, H. Groves,«., %. 9) G. E. BuUock-Webster, del.



NfTELU COMPTONli Grows.

LICHENS.

By A. LORRAIN SMITH, F.L.S.

Ms. OOMPTOK collected about 120 specimens of lichens. A certain number were sterile or otherwise undeveloped, but altogether 110 species or varieties have been recognized; of these, one genus and 20 species are new to science.

Several lists of lichens from New Caledonia have been published. In 1861, Nylandcr issued his "Expositio Lichenum Novse Caledom*, which comprises 104 species. This was followed in 1868 by the 'Synopsis Lichenum Nora Caledonia," t with 220 species or varies. Muller-Aargau at a later date described 73 lichens from Noumea J, and more recently 127 different forms from N. Caledonia §.

About half of those brought home by Mr. Compton were already recorded « one or other of these lists, but as all of the collections vary considerably, ^ may conclude that the lichen-flora of New Caledonia is not yet exhausted.

Our knowledge of lichens-more especially of Iropical lichens-is too fragmentary to allow of wide statements on distribution; bu enough is known to draw some general conclusions. A number of lichens are cosmopolitan; a very large number are common to tropical and subtropical lands; a few, so for « i- known, are endemic in differen areas. New Caledonia lichens are closely allied to those of Oceania: Stictace® are well represented; genera such as *Thyianotivcium* and *Heterodea* and species such as *Cladonia retepora* are confined to Oceania and are abundant on the island. Mttller-Aargau, from his study of Noumea Helens, concluded that air-currents transported the lichens of S. America to Africa, and thence to Oceania. The present collection certainly confirms that view. *Leptotrema* and *Lepidocollema* were until rtow monotypic genera confined to S. America: a second species of the former has appeared in New Caledonia, and a new genus, *Lepidoleptovum,* very closely allied to *LepidocoUma* has been diagnosed. Portions of lichen thalli are not only very light but support prolonged desiccation, and would revive after long sojourn m the air. The wide distribution of lichens is therefore not to be wondered at: the areas of distribution are climatic rather than geographical.

The specimens from New Caledonia submitted to me were mostly numbered, with a corresponding list of numbered localities. There was also a box containing sundry unnumbered rock specimens from Mont Montravel, north of Noumea, aud there were parcels of specimens from Baie Ouemo, Noumea, also without numbers. I have to thank Dr. Bernt Lynge, Mr. Gepp, and Miss Wakefield for helpful suggestions.

* Ann. Sci. Nat. (Bot.), xv. 1861, 37-54.

t Bull. Soo. Linn. Norm. *sir.* ii. 1867 (1868), 39-140.

X Rev. Mycol. xxxiii. 1887, 77-82.

§ Journ. de Bot. vii. 1803, 61-55,92-94,106-111.

PYEENOCARPINKiE*.

PYRENULACE.E.

PYRENULA NITIDA Ach. Syn. Licb. 125, 1814. On bark of *Exotheca.* Baie Ou&no. Riv. Ngoye, May. " Tree-trunks in *Spermolepis* forest on serpentine soil by river, 350 ft." 1102. Cosmopolitan.

Both specimens are untypical.

ANTHRAOOTHBCIUM DKNUDATCJM, var. OCHROTROPUM (Nyl.), MttlL.-Arg. Lich. Neo-cal. in Journ. de Bot, vii. I11, 1893. On wood. 1295 bis. 8. America-

The variety is distinguished by a yellow or reddish tinge over tw normally white thallus. The yellow parts give a strong reaction in KB() + crimson, and this suggests that the thallus may be invaded by some otne species. Waiuio found the same lichen in Brazil, and placed it in a n* genus, *Bottaria* (Trypetheliacese), with spocific rank. As the perithecia ai solitary, I have preferred to classify it as above.

TRYPETHELIACEJ:.

TRTPBTHELIHM SPRENGELII Nyl. Exp. Syn. Pyrenoc. in Maine & Loire Mem. Soc. Acad. iv. 77, 1858. On bark of *Exotheea.* Baie Ouémo, ncai Aoumea. Universal in tropical and subtropical countries.

ASTROTHELIACEJE.

ASTROTHELIUM SULPHUREUM Nyl. Prodr. Fl. Novo-Gran. in Ann.Sci.Nat-seV. 4, xx. 260, 1863. On bark. Riv. Ngoye, May. "Tree-trunks in *Spermolepis* forest on serpentine soil by river, 350 ft." 1104. S. America-

GYMNOCARPEJE.

SPH.EROPHORACEiE.

SPILSROPHORUS COMPRESSES Ach. Meth. Lich. 135, 1803. 718, I?[28]* No. 718. "Abundant on trunks above 3500 ft. in cloud forest." Frequent in the Southern Hemisphere. The thallus in both of the specimens is ochreous-white, almost as if bleached; described by Oompton as "white, with stout white erecto-patent apothecia stalks and black apothecia."

GRAPHIDACEJJ.

OPEGRAPHA DIAGRAPHA Nyl. Syn. Lich. N. Caled. 57,1868. On bark of unknown tree. Baie Ouémo, Noumea.

When moist the discs are brownish—not white as in Nylander's description ; but this may be the result of age. The lirelUe are very short, resembling those of *O. Bonplandia* var. *abbreviata* Mull.-Arg.

GRAPHIS SUBCONTEXTA Nyl. Syn. Lich. N. Caled. 79.' On bark of a tree. Kiv. Ngoye", May. "In *Spermoleph* forest on serpentine soil by river, 350 ft." 1098. New Zealand.

T G. scuiPiA Ach. Lich. Univ. 265,1810. On bark of *Fieus.* Baie Ouemo, Noumea. Cosmopolitan.

G. ELBOAHB Ach. Syn. Lich. 85, 1814. On bark of *EgoUuea.* Baie Ouémo, Nouméa. Cosmopolitan.

The specimen is a very small one, and the furrows on the margins ot the h'rellsa are somewhat indistinct.

GRAPHINA MENDAX (Nyl.) Mtill.-Arg. in Journ. de Bot. vii. 108,1893; var. BISPORA A. L. Sm. On bark of unknown tree. Baie Ouomo, Noumea.

Nylander and Miiller-Aargau have both recorded the species from New Caledonia as with one spore in the ascus, 80-100/*X 26-38/*. In the specimen examined the spores are occasionally solitary and measure up to 100 *n* in]eugth; more frequently there are two spores m the ascus ot smaller size, 57-80 >x 30/*.

CHIODEOTONACEJE.

GLYPBIS CICATKICOSA (Ach.) A. Zahlbr. in Engl. & Prantl, Nat. Pflanz.-*W 1, 1*, 103,1905 (syn. *G.famlom* Ach.). On bark *oiLxotheca.* Ba.e Ouémo, Nouméa.

Frequent in tropical and subtropical regions.

CmoDECTON SAKGUINKUM (Sw.) Wain. Lich. Brés. ii. 143, 1890; *Ch. rubrocindum* (Ehrenb.) Nyl. Lich. Nov. Gran. 48(5, 1863. On bark. Hiv. Ngoy<5, 25th May. " In *Spermolejn's* forest on serpentine soil by river, 350 ft." 1091. S. America, Africa.

CHRYSOTHRICACEiE.

Cnocvtfu OOSSYPINA (Sw.) Nyl. Lich. Jap. 59, 1890. On bark: sterile. Mont Canala, June. -In moist forest, 1000 ft." 1303. Tropical As.a A erica.

^VarMOLUR Hue in Mem. Soc. Sci. Nat. Cherb. ser. 4, vii.,239, 1909. On decaying wood. Ignambi; in forest j 2000-4000 ft. 1743. Oceania (Java), Tropical America.

CROCYNiAsp. On branches. Riv. Ngoye, May. " In *Spermoleph* forest on serpentine soil by river, 350 ft." 1097.

A sterile plant, forming small white subcontinuous scales on a dark nypothallus. Probably immature.

CROcrau sp. Riv. Ngoye, 25th May. On bark. " In *SpermoUpis* forest on serpentine soil by river, 350 ft." 1105.

A sterile form, consisting of small, crowded white scales on a dense brown liypotlmllus.

CROCYNIA CRUSTATA var. MINOR A. L. Sm.

The specimen, which is sterile, approaches very near to the descriptio *C. crustata* Hue, Sect. *Byssocauloii* (Mom. Soc. Nat. Cherb. ser. 4, vii. p 1909). It forms a continuous pale green glaucescent felt ovei irregular bark, 8-10 cm. long and almost as wide. It is continuous, c appressed, with a byssoid white border and white below. Within, the t are as described by Hue, but of smaller dimensions, though the whole is thicker. On bark. Mont Canala, June. " In moist forest, 1000 ft.

THELOTHEMACE J3.

LEPTOTREMA ANDAMANICUM, comb. *nov. (Thelotrema nndumanicum* in Bull. Soc. Linn. Norm. sér. 2, vii'. 1873, 168). On bark. Riv. *g In *Spermolepis* forest on serpentine soil by river, 350 ft. May. S. Asia (I. of Andaman).

L. BMTRYFUII, comb. nov. *(Thelotrema epitrypum* Nyl. in Ann. Sd- sér. 4, xix. 1863,334). 1107. From the same locality as the previous spe Tropical America (Cuba and New Grenada).

CCENOGONIACEiE.

C<ENOGONIUM LEPRIEURII Nyl. in Ann. Sci. Nat. sér. 4, xvi. 1862, 89. Palm leaves. No number. Tropical countries.

CLADONIACEJE.

THYSANOTHECIUM HYALIS™ (Tayl.) Nyl. Syn. i. 186, I860. On soi Mont Koghi, April. "Whitish erect stalks, with pale brown apoUiecio. bare serpentine soil: Niaouli-bracken formation, 1000 ft." 806. Mts., Jan. " Erect grey stalks, whito disc-like apothecia, 500 ft." Oceania (Australia, New Caledonia).

TH. HOOKERI Berk. & Mont, in Hook. Journ. Bot. v. 257, t. 10, " Plaine des Lacs. C'ommon on eround sticks and leaves, 800 ft." Oceania.

CLADONJA PYCX\OCLADA (Gaudich.) Nyl.Lich. N. Zeal, in Journ. Linn. Soc ix. 244, 1867. Baie Ngo, Feb. " Abundant on serpentine soil, in aera formation, forming large white masses [also seen at Plaine des kf Bogota, and elsewhere on serpentine]." 423. Australia, Asia, S. S. Amerio.n:

OL. FLOEUKEAHA -Sommerf. Sup|,l. Fl. Lapp. 128, 1826. On »f and old twigs. Tonghoué Mts., Jan. "Grey stalks tipped with brig crimson apothecia." 178. S. America, Europe.

OL. DIDYMA var. MTJSCIGENA (Eschw.?, Nyl.) Wainio, Mon. Clad. Univ. i- 141, 1887. Tonghoug Mts., Jan. 178. Plaine des Lacs, 15th Fob-

"Common on ground, dead sticks, etc." Erect: red apothecia" 425, Mont Canala, June. «From bark of trees in moist forest, 1000 tt. 1302. Oceania, S. America.

OuDOBi AOGBEOATA Acl, Lich. Suec. Pro*. 206, 1798· Baie Ngo' Feb. On ground among dead leaves, with *CL pycaoclada.* 424 " °» 8 1 ™ ' dry scrub formation, .serpentine." 717. Anstraha, New Zealand, Tnd.a, S. Africa, S. America.

OL. KETEPOKA (Labill.) Fr. Nov. Sched. Crit. 21, 1826. On tbeground. Plaine des Lacs, Feb. "Serpentine soil, very poor in humu*. « -. Australia, Tasmania, New Zealand.

Cu VKRTICI^TA (Hoffm.) Fl. Clad. 26, 1828· Mont KjgK,, April. " On grouncl, 1000 ft., serpentine .oil: Niaouli-bracken assocxat.on. 770. Cosmopolitan.

r STKHKocAutOKUAMeLOsaMAcLiletl.. 314, 1803. 1727. Australia, New Zealand, S. America.

LEOIDEACE^J.

LBC1DEA (\ PSOUA) FJtBBIOOLA A. L. SlU., sp. 11OV.

'JUUus albidus, continuus, gros.se granulatus ve ^to-squamulosus, 8«beffi$_{glll}$.atus. *Cortex* superior 45-50,, ht ex *hjv*b» ^e intricatis con- glntioTti. formata, gonidia protococcoidea, ca. 10^ dxan, J· atum continuum ca. 40 „ lat. forma^a; medulla ca. 150 M W. CK byphxs •H μ lat. intricatis con$_s$tans. *Apothecia* nigra, nitida, 1-3 mm. lat., snpra enstam ^m nunc sparsa nunc crebre aggregata, convexa, interdum lobata, *m*g*™. tann.' integro,parum elevato jnt«r$_g$r«n«lis minutis inspers.s; hypothecjomiapum, S«perne nigro-brunnea OKOlyphis adscendentibus oustans; pamphvsesLues, non bene discrete septate, sumun ^ *J* ^ *T* ^ ^; asci CaVati, 55-65.X 15, , spor* * ^ ^ £ l l £ * Z £ * »

Ad saxum femigincum pulverescens. Mont Uoie, maj. · · i soil, 1000 ft. 847· Tballus and apoH.ecia become powdered wnh non dust from the substratum.

nov.

stratum continuum formans, superficie minute l'Hcatus vel granulatus, flavo-ochraceus. *Apotheaa* pronumenha 0·5 1 lat., novella disco pkno flavo-ocbraceo, n.argine n^egro mgro P « ^ ^ cincta, deinde qua.i morboso-nigrica.ma; hypothecunn rufo- olworentes; asci Lymeniuu, hvalinum ca. 80/. alt.; paralyses tenues arete e oblongo-clavati; spore oetona.[1], ellipsoidea?, 12-lo// x 0-7/*.

Ad lignum. 803. 1M· , „ i ark; it

Tbe thallus forms a thin layer over the inequaht.es of the b. (Lich. resembles somewhat an Australian species, *L. h,dil,«nda* JluH-Arg Keitr. n. 11C2 in Flora, Ixx. 321, 1887).

LECIDEA GONIOPHILA Schaer. Enum. Lich. 127, 1850. On rocks. Montravel, N. of Noumea. Europe, Japan, &c.

A very small specimen with a brownish-white subcontinuous (K+yellow) and minute brownish-black apothecia. The colourless hymenium and the smaragdine tips of the paraphyses agree with those of type, but the spores are on the whole smaller, measuring about 10-13/** It is associated with tufts of *Stiyonem** sp.

MBGALOBPOBA CASTANOCARPA A. L. Sm., sp. nov.

Thalhis albido-glaucescens, continuus, sat hevigatus, tenuis, *Gonidia* protoccoidea, ca. *1 p* diam. *Cortex* superior tenuis, decomposé superne interdum liyphis supeificie parallelis ; cortex inferior sat crassus hyphis brunneis parallelis constans ad substratum arete ndhiorens. sessilia, turgido-convexa, castaneo-brunnea, 4-1)' mm. hit., ca. 1 » margine concolore mox evanescente ; hypothecium albidum donse pec chymaticum, gonidiis sparsis insiructum ; excipulum proprium ex nyP radiantibus, conglutinatis, formatum; paraphyses arete coha?rente?, sjirs flavescentes, tenues, ramosa, apice paululum incrassat»; asci longe cJaVc ca. 200 *fk X* 40/i; sporaj saltern quartern*, late ellipsoide*, 1-sept. (membia ā-7 *fi* crass.) 65-80 *fi x* 22-32 /A.

Ad corticem arborum. Ignambi, 2000-4000 ft., Aug. 1738.

BlATORINA INTERMIX!* (Nyl.) COlllb. 11OV., Ylir. AGGREGATA A. L- var. nov.

'lhallus tenuis, cinerascens, minute granulatus. *Apothecia* parraj acervulos sparsos aggregata, vel solitaria et turn usque ad 1 mm. » hypothecium et epithecium rufo-brunnea, hydrate kalico color in violacew sordidum mutatur; paraphyses conglutinatae; spone rectse vel levi *ei* curvulas, oblongo-ellipsoideje vel fusiformes, 1-sept., 20-24/xx 3-4/*.

Ad corticem arborum. Ignambi, 2000-4000 it. Aug. 1740.

Differs from the species (New Caledonia) in the grouping of the apothecia, which are scattered over the thallus in button-like acervuli; and ais in the somewhat narrower spores.

B. FUSCONIGHA A. L. Sm., sp. nov.

7/ta^w5albido-glaucescens, crustaceus, effusus, minute isidio-squamulos« vel isidio-graimlatus, sat tenuis. *Apothecia* parva, usque ad 0-8 mm. dtom. rufo-brunnea, deinde nigra, interdum aggregata, margine tenue, integ demum convexa margine excluso; hypothecium et epithecium rufo-brunnea, hynienio subconcolore; paraphyses graciles penistente conglutinatae, apic« non, vel leviter, clavato ; sporse octonie, ellipsoideie, hyalinse, 1-sept., ca. 10-12/AX2/*.

Ad corticem arborum. Riv. Ngoyé. In *Spermolepis* forest on serpentine soil by river, 350 ft. May. 1100, 1106.

l characters.

the inequalities of the rugged bark, as well

BAOTMA OROOWKHDM A. L. S ^ 2 ^ 1 » » « htM formans, squamulo-
rAa/^pallido-griseo-vn-ens (K+flavu)pU- e vel dense congregate,
granulatus ; granule minute, convexo-plan*, J « » on corticate, e
iuterdu.n imbricate, ad substratum, arete £r£*f im crebre coalitis>
hyplns en. 4, er., membran.s crass,, lum ne mm ^ ^ glomerul ^
composite; gonidiaprotocoecoulea,5-8,• *"•-. sparsa ^ fere ^
aggregata. ^«*fc«a sess.lm, novella' min uta concava, marginem al)Othecior«m
marginata, solitaria vel ^ - ^ , ^ f l e . u o s o , disco
vetustorun, ereseentia, oa. "5-1 >«'»• la !n ieciura e hyphis dense
carneo turn ochraceo-flavo, intiu aim*. Jt parap hyses tenues,
int-icatis; perithecium ehyplns ^ ^ . ^ J " ^ 1 * Jm paululum
conc reise, apice subclavatse; asci oblongo clavu, 25 μ × 1–2 μ.
attenuati, 40^x7,,; ^ " ^ ^ " S Z ^ ' t e * * on serpentine

Ad corticem arbormn. Riv. Ngoye. *t>P»"° I
soil by river, 350 ft., May. HOI-. llus an d a gossy *pina* in the
Somewhat resembling fn«S»«« in the sott tna - thecia. ^ ^ ^^
frequent "hen and chfckons" arrangement of the .vpo
more or less on abundant brown fungus hypM. Bo .^ ^^. Fl. Lich.

BUBLUA BISCIFOUMIS var. W " ? ^ ^) S n bark of *Exotheca*.
pt 2, 234,1902 (5. *Lauri-Cassm* (Fee) Mull.-Ai₀.>
Baie Ouemo, Noumea. Cosmopolitan.

, *ir 1«fil On rocks; Mont Montravel,
B. 8IMUTTATA Mudd, Man. 216, 1861.
N. of Noumea. Cosmopolitan.

B. GLAUOO-AREOLATA A. L. Sm., sp. nov. glauco- c; nereus minute areolatus,
xluMm crustaceus, nigro-deternuuatus, g K + fla yns ddn ferr ugineus).
areolw ca. -3 mm. lat. planas vel subcomexa^ ina ^ marg imita vel con-
Apotheda nigra, prominnla, ca. 0-5 mm. d a e 1" flavescens; hymeninm ca.
vexa; hypothecium brunneura, supe ne I* b runneo-pileatse; asci
50-64M St; pa-P^ ^«eS' * ? % £ ^ ellipse,, 7-10^
clavati, ca. 40/iX 10f»; spor« octon» fuscae, P
X4-5/i.

Ad saxa. Mont Montravel, Noumea. .. b-- the rust-coloured reaction
Distinguished by the bluish-grey thauw, y • - parap hyses have a
with pottsh, and by the apothecial d - », * V . ™ F P ?
narrow brown cap like those of *Biatonna lentil* ».

B. ALBIDO-FLAVA A. L. Sm., sp. nov. :nt»rdnm nigro-determi-
rA««««, crustaceus, l«vis, g " - ^ ^ ^ ^ ^ concern arete
natus, albido-flavus (K-J, ^ o'5 mm, '^ ^S*b vulgo 1 mm.dum..,
•dh. en.-.gonidiaprotococcoideaJ-lO^diam. *Apotheadiig*

vel latiora et lobulata, subimmersa, nigro-marginata, disco piano, o viridi-pruinosa ; hypothecium nigro-brunneum, crassum ; hymenuu ad 100*fi* alt. fuscescens; paraphyses tenues, septatse, apicibus parum satis-, ramosis ; asci clavati, ca. GO /xx 15/t; sporre ellipsoidese aut tu fuscse, 1-septse, 15-22 /uX 7-10 /A.

Ad corticem *Ed'othevcv.* * Baie Oucmo, Nouméa.

The specimen is a very small one, but so distinctive that it lias worth while to give the diagnosis. In section, the epithecium is not co though if the section be thick the pruina forms a dark lino.

PHYLLOPSORAOE^.

PHYLLOPSORA PARVIFOLIA (Pers.) Miill.-Arg. in Bull. Hero. App. 1, 45, 1S94. On bark. Mont Koghi; stream-valley forest 1000 ft., April. 802. Tropical countries, New Caledonia, &c.

EPHEBACEJE.

THERMUTIS sp. A dense felt of the lichen but no fructification, On rocks, Mont Montravel, Nouméa.

COLLEMACE^.

LEPROCOLLEMA NOVA-CALEDONIANUM A. L. Sm., sp. 110V.

Tltalhts crustacous, tenuis, continuus, non corticatus, furfuraceus, virescens. *Gonidia* nostocacea, e cellulis ereruleo-virescentibus ;lomeruloso-concatenatis, familias globosas forniantia. *Apothecui* 0*5-8 mm. lat., disco ochraceo, margine proprio pallidiore, mtu» a hypothecium incolore vel flavum; paraphyses arete cohsorentefe, «I clavatre, interdum ochracese; asci oblongo-clavati usque au ou p sporse octonce sfnplicos, ellipsoideo-fusiformes, 10 *fi* x 2-li /A.

Ad lignum vetustum. Mont Koghi; stream-valley forest, 1000 ft., 805,

Rio <te

The only other species, L, *americamtm,* recorded by Wainio from •Janeiro, differs in the form of the thallusand in the much larger spores.

SYNECHOBLASTUS BELENOFHORVS Miill.-Arg. Lich. Beitr. n. Ifi6 in .lxiii. 259, 1880. On bark. Nouméa (two specimens). Oceania.

S. NEMA'rosroitus A. L. Sm., sp. nov.

Tliallus subinonophyllus^ irregulariter crispato-lobatns, virescens. moniliformi-catenulata, ca. 5-6/tx 3//,. *Apotliecia* immersa ca. 0"5-o lat., disco rufo-brunneo, margine thallino crasso, incurvo, integro; asci cln apice membranâ incrassato,adbasim attenuati,ca. 85*fi*x 12 *fi;* sporce acicu formse, ca. 65 fix 2-2*5/x.

Plaine des Lacs. Gelatinous masses on trunks in valley forest, 1000 i JFeb. 275.

The specimen was preserved in form** and when washed and dried it collapsed to an nlmosi.film-like expansion, somewhat w r » ' k l e ^ the surface and dark brownish-green in colonr. The spores were so closely adherent that it was difficult to note the septn.

1835. Ermitage stream; loose encrustation on barlcgelatinousdarkbrownrapothecuhghth' o ™ ^ £ -81, Also on rocks; Mont Monfcravel, near Noumea. Almost co.mopohtan.

V«. A « J « ™ Nyl. Syn. i. 125,1858. 1461. Cosmopolitan.

L. sp. (Sect. *Mallothon).* Sterile. Ignambi. On mosses in forest, 2000-4000 ft., Aug. 1739. A strikin" plant, dull crcrnleo-

Thallus rather wide (about 10 cm.). *A* ^ " ^ ^ covered brownish, beset with folioles and widia; the under su.tace *y* with short or long blackish hyphffi.

PANNARIACEiE.

LEPIDOLEPTOGIUM A. L. Sin., gen. nov'

11^ squamosns, adpressus vel ad.ende- xima parte gonidiis s stratum corticale impUto.; hypotlj.Iln.mger, - ^ ^ ^ ^ I n i k f o v m i - c o n c a t e n a t a suporius plectenchymnteum. ^*mdia* no toe riore on Mk)nrai desti- rtminm .nedullare homoeon.er.cum, vel in p.. to into fc ^^ ; tutum; cortex inferior non bentf evolutas. parum eidpnlo thallino instructa; .puna octon*, simphces, tncojo e . from *Le idio- P.*

The above genus, owing to the cellular upper cortex, dxftus *collema* as *Lepto</w»i* differs from *Collema.*

L. MONTAGUEI A. L. Sm., sp. nov' a(lsce ndcntes vel intordam rAa^SSquanmlo.us; • J ^ ^ J S J ^ anguste lacinulabe, hdnte adpressaB, lobulate, ninnute ^ J 1 " ^ } ™ «*<** rhiri-i. nigrican.ibus, Mmplicos vel irregulariter p m ^ ,« uri do g ^ - J ' ns intricatus. Thallu3 ^ •pawfc, substrate affi»e; liypothallns mgei, «e e celluli ^ ^ ^ ^ ^ 120M cvas.us; stratum cortk-ale f l)e"'" ^i^lmeruloso-concatena.is, lO^Wformatum; g«niJk ^ ^ ^ ^ fncta • stratum inferius e non ag^gatis, composite, levter v.olacco-n jo tac a' his viola ^^ -nigris> hyphis pp,auci, p parallelis, ^ ^ ^ f ^^ t ^ t, ^ , , plana, maginata, en. 5 *[i* cr. coustans. *Apothena* ca. i mm. Bu<>el>Bbi; nmgine sæpe perfo thallino ii 60 μ × 17 μ; sporæ octonæ, late ellipsoideæ, 12- Ad cortices. Riv. Ngoyé. In *Spermolepis* forest on serpentine soil by nver, 350 ft., May. 1094. ad ont thus presenting

a

deformation occurs in *Pannaria perfossa* Stirton, a New Zealand pk[n] but the apothecia of the latter have crenulate margins and smaller spores, and the structure of the thallus is different.

The specific name *Montaguei* commemmorates the brilliant young zoologis» Paul Montague, with whom Mr. Compton was associated in the expedition* New Caledonia. Mr. Montague joined the army on his return to Engl«* and served in the R.F.C. He lost his life" in an air-fight in Salonika.

LEPTDOLEPTOGIUM RUGULOSUM A. L. Sm., sp. nov.

Thallus squamulosus ; squamulsj variabiles adpresse vel plernmqne [adsC]?T dentes, spathulsitss ad apices ssepe iinmarginata, flabellatim rugulosse, lun[d]o grisege,ad basim adfixre ca. 1-2 mm. long., lmin.lat.; hypothallus nige't non bene evolutus. Thallus ca. 500/* crassus ; stratum corticale snperias ca. 10 *fi* cr. monostromiiticum ; medulla ex liyphis intricatis et gonidiis nostoeocaceis caeruleo-virescentibus, rubentibusve, lnoniliformi-concatenatis ; stratum corticale inferius tenue, indistinctum. *Apothecia* usque ad 1/5 mm. lat-, [Jisc]f aurantiaco, margine granulato; hypothecium citrinum, K + rubro-auvan[t]iacum ; paraphyses graciles, arete cohjerentes; asci clavati, ca. 80/*x 16 f ' sporae octonge, ellipsoidese, 12 *p* x 6 *fi.*

Ad corticem. Riv. Ngoyé. *Spevmolepis* forest on serpentine soil [b]y river, 350 ft., May. 1089.

PARMELIELLA FULVA A. L. Sin., sp. nov.

Thallus fulvo-aurantiacus, suborbicularis, laciniatus, ca. 5 cm. lat. versus centrum plus minus granulatus et areolatus. Lacinise arete adnat#r 3-4 mm. lat., stellato-radiantes, simplices vel divisse, versus ambitum sensim dilatatae, interdum crenata?, subtus rhizinis nigris prseditse; supra leves vel irregulariter transverse rugosse. Cortex superior plectenchymaticus, 25-30 /* lat. ecellulis ca. 12/x, lat. formatus ; gonidia nostocacea, ca. 10 \i lat.; cortex inferior et rhizinse e hyphis nigro-brunneis format!. *Apothecia* convexoplana, supra thallum parum elevata, ad centrum adfixa, ferrugineo-nigra, non marginata, sparsa vel aggregata, ca. 0'5-l mm. lat. irregulariter orbicularifff subtus hyphis smaragdulis *5 fi* lat. pnedita ; parathecium smnragdulum ; hypothecium pallidum; hymenium 90-100/i alt. incolor; paraphyses dense conglutinatse, 3-4 *fi* lat. clavatse; epithecium brunneo- vel smaragdulonigrum; asci clavati, ca. 45 *fi* x 8-10 *p* ; spora octonse, hyalinse, cymbtformes vel ellipsoidea?, bi-guttulataa, simplices, 12/^x3-4^.

Ad corticem% Cap Bocage. On bark of shrubs in serpentine scrub, 500 ft., July. 1463.

A very striking plant with an almost effigurate ontline. The rugse of *the* lacinise recall those of *Parmeliella plumhea.*

P. COMPTONII A. L. Sm., sp. nov.

Thallus squamulosus, lurido-griseus, corticatus, subtus albidus non-corticatus. *Squamulw* adscendentes, spathulatse, ad basim late adfixje usque ad

2 mm. alt. dense imbricate, crenate, vel in lacinias angustas sjepe minute pinnatas divisse. Thallus ca. 175 /* cr.; cortex superior ca. 35 ^ cr. e celluhs decomposes constans, lumen cellularum 7 H diam. vel ca. 12 *p. X* 7 *p* ; gomdia nostonacea 5 /* diam. stratum densuin 50/t lat. sub cortice formant.a; hyph* medullares, intricate *5fi* cr. stratum ca. 100/i.cr. formantes. *Apotheeia* plano-convex$_a$,rufo-brunnea,margine pallidiore cincta, sparsa vel in glomerulos parvos aggre-ata, irregulariter orbiculares, 0-3-1 mm. diam.; hypothecium flavo-brunneum; paraphyses ca. 2-5/* cr. septate,arete coharentes ; asci clavati, ca. 45 ux 8/i; sporie ellipsoideo-fnsiformse, hyal.nse, 7-8/*x 3-4u.

Ad lignum. Riv. Ngoye. *Spermolepis* forest on serpentine soil by river, 350 ft. May. 1095.

The squamules are somewhat similar to those of P. *tnptophylla* in colour, but rather lighter, much larger, and more densely imbricate.

PARMEUBLLA sp. Thallus of spreading reddish-brown lacinfe, irregularly crenate in outline, branched or simple, blunt at the tips, about 2-4 mm. wide, up to 12 mm. long, beneath densely pannose with dark hyph* solitary or m strands, about 3 mm. long. Thallus about 140 M thick, the upper cortex a layer of two cells with extremely gelatinous walls and restricted lumen ; the gonidial zone narrow, of conglomerate blue-green alga,; the lower cortex of decomposed cells. Sterile. On bark. Mont Mou. Brown above, black filaments round edges and beneath. March. 713.

PANNARU MARIAKA MUll.-Arg. Lich. Beitr. n. 1159 in Flora, lxx. 321, 1887.

On trees. Ignambi. In forest, 2000-4000 ft. Aug. 1736. E.Indies, N. Caledonia, N. and S. America.

Var. ISIDIOIDEA Miill.-Arg. he.

Ermitage stream. "Encrusting stones by stream. Grey, fringed with black hain," Jan. 230. Ignambi. In forest, 2000-4000 ft. Aug. 1736. *E.* Indies, New Caledonia, N. and S. America.

P. NIGROCINCTA (Mont.) Nyl. Syn. ii. 39, 1885.

On branches. Noumea. Oceania, W. Africa, S. America.

PSOROMASPHINCTRINUM (Mont.)Nyl. Syn. ii. 24,1885^On wood· Ignambi. In forest, 2000-4000 ft. Aug. 1733,1734. Africa, Oceania, S. America.

Ps. ARANEOSA (Bab.) Nyl. Syn. ii. 23,1885. On soil. Mont HumboldL In moist gully forest, 1000 ft. May. 1086. Oceania (New Zealand).

PSOROMA sp. Thallus reddish-brown of small, mostly ascending, variously crenate-lacinulate squamules. Abortive apotheeia alone present. On tree-trunks. Riv. Ngoye. *Spermolepis* forest on serpentine soil by river, *6W* tt. May. 1096.

COCCOCARPIA PELLITA Miill.-Arg., var. PARMELIOIDES Wainio, Lich. i. 209, 1890. On bark. Baie Ba. " On mangrove trunks and other by shore." 1462. Oceania (New Caledonia), N. and S. America.

Var. CRONIA Miill.-Arg. Lich. Beitr. n. 421 in Flora, Ixv. 320, 1882. On rocks; Mont Montravel north of Nouméa. N. and S. America.

STICTACEÆ.

LOBARIA INTERVERSANS, comb. nov. *{Uicasolia interversans* Nyl. lxix. 173, 1886). On bark. MontCanala. In moist forest, 1000 ft 1305, part. W. Africa.

LOBARIA sp. MontCanala. In moist forest, 1000 ft. Julie- 1305i, Kd'. A sterile specimen, but with the same reaction as *L. interversans* (I K (CaCl) rose-red). The tliallus is stouter and it may be *L. subtavis,* which differs in having lobate margins to the apothecia, and narrower spores.

LOBARIA (§ LOBARINA) SUBPINNATA A. L. Sm., sp. nov.

Tliallus foliaceus, glauco-flavescens \el pallide cervinus ca. 10-15 cm- adscendens(?) non adpressus, versus ad basim laciniatus ; lacinise sat aug tatae, irregulariter'et iterum subpinnatse, lacinise ultimas ad apicem dilatatse et truncatse ; pagina superior sorediis parvis, cinereo-albidis, a spersa ; pagina inferior fere ad apicem pilis crebris fuscis instruct*, am subnuda(K—, CaOl—). *Gonidia* nostocacea, oeruleo-virescentia, rata, ca. 5 *p* diam. *Strata* corticalia ca. 25 mm. lat. e seriebus c<ellularum formata; hyphis rhizoideis numerosis, connatis, usque ad 800 /* long. *Apothecia* non visa.

Ad ramulos arborum. Mont Arago. On bark of shrubs in serpentine scrub, 500 ft. July. 1466.

The lichen has a light graceful appearance unlike any other descn *Lobaria.* The upper surface resembles that of *Sticta crcjyracea.* The un- surface, at the tips of the lacinise, is occasionally golden-brown. The tbal u is closely attached to the support where it touches, but the main part is fr[ee#]

STICTA INTRICATA Del., var. THOUARSII Mudd, Man. 90,1861. On bark. Mont Canala. "In moist forest, 1000 ft." June. 1298. Europe, b- Africa, Oceania.

S. CROCATA Ach. Lich. Univ. 447, 1810. On bark of tree. Baie Oueino. 237. Co>mopolitan.

8. WEIGELII Wain. Lich. Brés. i. 189, 1890. On bark. Mont Canal* In moist forest, 1000 ft. June. 1301. Universal in tropical or subtropical regions.

STICTA DAMJSCORNIS Ach. Mcth. Lich. 275,1803. 1735. Tropical countries. Rare in Europe.

Vnr. CAXARIENSB Ach. Syn. Lich. 231, 1814. Mont Oanala. Bark of *rees in moist forest/lOOO ft. 1296. W. Africa, W. Indies, Brazil.

Lighter in colour than the species and with blunt-tipped lacinise.

8. VAIUABILIS Ach. Lich. Univ. 455, 1810. Igna.nbi. "In forest, 2000-4000 ft." 1740. S. and E. Africa, Oceania.

S. HYPOSPILOIDES Nyl. Exp. Lich. N. Galed. 42,1861. On bark. Large grey-surfaced, dichotomising thallus, drooping outwards from trunks. •Valley forest, 600 ft." 715. Oceania.

S. OOLENSOI Bab. ex Hook. Fl. N. Zeal, part 2, 274, 1855. On bark. Mont Oanala, June. In moist forest, 1000 ft. 1300. N. Zealand, Tasinan.a.

S. AUBATA Ach. Meth. Lich. ,). 277, 1803. On dead branches, valley forest, 600 ft. 716. Mont Canala, June. In moist forest, 1000 tt. Ii94. • Cosmopolitan.

A second specimen is a deep rose-red, but differs from the similarly coloured' *8. clatlivata* De Not. and *S. aurora* De Not. in the presence of isidiose soredia on the margins of the lacinias

Var. PAIXENS Nyl. Syn. Lich. i. 361, I860. On bark. Igna.nbi. In forest, 2000-4000 ft. Augnst. 1731. New Zealand.

Distinguished by the paler colour and by the coating of short white hairs on the under surface and, more sparsely, on the upper surface.

S. DEBim-LATA Nyl. subsp. MULTIFIDA Nyl. Lich. N. Z. 37, 1888. On Wk. Ignnmbi. In forest, 2000-4000 ft. 1742. New Zealand.

S.DHMUTABiusKrempelh. form LJSVIS Krempelh. in Journ. Mns. Godeffvoy, «v. Heft 4, 6, 1873. On bark. Ig-ambi. In forest, 2000-4000 ft. 1729. Oceania (Samoa).

S. FKEYCINETII Del. Stict. 124,1825. On branches. Grey surface, but yellowish, with black spots. 716. Valley forest, 600 ft. 740. Mont Oanala, June. "In moist forest, 1000 ft." 1304. Oceania, Antarctica, •S. America.

PERTUSARIAOEiE.

PamwAMA VEIATA Nyl. Lich. Scand. 179, 1861. On bark of *tooth*™. Baie Ou^mo, Noumèa. Cosmopolitan.

P. VELATOIDES A. L. Sin., sp. nov.

Tludlut albidus, tennis, minute rugulosus et sparse granulatus (K-, vel + ·obscure flavescens, K(CaCI) + ru.bens, CaCl-). Verruca fertiles nuniProsa, -

confertæ ca. 0"5 mm. lat. vel minores, hemispheric*, apice truncate, pri>«° albide velato dein pallide carneo (CaCl + roseo-tincto), apothecium unum vulgo continente; sporæ solitariæ, ellipsoide*, intus leves, ca. 135-150/* long., 70-45 /i lat.

Corticola. Mont Arago, July. In damp forest, 1000 ft. 1466. Without locality. 1467.

Differs from P. *velata* Nyl. and from subsp. *subvelata* Nyl. in the negative reaction of the thallus with CaCl alone, in the absence of soredia, and in the smaller spores.

PERTUSABIA PYCNOTHELIA Nyl. Syn. Lich. Nov. (.Wed. 31, 1888- On bark of *Exotheca.* Baie Ouénio, Nouméa.

P.LKIOPLACA Schaer. Lich. Helv. Spicil. 66, 1823. On bark of *Fi«<>* Baie Ouemo, Nouméa. Cosmopolitan.

Var. OCTOSPORA Nyl. Lich. Sound. 182,1861. On bark of *Exotheca.* Baie Ouemo, Nouméa. Cosmopolitan.

The specimen shows a wrinkled areolate thallus, tinged greenish-yellow in places. The verruca are large and congregate. Spores measure 65-75/* * *OV—Odfi,*

P. cmtiNA, A. L. Sin., sp. nov.

TMlus citrino-sulphurens, tennis, minute areolatus vel purpuraceus, plernmque dense sorediatus (K-, CaCl + aurantiacus), soralia ca. 0'5 nn«-tat.; verrucas fertiles confertae vel spars*, hemispheric*, vulgo minntofc •5W mm. lat., sed usque ad 1-5 mm. lat. CaCl + roseo-aurantiac*. *Apolluda* sohtaria vel plura ; asci cylindracei; sporas octonse, ellipsoide*, intus I^es, ca. 65/* long., 28/t lat.

Ad saxa ferrugineo-arenosa. Mont Montravel, Nouméa.

JNear to *P. mlphurea,* but persistently brighter in colour and differing in the torm and colour of the apothecia, the discs of which in *P. mlphurea* takfr a violet colour with potash. The reactions of the thallus are also different.

JUUUANURACE.ffi.

LBCANORA SUBFUSCA var. CHLOBONA Ach. Syn. Lich. 158,1814. On bark of *Acacia.* Baie Ouémo, Nouméa. Cosmopolitan.

L. LUTESCKNS (DC.) Nyl. Lich. Jap. 110, 1890. Baie Ouemo, Nouméa Two specimens on *Ficus* bark; one on *Acacia* bark; one on ^o/7^ bark. Oceama (Labuan), Japan, Europe.

L. GALACTINA Subsp. «ISPJ5RSA Ny,. ex Q^^ jn Q re^, ea, xviii< gg , 1890. On rocks. Mont Montravel, Nouméa. Cosmopolitan.

L. PABELLA Ach. Lich. Univ. 370, 1810. On bark of *Etotheca.* Baie Ouemo, Nouméa. Cosmopolitan.

H^MATOMMA PUNICEUM (Acli.) Wainio, Lich. Brés. i. 72, 1890. On bark or *Acacia.* Baie Ou&no, Nouméa. Frequent in the tropics.

H. BABINGTONII Massal. in Bull. Soc. Mosc. xxxvi. 260, pi. 2, 1863. On bark of *Acacia* and of *Exotheca.* Baic Ouémo, Nouméa. Oceania.

PARMELIACEJ3.

HETKRODEA MUELLEUI (Hampe) Nyl. Syn. Lich. Nov. Caled. 9, 1868. The Monac, 11th Dec. On bare gritty earth on hillside : Niaouli association, 100 ft. Doc. 2388. Also from Nouméa. Oceania.

PARMELIA WAINII A. L. Sin., comb. nov. (P. *proboscidea* Wainio, Lich. Brés. i. 29, 1890). On bark. Canala. "Trunks near village: moist forest association, sea-level." 1471. S. Africa, S.. America.

Described as *Parmelia proboscidea* Tayl. by Wainio and others in a misapprehension of Taylor's species. *P. crinita,* quoted as a synonym *pro parte,* is more nearly akin to *P. proboscidea,* and cannot therefore be used.

P. PERFORATA Ach. Meth. Lich. 217, 1803. On bark. Mont Canala. In moist forest, 1000 ft. June. 1306. New Zealand, Africa, S. America.

P. CRISTIFERA Tayl. in Hook. Journ. Bot. vi. 165, 1847. On bark. Canala. Trunks near village : moist forest association, sea-level. June. 1467, 1473. Asia, Oceania, S. America.

P. PBRLATA Ach. Syn. i. 197, 1814. On rocks. Mont Montravel, Nouméa. Cosmopolitan.

P. TIXCTORUM Despr. ex Nyl. in Bull. Soc. Linn. Norm. sér. 2, vi. 269, 1872. On bark. Mont Canala. In moist forest 1000 ft. June. 1474. Canala : moist forest association, sea-level. 1295. Frequent in the Tropics.

P. CETRATA Ach. Syn. Lich. 198, 1814. On bark. Mont Canala. In moist forest, 1000 ft. June. 1732. Ignambi. " In forest, 2000-4000 ft." Aug. 1297. Cosmopolitan.

P. CONSPERSA Ach., var. ISIDIATA Leight. Lich. Fl. 135, 1871 (?). On rocks. Mont Montravel, Nouméa. Oceania, Europe.

The specimen (sterile) agrees with *P. conspersa,* a cosmopolitan species, in habitat and in appearance, but the medulla is not stained with potash. The reaction medulla K(CaCl) H-rose-coloured is the same as that of *P. acariospora* A. Zahlbr., a corticolous species from S. Brazil. In the absence of apothecia it is not possible to decide with certainty.

P. CIRCUMNODATA Nyl. in Journ. Linn. Soc, Bot. xx. 1884, 51 (?). On bark. Cap Bocage. " Shrubs in serpentine scrub, 500 ft." 1465. East Indies (Penang).

Nylander's specimen from Penang is sterile. The above, which is al*° in thallus, bears numerous apothecia up to 2 mm. wide, the margins crena « when young but becoming subentire, the margin and under side beset wit 1 black setfB which tend toibe less visible in the more developed fruits ; W hypothecinm is colourless ; hymenium 50-60*fi* high; asci clavate 40-50 j** ^ 10-12*fi;* paraphyses concrete, the tips involved in reddish-brown mucilage? spores small, ovoid, or subglobose, 5/* x 7/i.

It would be necessary to secure fertile specimens from Fenang to be quite sure of the specific identity of the specimen from New Caledonia. J-ne black setse, up to 1 mm. long, are a distinctive feature of the apothecia; they recall those of *Parmelia tiliacea* subsp. *carporhizans* (Tayl.) Nyl.

USNEAOEJS.

RAMALIXA CALICAIUS Fr. Lich. Eur. 30, 1831. On bark. (Janala- "Trunks near village: moist forest association, sea-level.[1]' June. ^ Cosmopolitan.

USNBA PIJOATA Web. in Wigg, Prim. Fl. Hols. 91,1780. On bark. On living trunks in slight shelter, 600 ft. 719. Cosmopolitan.

U. LOXGISSIMA Ach. Lich. Univ. (J26, 1810. On bark. Mont Canala, In moist forest, 1000 ft. June. 1293. In tropical and subtropical countries; rare in Europe.

U. INTBRCALARIS Krempelh. in Joum. Mus. Godeffroy, xiv. 4, 4, 1873. On bark. Canala. Trunks near village : moist forest association, sea-level. June. 1472. S. America, Oceania.

PHYSIACE^G.

PLACODIUM GBISEO-VIRENS A. L. Sm., sp. nov.

Thallas uniformis, efFusus, minute isidiosus, griseus vel pallide viren» (K-). *Apothecia* -5 ad 2 mm. Lit. sessilia vel tlmllo subimpressa, disco concavofeiTugineo-rubescente, margine thallino crassiusculo, demum isidio?°> persistente ; paraphyses sparse scptatre, ramo&te; asci oblongo-clavati, 53-*to/iXS-Ufi*; sporse polarilocularia?, late ellipsoiden?, 15-17 *fi*x 10/A.

Ad corticcm arborum. Port Ngeu. Bark of *Fir its.* Jan. 23(5.

Distinguished by the isidicse greyish-green thallus and by the rather large apothecia, the margins o£ which l>ecome in time smothered with isi^ia ; these marginal isidia take a strong crimson stain with potash.

PL. (OALLOPISMA) CINNAMOMEUM, A. L. Sm., sp. nov.

Thallus cinereo-albidus, tenuis, areolatus, aut obsoletus (K-). *Apothecia* congregata sessilia, minuta, ca. 0*5 mm. lat., disco cinnamomeo, piano vel

convexiusculo(K+roseo), interdum tenue tballino-marginata; sporse oblongo-cUipsoideae, pohiriloculares, loculis parvis tubulo punctis, ca. *"20fix* 6-7 *ft.*

Ad corticem arborum. Baie Ouémo, Nouméa.

The species is distinguished by the whitish-grey thallus without parietin and by the rather narrow oblong spores. There are two specimens: one on *Ficus,* the other on *Acacia* (?).

PHYSCIA SPECIOSA (Wulf.) Fr. Lich. Eur. 80,1831. Var. HYPOLEUCA Nyl. Syn. i. 417, 1860. On bark. Canala. "Trunks near village: moist forest association, sea-level." On rock. Mont Montravel, Nouméa. 1468. Cosmopolitan.

PH. EL^EINA (Wahlenb.) A. L. Sm. Monogr. i. 244, 1918 *(Ph. adglutinata* Nyl-). On bark o£ unknown tree. Baie Ouémo, Nouméa. Cosmopolitan.

PH. PICTA (SW.) Nyl. Syn. i. 430, I860. On bark. Canala. Trunks near village : moist forest association, sea-level. 1470. On bark of *Exotheca.* «aie Ouémo, Nouméa. On rock. Mont Montravel, Nouméa, Tropical and subtropical countries.

PYXINE MEISSNERI Tuckerm. Syn. N. Amer. Lich. 80, 1182. On bark of *Exotheca.* Baie Ouémo, Nouméa. Tropical countries.

Subsp. CONNECTENS Wainio, Lich. Brós. i. 154, 1890. Near Nouméa. On *Ficus* bark. 87. Brazil.

P. COCOËS Nyl. Syn. Lich. ii. 2, 1885. Port Ngéa. On *Ficus* bark Jan. 236.

Var. SOREDIATA Tuckerm. in Proc. Amer. Acad. Arts & Sci. iv. 400, I860. On *Ficus.* Port Ngéa. Jan. 236. Tropical countries.

P. RETIRUGELLA Nyl. in Ann. Sci. Nat. sér. 4, xi. 240, 1859. On bark o£ *Ficus.* Baie Ouémo, Nouméa. Polynesia, S. America.

RINODINA PELOLEUCOIDES A. L. Sm.

Thallus cinereo-albidus, sat tenuis, ca. 100/* cr., areolato-ramosus, loevis nigro-determinatus, K+flavens dein sanguineus; hypothallus niger. Gonidia usque ad *S/i* diam.; hyphae medullares interdum I + cseruleo-tinctse. *Apothecia* fusco-nigra, parva (0*2-3 mm. hit.), margine thalliuo integro cincta ; hypothecium rufo-brunneum ; paraphjwes graciles, conglutinatse; epithecium fusco-nigrnm ; asci clavati, ca. 50 *fi* x 10 *fi*; sporse fuscse, ellipsoidea?, 1-septatse, ca. *V2p x 'op.*

Ad saxa (conglomerate rocks). Mont Montravel, Nouméa.

Differs from *Rinodina peloleuca* (Nj'l.) Miill.-Arg. in the much smaller spores ; like that species it recalls *Lecanora cinerea,* but is of a more minute and regular formation. The chemical reaction (not recorded in *R. peloleuca)* is very distinct.

FUNGI.

By ELSIE M. WAKEFIELD, F.L.S.

THE fungi of New Caledonia have not been very extensively collected. Previous lists have been made by Patouillard, who in 1887 enumerated 6i spec.es which he found in the Museum at Paris, collected by VieiHard-Paneher. In 1902 a collection of 84 species was sent to Paris from the Museum at Nouméa, by Bernier, and between 1907 and 1911, various interesting species were collected by M. Le Rat, and recorded in the Bnll, boc. Myc. de France. In 1911-12, Sarasin and Roux made » large and tairly representative collection of fungi, and between 90 and 100 species were named at Kew. Descriptions of the new species included in this collection were issued in 1916 (Vierteljahreschrift der Naturf. Ges. in Zilrich, Jahrg. 61), but owing to the war the full list was not published until 1920 (fearasin & ROUX, Nova Caledonia, Botanik, vol. i. d. ii.).

Prof. Compton's collection adds a number of new records, including two new species. It bears out the conclusion arrived at from the Sarasin and Roux collection, that the affinities of the fungus-flora are chiefly with that ot the tropics of the Old World. There are, however, links with South America, and there is also a distinct temperate element.

In the following list, species marked with an asterisk (•) were included in the collection made by Sarasin and Roux. Those marked t haw been previously recorded in literature from New Caledonia.

Of the 33 species here named, therefore, nine are new records for the island, two of them being apparently hitherto nndescribed.

*t SCHIZOPHYLLUM COMMUKE Fr., Syst. Myc. i. 333. Ermitage Stream. Jan. 188. Cosmopolitan.

POLYPOBUS DUBUS Jungb. Prajmissa in Flor. Crypt. Java, 1818, 62- Ignambi; 2000 ft. August. 1747. India, Malaya, Australia, Polynesia, [illegible]

t GANODERMA LUCIDUM (Leys.) Karst. in Rev. Myc. 1881, No. 9, p. I7' Parasitic on coconut, and said to cause considerable loss. The single specimen included in the collection is the sessile form. Cosmopolitan. Previously recorded as a parasite on coconut in Ceylon. The symptoms of the disease described for Ceylon are similar to those observed in New [illegible]

•tG. AUSTBALB (Fr.) Pat. in Bnll. Soc. Myc. Fr. 1889, 71. Ermitage Stream. Fe.b. 427. Cosmopolitan in the tropics.

tFoMES RIMOSUS (Berk.) Fr., Nov. Symb. 66. Noumea ; common on old stumps and dying trees of *Acacia spirorbis,* woods of Port Despointes. 14*.

India, Polynesia, Tropical Africa, Mascarene Islands, South Africa, North America, West Indies.

•t PoLvsncTUS XANTHOPUS Fr., NOT. Symb. 74· Ermitage Stream. Jan. 233. MontCanala. June. J354. Tropics of Old World.

•tP. FLABELLIFORMIS (Kl.) Fr., Symb. Myc· 74· Mont Canala· June. 1355. Ignambi; 2000 ft. August. 1748. In the gathenng It°. 1748, some of the larger specimens have an almost perfectly smoort, very dark-coloured, indistinctly zoned pileus. These agree exactly with Phhpp.ne specimens distributed under the name P. *mcrolnna* Lev. *P mcrolona* » probably only a form of *Pjabelliformis.* Tropics of Old World.

*† P. SANGUINE S Fr Nov. Symb. 75. "Common in the whole of the Nouméa district1\ eisevlre"." 234. Cosmopolitan in tropical and sub-tropical regions.

«LASCHIA uHFnou Berk, in Journ. Linn. Soc., Bot· xiv. (1873) 58 (i W « *ccespitosus* Berk, in *op. cit.* xiii. 167). Ermitage stream; on dead ^ood. Jan. 192. Ceylon, Malaya, Australia, Polynos*. Probably widely spread in the East.

The original description of this species was very scant and in some respects mfsleading. The present collection and gathennga made xn 1911-12 in New Caledonia by Sarasin and Rous, all of *hioh were preserved.*n, fa^ds stow that when young and fresh the pileus is nearly always moreMW^ S. pointed at the apex, sometimes even sharply umbonate. Ifa. «« J ' * is also seen in tile original drawings of the Ceylon specimens (Ihv.aites 182^ which Berkeley referred as «*L. ccespitosa,* var." Older specnens may become more flattened, but there is usually a trace of an umbo An amended description was given by Hennings in Hedwigm xl 1902^78, but his spore measurements are slightly too small. In all the specmens examined'by me, including the type from Austria' *tte.*spores are bioadly elliptical, or sometimes slightly pip-shaped, hyaline, ^b-8x4 5-5/*.

Favors albulus Massee differs only in the wh^sh pileus *Polype mycenoides* Pat. from the description appears to be dis met. It *u£* tote pLphorescent, and this character has not been noted for any of the specimens of *L. caspitosa* received at Kew.

•tSTERKUM CAPEBATUM (Berk. & Mont.) *(Thelephora lamellata Bevl· &* Cart). Ignambi; on dead logs in forest, 2000 H. August 1.49· Malaya, Australia, Polynesia, South America, West Indies, Southern United States.

* STEREUM RIMOSUM Berk, in Hook. Journ. Bot. 1851, 169. Stream; on dying tree. Jan. 155. The present specimens are very more or less saucer-shaped, with the hymenium not yet cracked. is well marked in habit and possesses laticiferous ducts. When a uniform fawn colour, but the collector's notes with this, and with a collection from the same island made by Sarasin, state that it is orange fresh. In the present case it was also observed to exude a red]Uice touched. India, Ceylon, Tropical Africa.

OoRTidUM CERULEUM (Schrad.) Fr., Epicr. 562. Locality not 720. Europe, North America, India, Ceylon, Malaya, Australia.

CLAVARIA FLABELLATA Wakefield, sp. nov.

Fungus albidus, magnus, ad 15 cm. altus, valde ramosus. lato-divisi, compressi, Ireves, 1-5 mm. crassi. *Ramuli* suberecti, cylindracei, 1-1*5 mm. diam., apicibus fulvitinctis, ssepe flabellato *Basidia* minuta, 10-15 x 3/*. *Sporce* hyalinse, elliptic*, laves, 5-6'5 >

I lab. Ad terrain humosam in silvis. New Caledonia, Mont 1500 ft. 1271).

The species is readily distinguished by its large size and by the tta branches. The fan-like expansions at the tips of the branchlets give characteristic appearance. Preserved in formalin the plant is un ochraceous or pallid, but when fresh it is white, with light brownish tips, is said to be eaten by the natives.

C. STRICTA Pers. apud Fr., Syst. Myc. i. 468. Mont Canala ; on rotting wood, damp forest; 1500 ft. June. 1179. Europe, North India, Ceylon (?).

C. FrsiFORMis Sow. apud Fr., Syst. Myc. i. 480. Ignambi; on with little humus, in forest; 2000 ft. Aug. 1652. The basidia and spo are slightly smaller than in most British specimens, but otherwise the agre ment is very close. Europe, North America, Ceylon (?), Madagascar.

•AURICULARIA TREMELLOSA (Fr.) Petch in Ann. Hoy. Bot. Gard. iv. 1910, 414. *Cf.* also Patouillard in Journ. de Bot. i. 1887, 226. Dore. April. 710. Asia, Australia, Polynesia, Central and South America.

*tHiRNEOLA POLYTUICHA (Mont.) Fr., Fung. Natal, 146. Ennitage Jan. 218. Baie Ouemo; on dying brunches of *Fiats* sp. Jan. Cosmopolitan in tropical and subtropical regions.

*tGuEPiNiA SPATHULARIA (Schw.) Fr., Elenoh. ii. 32. Mont Mou. March- 706. Probably cosmopolitan in tropical subtropical, and warm temperate regions.

tOLAVARioPSis PT-LCHELLA Pat. & Har. in Bull. Soc. Myc. Fr. xxviii. 1912,280. MontKoghi; 1000 ft. April. 797.

No spores are present on these specimens, which arc preserved in formalin, but the macroscopic characters agree with those described for *C. pulchella.*

Only recorded from New Caledonia.

CLAVARIOPSIS sp. Ignambi; 1500 ft. Aug. 1683.

Although the specimens are not in sufficiently good condition for determination, it seems worth while putting the occurrence on record, as so few species of this genus are known. The plants are caespitose, 2-3 cm. high, and more or less dichotomously branched, usually in one plane so as to form flattened expansions. The substance is very firm, and the colour when fresh din.T yellowish-white. Possibly the species is *C.phynts* Holterm., but no spores are present, and it has not been possible to trace the varying forms of basidia described by Holtennann.

•t Dici'YOPHOaA INDCSIATA (Pers.) Fischer in Sarasin & ltonx, Nova Caledonia, i. pt. i. 1914, 3. Mont Mou ; on the ground, in old burnt-out Lantanaarea. March. 586. Cosmopolitan in the tropics.

tLERATiA SIMILIS Pat. in Bull. Soc. Myc. Fr. xxiii. 1907, 52. Ignambi; on dead wood in forest; 3500 ft. Aug. 1628.

In these specimens the columella is not limited to the base of the fruit-body as Patouillard figures it. It tapers gradually upwards, and passes imperceptibly into the gleba near the upper surface. The cavities of the gleba are small, hence the head is rather firm to the touch. The colour of the peridium when fresh is described as «light scarlet. Spores 12-15 x 6-9 *p.*

Only known from New Caledonia.

MLERATIA SMARAGDINA Pat. in Bull. Soc. Myc. Fr. «v. 1909, 33. Ermitage Stream. Jan. 190. Mont Mou. March. 709. lonme ; 2000 ft. SeP*- 1952.

On dead logs in forest. These specimens also show a columella ot varying development. In one case it reaches to the top of the fruit-body, and is continuous with the peridium as in *Secotium.* All the specimens being young, the mode of dehiscence is not evident, and it has not been possible to ascertain the relationship between this genus and *Secotium.*

The colour appears to vary in the fresh state, for while the formalin specimens do net differ from one another in microscopic details, the <»llt>ctoTM notes give No. 190 as « peacock-blue," No. 709 "dull green," and No. L>52 " dark blue."

*tLycoPERDO>- GEMMATTM (Batsch.) Fr., Syst. Myc. iii. 36. Ignambi; 1500 ft. Aug. 1685[i]. Specimens very young. Cosmopolitan.

1J f T " f^t!'!" COnm 6X PatouiUard * Bu»- Soc Myc Fr. 1»J. 73- **Ignambi; 3500 ft.; on leaves of *Agathis* sp. and occasionally ou the young shoots, , causing slight hypertrophy. Jnly. 1551. Malap, Polynesia.**

†XYLARIA POLTMOBPHA (Pers.) Grev., Flop. Edin. 35. Mont. Canala J 3000 ft. June. 1213. Cosmopolitan.

X. " » ,« W n u Mont. Syll. Crypt. 204, „. 688. Mont Mou. March. 707. Ceylo «, Iropical Africa, West Indies, South America.

tX. IHVOLDTA Kl. ex Cooke in Grevillea, xi. 1883, p. 82. For synonymy see Br$_{es}$, Ann· Myc. v. 1907, pp. 240-241. Mont Canala; 2000 ft. J«»^{e,} 1212. Ignambi; 3500 ft. Aug. 1591.

r^in J r T V 6 1 7 fi,,e,and bein S 1~™1 i" formaUu they have f r t', 1 1 ™ TM ™ 8iZo 8nd Shai,e, so that the appearance is very different Horn that of dried specimens.

Probably cosmopolitan in the tropics.

X. FLABELLIFORMIS (Schw.) Berk. & Cart, in Journ. Linn. Soc, Bot. *• (1868) 1869, 381. Ermitage Stream. Jan. 189. Ceylon, Malaya, Australia, Tropical Africa.

Zealand, S -p-, ΓIT"' t"' 217, Abundant- Malaya, Australia, New sSes. ---nCa, Solltb Alnerica- West Indies, Southern United

•KEETZSCHMARIA CCENOPUS <VV \ « o Very common. Jan. 21^T£'?^ac M°",^ L m ^nnUage Stream. South America. Wlon, Malaya, Tropical Africa, West Indies,

p i n s ;r T n f t 0 (os - *De »«*•;n«— *- **• »• L April. 685. 6; on doad bra«"l'es of CWarina ; 1000 ft.

The species differs from *J)· <•,,,,«,,,,,ica* · une by dark lines. Spores 13-l$_{5x}$? 7,4. '" Soft> wllUish zones, separated Europe, India, West Indies, NorthAmerica.

fD. ESCHSCHOLZII (Ebrenb.) Rein$_{n}$ *

oentrica var. *nncrospora* ($_{Sblr}$b.) The^"h Jf^"' 1904,1?5, (7)> ^ Starb.; probably *D. cognata* Har & ..p i ?.a L • tWn,CMa var_ *mifros;wra l*

Theissen considers this n.erely "„ a vlefy o. f T 1^! 10o"' Sei>t> 1915# association of small spores with the eon " *J)-cotu-entrica.* The constant tation, however, appears to the author t..n T T· o?>1>P817 or pnil>Kah inCr,,S, specific rank. The species v™«. f a dlstmction suflScient to merit I. varies from completely sessile to more or less

distinctly stipitate forms, and occasionally, as in the present specimen and in -0. *cognata,* several stromata become fused together. Spores 8*5-10 x 4-5*5 /*.

Polynesia, Tropical Africa, South America.

MEGALONECTRIA PSEUDOTRICHIA Speg. in Fung. Arg. Pug. iv. 1880, 82. locality not given. Common in the tropics.

ANTENNARIA PANNOSA Berk, in Hook. Lond. Journ. Bot. ii. (1843), 640. Kuakue. May. 954. Frequent in the scrub area on various trees ; often 'associated with scale insects and bark-living larvre.

The species is distinguished from *A. liobinsonii* by the stouter hyphae, and V the raoniliform threads being slightly rough (punctate). Compared with *A. scoriadea,* the hyphse are more frequently branched, and the branches are more slender towards the apex; moreover, there is greater variety in I he types of hyphse present. No form of fruit-body is present in these specimens.

South America.

EXOASCUS CORNU-CERVI Sadeb., Die parasitische Exoascaceen, 68 (*Taphrina eonnt-cervi* **Giesenh.). Mont Mou; on fronds of *Aspidium aristatum.*** Miirch. 705.

The peculiar forked outgrowths were noted to be white when fresh, but in formalin, as in all the dried material seen, they have become quite black.

Distribution probably that of the host. Recorded from Nepal, Ceylon, Fiji, Samoa, Queensland. In the Kew Herbarium there is a previous specimen from New Caledonia on a collection of *A. aristatum* Sw., made by Deplanche.

ENCCELIA NEO-CALEDONICA Wakefield, sp. nov.

Ascomata breritor Stiptata, CW|>«« , coriacea, ad 14 mm. diam, s®pins contorta, eactas ferruginea, minute tesselato-verrucosa. *Discus* tuliginosus, applanatus vel undulatus, margine involute cinctus. *Ami* clayati, in stipitem passim attenuate 110-120 x W / i , octospori. *Sporw* monostichse, elliptical hyalinso, 9-11X35-4*fi*. *Paraphjses* ascos superantes, sursum brunneae, clavato-incrassatse, 3*4 *p* diam., deorsum hyalinae, filiformes.

Hab. Ad truncos einortuos, in silvis, New Caledonia. Oct. 2194,

A large and distinct species, differing from *E. furfuracea* in the spores and in the nature of the outer covering. The latter consists of minute, closely-set pyramidal or conical warts, which are made up of chains of oblong or polygonal bright brown cells, **8-10/4** in diameter.

MYCETOZOA,

By G. LISTER, F.L.S.

THE collection contains ten species. They were found in the high forest within thirty miles of Noumea, and were all on dead wood except one which was on dead leaves. It is curious that prolonged search in these undisturbed tropical woods should not have resulted in a larger number of species being obtained. Possibly the climate was too wet for their perfect development. Mr. Compton describes the forests remaining moist for long periods, the plasmodia seemed rarely to form sporangia, and the litter soon became a prey to mould. He writes :—"Rotting logs lying across streams appear to be the most productive spots ; once I found four species on a single log, but all unpresentable things." In spite of these adverse circumstances the specimens collected are in beautiful condition ; they were preserved in air-tight box, to the cork lining of which they were firmly fastened by pins.

The following is a list of the species with notes on their characters and distribution :—

PHYSARUM VIRIDE (Bull.) Pers., var. AURANTIUM Lister. A large development on dead wood ; the small hemispherical sporangia are on long, slender, pale stalks. This variety with orange-yellow sporangium-walls is far less common than the typical lemon-yellow form.

Distribution. Europe, including the British Isles, South Nigeria, Borneo, New Zealand, Japan, North and South America.

P. ROSEUM Berk. & Broome. A group of typical crimson sporangia with orange-brown stalks was found on dead wood.

Distribution. Not common. South Nigeria, Ceylon, Java, Borneo, South Japan.

DIDYMIUM NIGMPES Fries. On dead leaves. This is the usual form with dark brown stalks and columellse.

Distribution. Abundant in temperate and tropical regions.

STEMONITIS SPLENDENS Host. A forest of sporangia 22 mm. high was found on dead wood covering an area of several square inches. The surface net of the capillitium shows an approach to that of *S. herbatica* Peck in having rather angular and spinose meshes from 15-30 *fi* in diameter. Found abundantly growing on tree-trunks a few feet above the ground.

Distribution. Abundant in the tropics and in the United States of America; less common in Europe.

S. FERRUGINEA Ehrenb., var. VIOLACEA Meylan, *in litt.* This specimen consists of small scattered clusters of violet-brown sporangia, 5-6 mm. high,

ou dead wood. The surface net of the capillitium has rather small ^ry uneven meshes bounded by slender threads ; the spores TMTMTM^*^ lose, 5-6 , dial,, with -ddish-lilac ratW fim j J ^ J * -J F - - J specimen, holding a position intermediate between a./« • ea an *S. pallida* Wing. With the tamer it agrees in the sma1 TM^Z^*SL1* *& pallula* in the scattered habit of the • ¥ ^ ^ * ^ y i r P W W and of the capilfitium ; the spores are browner th n in ^ ^ ^ m le«s grey than in *S. paltuta.* M. Moylan finds a similar --n l in his Co^y clustered sporangia in the Jura ° ^ ^ * & *7 l* * — Otters A/rm^ii-.. m. *!«««, »» anie ^ f TM1 that a Lost endless venienoc o£ reference. In this variable genu, tapp as that *S. fusca* Roth., forms may be met with connecting the descr bed spec* s of the spores. Wevor, is always distinguishahle by ^ ^ ^ ^ and tropical

Distribution. Typical S. /«f«V»«« °f urs IIX regions, but is perhaps especially abundant m warm chmate...

COMATRICHA TYPHOIDES (Bull.) Bo t .. A large growth was found on gheath which rotten wood, typical e: the upper third in these usually clothes the wh sporangia.

Distribution. Common in tenn-te and tropical region,

D (Schum.) Ro st., var. KNTHOXANTHUM (Berk.) G.. Lister, var. nov. nov. M ^ « J ^ J ^ t ^ t50-60C, mm. The present specimens cons»st ot ijr f » Ute nem branous hypothallus; diam., 1-7-2 mm. thick, • « « « » * « £*'ponent sporangia are convex and the dome-like apices or caps of the co i ^ comiccting them with the minute, measnring 40-60/* diam.; he thread ^^ dia(n Thig robugt var5ety basal membrane are winged and broad j ^ *Reticularia entomntha* was first found in Sikkim, ijnd name, ^y p^^ glnce ^ ^ ^ fi ^Q (Hook. Journ. Bot. *ui.* p. 301, « • J • ider aistribnted typical form was Ceylon. A link connecting ^t «4 ito« ts of large ^^ 2 mU)> thick found by Prof. Thaxtcr in Chili; this con, is having the usual clay-coloured spores.

LYCOGALA EPIDENDBUM *(b.)* Fries Specimens of both the typical form and var. *tessellatum* ined; the lat haye dark brown æthalia, 3–6·5 mm. with the characteristic many-chambered vesic

D typical form is abundant in temperate and tropical regi *sellatum* is much rarer, and has been obtained in the Can Africa, Ceylon, Java, New Zealand, Texas, Philadelphia, and the State o£ New York.

ARCTRIA DENUDATA (L.) Sheldon. Four specimens were found ; three are of the usual crimson colour; the fourth is unusual in having almost scarlet sporangia, the capillitium, however, is typical.

Distribution. Abundant in temperate and tropical regions.

A. CINEREA (Bull.) Pers. A few clusters of pale drab sporangia with typical papillose capillitium were found on dead wood.

Distribution. Common in temperate and tropical regions.

This interesting collection confirms on the whole the remarkable consistency of the specific characters of the Mycetoaoa, and gives a further proof of the wide distribution of many of the species. A large number of Myceto zoa appear to thrive equally well in warm or cool climates, but certain species may be considered especially characteristic of warmer regions. As examples of these in the present collection, *Physarum roseum* and *Stemonites spp.* may be mentioned ; on the other hand one notes the absence of any species of *Trichia,* a genus abundantly represented in temperate woods, but comparatively rare in the tropics.

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[Continued on page 4.

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1924.

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mark the boundary between the inner and outer cortex. The stem up to this boundary has a radius of about 21 mm. ; the outer cortex occupies a small space, so that the stem as a whole does not exceed 46 mm. in diameter. The rest of the specimen is composed of petiole-bases investing the stem and closely pressed against it: of these, only the most internal are preserved ; the more external petiole-bases are shown in another specimen of the fern, which consists entirely of a group of these organs.

The elements of the outer xylein zone are sharply-pointed tracheae with regularly disposed pits which are elongated in the direction of the breadth of the tracheae and are disposed according to their size in two, throe, or four vertical series; some portions of the tracheal wall show pits in five or even six series. By their transversely elongated pits the xylein elements remind one of the scalariforni tracheae which have a single series of transversely elongated pits. The narrow protoxylem elements, in which the pits are uniseriate, exhibit a specially close resemblance to scalariform tracheae. Those protoxylem elements form *u* part of the outer xylem zone, chiefly in the prominences which mark the points of departure of the leaf-traces where the elements are grouped together at some distance from the edge of the prominences among the metaxylem trachcids. The remaining part of the outer xylem zone does not show much decrease in the tracheae, which remain fairly constant from the centre to the periphery. The inner xylem, in contrast to the outer xylein, is composed of short and wide tracheae which resemble irregular sacs tapering at the ends, with the result that the boundary between two kinds of xylem is obvious in the transverse sections and especially so in longitudinal sections. The tracheae of the inner xylem have thinner walls than the elements of the more external xylem. The pits in their walls are transversely elongated, but their irregularity of distribution gives to the xylem elements the appearance of reticulate rather than scalariform vessels. This reticulate structure of the wall is noticeable not only in longitudinal but also in transverse sections, because the pits cover both the transverse and longitudinal walls of the tracheae. All the elements of the xylem, both outer and inner, appear to be vessels, but the pits, because of the absence of the middle lamella in the walls, appear to be true pores. In the reticulate tracheae each pit represpnts.an independent perforation in the wall, but in the elements of the outer xylem zone all the pits of the same series communicate with one another by a split in the cell-wall, as in recent Osmundaceae. The cell-wall of the tracheae of *Thamnopteris Kidstoni* is preserved in such a way that the spaces in it are visible as double black lines in the middle part of the membrane, but the wall itself appears to be stained a brownish-yellow colour. The central portion of the stele, as I have already said, has a cavity along the border of which, and in contact with the short tracheae of the inner xylem, as shown in longitudinal section, one can see here and there groups of isodiametric and rather small cells which have the characters of parenchyma, and undoubtedly represent the beginning of

the pith in the form of islands among the xjleu. element, which occupy the stele up to the centre. Groups of such cells were also discovered along the edge of the cavity in the transverse section of the stem. Outside the Xylem th6re are from fonr to «even layers of small, thin-called cells .winch represent the xylem-sheath (PI. 22, fig. 2). In sheath at a distance of one row of cells from the xylem are disposed here and here in one or two layers, cells with brown contents which were no doubt specialized cells, because identical cells with brown contents are found in the xylem-sheath of the leaf-traces. The sheath is surrounded by a zone of phloem consisting of thin-walled, comparativoly large cells which appear to be sieve-tubes. These sieve-tubes form a band of three or four layer*. I" some places the zone of sieve-tubes reaches a width of seven cells: this occurs on the sides of the xylem prominences where the phloem tissue, in consequence of the junction of the descending leaf-traces with the xylem of the stem, is removed from its normal position. The sieve-tubes are connect*" with the small-celled tissue which surrounds the whole stele by a zone of three to four layers of cells.

In some places, it is true, the number of rows is neater, being sometimes as many as eight. This zone certainly appears to be pericyclic ; but it is not possible, m spite of the wonderful preservation of the tissue, to distinguish a penpheral series of cells having the structure of endodermis. This pericyclic zone comes out very clearly, being limited towards the centre by larger sieve-tubes and towards the periphery by no less large but thicker-walled cells of the inner cortex which in this region have black contents. The pericycle zone is equally clear in longitudinal section, because its cells have a somewhat prosenchymatons character and are easily distinguished from the isodiametric, empty cells of the inner cortex and the long and comparatively empty sieve-tubes which are clearly contrasted with the narrower and shorter cells of the xylem-sheath. The cells of the pericycle, which remind one in transverse section of those of the xylem-sheath in longitudinal section, are easily recognizable. The pericycle cells have the shape of sacs, while those of the xylem-sheath are tubular. The inner cortex is admirably preserved throughout its whole breadth up to its junction with the outer cortex. I* cells arethin-walled, but not so thin as those of the pericycle and sieve-tubes The cells which surround the* leaf-traces of the stele have black contents, which suggest that they were probably rich in starch. These layers of cells with black contents surrounding the leaf-traces and the stele are easily recognized, and give one the impression of a sheath. Tn other places the

m tint. By this hghter colour they are distinguished from the darker and walled parenchymatous cells of the outer cortex — longitudinal diameter in the inner cortex in * middle portion are either isodiametric, or somewhat broader than long.

heaf-tntces.

The W-tnu» Wm th. .tel. in *« .am. .»»»"'•» » ' • I[TM]"'*[1i1]" """• •nie place of prominence in the central part of which is one sm .m elements. At a sou higher level the base of nes separated from the ery of the xylem by a narrow-celled tissue of the xylem-sheath. At a still higbor level the section of the leaf-trace, its cells filled with dark and in which tne i « V,^« n me«arch position and is rather nearer to the a[l-]al s ed by a .1,::h q ttP» in .hich to ...n-nts of the ^ nd lay^ ^ ^ ^ ^ ii t • , , Knrnnfprised bv brown contents, lhese cells aie to De the tbrd layer are ch*.act ™ J ^ >bundle hnt are espec[ia]y we] devcloped observed round the whole^cu;aes. Im ^ ^y ^ ^ tbese eells and on the adaxial and r.^Jj"f oneQr ^ kver8 of empty cells occurs generally separated f om hem by the comparativg ly large sieve-tabeS) which the phloem, read.iyrecog n^«db^y- rcs three or ^ ^ width, ^ ^ are usually arranged in the form ot a . In addition to the si(!ve-h,beS) Jh. adaxia. and ^ ^ ^ ^ ^ occur o n the outside a s o,e tho phloem anclud » p i ° ^ mdle Js ^ ^ by a series o f cells with or two layers ot colU. W " « .h unitino on the adjudal side rf ^ ^ ^ ^ ^ a sheath o the ^ame^ o f cells" with ^black^ ^contents^ ^that surrounds the st le. al side of the may eight layers of s:e h J£ ^eath is clearly limited on the outside by a lay[er] of empty cells of the inner cortex, disposed sometimes with the longer axis at right-angles to the leaf-trace. The cells with black contents are described by Kidston and Gwynne-Vaughan *hamnopteris Schlechtendalii* these cells are preserved round the as resistant cells, lea[f] (that *T Thamno-pteTslulhtendal* the resistant cells of the endodermns are clearly seen as a bk k Z t S d i n - on the outside the cells of the pencycle wInch aba[t] on ,' ' i Rnt in *Tliamnopteris Kidstoni,* in B▷ite ot the excellent the protophloem But in .1 * » ^ ¡ le to distinguish with certainty th, preservauon ot the tassue, i t ^ . w t £ « * • [1.1]-em. & is especially dirficnit

is fe[e] h y developed. Prosenchvmatous cells appear on the ^ *f* * ° * the bundle; their number gradually increases until at a higher level they entirely replace the centripetal sylem; the oval mesarch vascular b«*dk becomes endarch, with a bay of parenchymatous t.ssue oppose^ the proto-xylem which gives it a falcate form. On the adax.al side the ce[l]s of the xylem-sheath with their bro«n contents appear beh.nd [t]he empty paren-chvmatous cells of the bay, and at a higher level cells with black contents make their appearance; "these cells represent the mucilagmous sacs winch

occur in the pericycle of living Osmundacese. At this level and sometime at a lowp.- ono may be seen the splitting of one protoxylem group into two. At a higher level the vascular bundle becomes more and more open on the adaxial side ; at first it has a narrow falcaie outline, and later assumes the form of a hormghm. (PI. 32. fig. 5). The number of protoxylem groups *merged by the branching oi the* two original groups until in a leaf-trace on the point of passing from the inner cortex to the outer the number of protoxylem strands may be four or five. As a leaf-trace opens on the adaxial side the bay-like prominence of tissue surrounding it widens, and in this prominence it is possible to detect a band of phloem accompanied on the outside by a series of large cells with black contents (PI. 32. fig. 6). Associated with the small-celled tissue of the pericyclo are some parenchymatous cells of the inner cortex. The latter tissue may be accompanied by a thick-walled tissue having the features of the outer cortex. The large cells with black contents which make their appearance in the leaf-trace as it passes through the inner cortex occur as a group on its adaxial side. In the pericycle they appear to be characteristic of that tissue as it traverses the outer cortex, and especially when it passes through the petiole. In transverse section these cells appear to be vesicular, and in longitudinal section they resemble much elongated, septate fibres. Kidston and Gwynne-Vaughan call these cells mucilage sacs, and compare them with similar elements in the petiole of living Osmundacese. They are undoubtedly mucilage sacs, and agree closely with those in the pericycle of recent Osmundacee. They are situated on both the adaxial and abaxial sides of the leaf-trace, along which the phloem forms an investment to the horseshoe-shaped bundle of the xylem immediately behind the protophloem. In the petiole the pericycle, which is feebly developed, as we have seen, in the leaf-trace during its passage from the inner cortex, becomes more developed and consists of five layers of small cells. The mucilage sacs are associated with these cells. On the abaxial side of the leaf-trace they are usually arranged in one or two series ; on the adaxial side, where the pericycle zone attains a greater thickness, they are more irregularly arranged. On both the abaxial and adaxial side of the leaf-trace these arcs and mucilage sacs are enclosed by resistant cells which are stained brown, but agree closely with the black resistant cells which form the sheath of the leaf-trace in the inner cortex. As the fundamental tissue of the petiole is parenchymatous and light in colour, it is easily distinguished from the brown resistant cells surrounding the leaf-trace, and from the cells of the sclerenchyma which extend to the periphery and form in the petiole a border of characteristic outline. Outside this sclerenchymatous border is a narrow band of parenchyma which marks the limit of the petiole. This band represents the wings of the leaf stipules: the boundary between contiguous wings is indicated by a brown line. The wings of the stipules of

ThamnooterU Kidsto.d are shorter and blunter thnn those of *Thamnopteris SckleckLalii,* and, so far as one can see in tie .pecinen, here „ an y one .rout, of sclerenchyma in the form of a dot on each side of th e shpuk^ and

aSSSssfffiS

as border while in

in its outer portion are Lent in the form of an arc curved outwaids, *Thamnopterl SrhlectdevdaKi* they are curved slightly inwards.

The Utructure of the Roots.

The xylem bundles of the roots emerge from the periphery of the stele almost vert;cally, so that in the transverse section of the stem they appear as >£ ^ g ^ , ^ The bundle is from the stele of the leaf-trace either singly or in pair.. bundles as these bundles are posterlor andl atol tF » ^ xy c m becom-ng dctad, ed ^ ^ f e k . - after the have 7^ ^^ of ^ ^ ^ ^ m the inner cortex. Th«^«ot b undles traverse ^ ^ region o£ ^ ^ possible directions, and w^ ^ ranS verse section The ^ ^ ^ they appear ether in tongitudxnal ot transverse section — o£ ^ ^ ^ ounded by a zone section revea, a ^ ^ ^ This .one contains about eight surroTind cin surroTind cin is tr laye.sot ^ * " « em- cells which apparently represent by a ring of four to nve^ aye J. o J t^L Jrientated in relation to the inner zone and forming its sheath. « In « J. J ^* ^ J F o n the cells o£ the inner zone enclosing the vascular ^ / " ^ i t r f ^ d J L d r f perforations their walls are P ^ ^ , ^ ^ f a the 1>rosenchymatous cells o f varying m diamete. and jmnar F . ne of light^oloured tissue in the outer cortex of the ^'J^'ZnohymLs cells with similar, longitudinal section appears to con >rt ° Pf 5 their walls—a fact ^ t do.nons.rates occur, do not represent the structure state of preservation. The vessels of the root, like those of the leaf-traces, are provided with multiseriate pits. As the root passes from the inner cortex to the outer part of the stem it is surrounded by its own cortex, the inner portion of which consists of thin-walled parenchyma and the outer part of sclerotic prosenchymatous cells. The roots as they traverse the parenchyma of the stipules of the petioles are provided with these two kinds of cortex and enclose in the centre a well-marked diarch vascular bundle surrounded by phloem which is not always well preserved.

TiuireoiTKMS GWYNKE-VAUGHANI *Zalesshj,* n. sp. (l'l. 33. figs. 1-5-)

The transverse section of the stem of this fern, represented by » »»8 specimen from the Permian deposits of the River Kozva in the basin of t Petchora River, h«s a central stele 11 mm. in diameter; the xylc" *rea*?™*A* a diameter of about *9* mm., and consists of two distinct regions, an inner an an outer (PI. 33. figs. 2 & 3). The inner xylem, about 7 mm. in diain occupies the central part of the vascular cylinder, and consists exclusively o short, wide xylem elements with reticulate pitting. There are no tracesi o parenchymatous tissues among the xylem elements present in the centra part of the stele of *Thamnoptms Kidstoni* The outer xylem, *& encircles the inner, is composed of long and narrow trachea? with multiset transversely elongated pits; its periphery is somewhat irregular in outlin because of the prominences caused by the exit, of leaf-traces which are gi* off at a wider angle than are those of *T. Kklstoni.* As a result of the eoo» followed by the leaf-traces those next the stele in a transverse section of stem are cut obliquely, and show multiseriate pits in the walls of the xyle" elements. The angle at which the leaf-traces leave the stele varies troi 22° to 30°. The xylem cylinder is surrounded by a sheath consisting narrow and long cells. This sheath, which is badly preserved, include «> or four layers of cells, and is surrounded by another zone of four to six j») of cells made up of equally long but wider elements, in which it » » difficult to recognize the sieve-tubes of the phloem. This tissue is also bad preserved, and occurs only in some places on the circumference of the ate The next zone of tissue has not been preserved, and beyond this is a sing layer of badly preserved cells sometimes represented only by an irreg«'» brown line representing the remains of the endodermis. The vacant spa between this line and the phloem was occupied, one must suppose, by pericycle, which is nowhere preserved. TV *p»Jo,h>rmh .»n" >aeeee f i^ th<- tinner* corft>.\, *tint* MNMIO of wliiuli is only occnsioiiuNv preserved, uurtioai c«i/s are purcnchymatous mid their diameter is much larger than that of the Rin-A fnliuu. T« 2 ne s ocnu

foneZnt •! I n e n exiined the inner cortex (CCUi

(10e about 9 mm. Wlde, and is clearly distinguished from the onter cortex leaf 12. broad) COmposed of thick-^"^ prosenchymatous elements. *The* whth ar! ?*TF* t h g h thC lnner and outer c tex "tor the ,***• £fa?l *jt*[8] *A!*[a] 8e COntact, b, lt •«« the peripherv they are only lite C ^ ailOther> The l Jittioles E .o™ a WriJ thick covering

The Departure of the Leaf-traces.

J^[&U] *T*™ ^™ the peripher y of tlle stele at the places where p om nences have been previously formed as a first step towards separation of the fohnr bundles. As I have already pointed out, the sections of these

bundles near the stele are generally cut obliquely because of the wide angle at which they are given off. They bend sharply towards the periphery, and arc seen as oval strands with an almost centnil protoxylem. At a higher level these bundles become .somewhat elongated tangentially find, in consequence of this, they are cut more or less transversely in a transverse section of the stem (PI. 33. fig. 4). The metaxylem group of small trauheids, which was previously almost central in its position, is shifted towards the udaxial side of the bundle and eventually passes from a mesarch to an endarch type of structure. At the same time the oval bundle becomes crescentic owing to curvature on the adaxial side. Examination of a* transverse section of the stem shows that this change takes place very rapidly, and it is not possible to follow the gradual reduction in the centripetal xylem and its replacement by the parenchyma that has been observed also in the leaf-traces of *T. Kidstoni* and 7[T]. *Schlechtendalil* This is explained by the sharp deviation of the leaf-trace from the stele and by the imperfect preservation of the tissues of the xylem-sheath and phloem which form round the vascular bundles a band composed of an imperfectly preserved mass of cells ; this band abuts on a space left by the pericycle and is limited towards the outside by a brown line of endodermal cells. At a higher level the vascular bundles of the leaf-trace become more and more crefecentic, and the single group of protoxylem branches into two (PI. 33. fig. 5) : one protoxylem group occurs at each end of the median line on the concave, adaxial half of the trace. Before the entrance of the leaf-trace into the outer cortex three of the protoxylem groups become differentiated ; one group is situated on the median line and the other two on the flanks, one on each side. It is important to note that on the abaxial side of the vascular bundle at each horn of the crescentic xylem, which consists of tracheae of the ordinary size, their occur along the edge linear groups of protoxylem. This occurrence of linear groups of narrow tracheae on the flanks of the abaxial side of the bundle appears to be characteristic of *T. Gwynne-Vaughani,* as in *T. Kidstoni* and *T. Schlechtendal'ri* nothing similar has been observed. At its entrance into the outer cortex the leaf-trace is accompanied by an enveloping sheath of parenchymatous cells the tissue of wliich is badly preserved. Among the parenchymatous cells of this sheath, on the abaxial side of the trace and abutting on the phloem, there occur elements which correspond in structure and position to the secretory sacs that occupy a corresponding position in *T. Kiddonl* The secretory sacs are accompanied by a group of cells with brown contents, and these cells appear to correspond to the elements in *T. SMeclitendalii* called by Kidston and Gwynne-Vaughan resistant cells. Similar cells are seen in certain leaf-traces on the abaxial side in the form of an arc which passes across to the adaxial side and envelops the whole leaf-trace. It is possible to observe also in certain leaf-traces secretory sacs on the abaxial side, where they occur as. a narrow band immediately adjacent to

the
cour?Ti^r' *'''' ''' Cells have brown intents. In this part of il»
about si7 '? ''T iiaS a Cearly marked ho»eshoc shape, and there are
about su protoxylem groups on its inUer face.

On t
resembI' ^W the le«'-^ace there are no longer any of the tracbe*
Z S .7 ^ F' Tr &V eU elements, Which werf p^ent during its passage
t Wtl * leaf traces »-«*o ^coHexas
rW Z V m- to hSrin g is a Pa^enchymatous tissue which belongs to the
wmgs of the sfpules and is pierced in many plaC(,s by rootlets.

&" Portion of *this* cortex is «een behind them as a
whLof ; r \

T'w Structure of the Moots.

Th t
the p i n Ur 7 rithe1, froai the leaf tlaees »8 ll« v become apparent o»
he pe phery0 *the stele, or after they have become detached from it; in
the htter ca e
oval ct e.trace.w one iy one from ^anterior surface The
r 0 r« i ll i ; SOUkr buadle of " stra^« which usually lies i" a
T ity Z on -ho destruoiqn of the phloem and inner cortex. This cavity
is surrounded by +1 he Oller cortex » d - m r to *» p « » ^ . l)>'a rin*ot
sclerenchvma.

ZALESSKYA *Kidston* ('y *GioyumVmglu*m.
(Trans. R. Soc. Edinb. ,0l. xlvi. 100s, p. *m.*)

ZAL yA
We r ;iULicA /ai^ -• »•• («• 34. fig.. i-3.)
prepare Hi 0" 7 o"6 traSVerse s^on of the stem of this species ; it "f
from th P li an T U ;elOngitg 0the artlst Denisov-Ouralsky, and is
whole s J*z Tr,; the Ura Mounti ns Demidov Lvceum at Ekaterinburg.
kindly p^ented /' t0 ^ Satisfi6d Witb " »»«« -tion which the o^r
slightlcolrt ? "• The oentre of *»» *» *• occupied by a stele,
diameter Tl '2 *?*?* ^"^ which ~' " L. The other
of the centJ t's P™*08^ " a space formed by the destruct.on
spaced^S'iI o tLe Stele, Whioh Und <> unitedl V <>-'pied ** ***
an outer portion of") ^ Th<J Stele COnsists ^tw0 kind8 ofXylem „
scalariform pHs, a,fl >ng_ traCll<!{B rf th USuaI width with multiSemte
elements with i« i T Uuler Portiou compOsed of wider and shorter,
pits wth g t x ^ l d1stributed inuitueriate anj *___^eiongate d
portion of ti tele 1 tt (Se il retiCnkte a)earance In the peripheral
edge, there ^\ tt ^\ il pro wle 11 ^\ and at ~ distaoCe ^ t
which represenfT wlem groups of two or three elements each,
immerJ in l th Ser Sar C1 * * * - •* the ends of the leaf-tracej
prominences of the stek i. * hi gher levo1 these assume the forffl
are ^ *n t ^ y ^ l* ^ ^ • ™ « A protoxylem: the prominences
and the phloi. Th xvl ^ of the 8tele * the ^ m-shea
F m. ine X7 jem u surroundd b y a zone ^ e onga e l t J narr0«

cells in four to five layers, and in this zone occur cells with brown contents ; these are either scattered singly among the elements that have no brown contents or in groups. Nfext to Uiis zone, serving as a xylem-sheath, is a band of wider phloem elements. These are sieve-tubes, and with them are sometimes seen small cells which represent phloem-parenchyma. The phloem is succeeded by a band of cells almost as large as the sieve-tubes, enclosing a brown mass. This band consists of five not quite regular layers. The inner series of these cells may be regarded as the pericycle, although the characteristic cells of the endodormis have not been found. The thickness of the inner cortex generally reaches 13 mm. ; it is thus 7 mm. less than the thickness of the same tissue in *Zalesshja gracilis.* The outer cortex seen in my preparation, on a small extension of the circumference of the stem, is preserved only in its inner portion, and the thickness of this part does not exceed 6 mm. The leaf-traces, as seen in section near the stele, have an oval outline, and are separated from the cells of the inner cortex by a band of cells with brown contents. The protoxylem, even in leaf-traces that are very near the stele, occurs on the edge of the ad:ixial side so that the trace, which at its departure from the stele was niesarch, soon becomes endarch. The xylem-sheath of the vascular bundle and the phloem surrounding it are sometimes well enough preserved to show the sieve-tubes and, in the sheath, cells with brown contents. Nearer the periphery the leaf trace becomes reniform and the vascular bundle crescentic, first with one then with two protoxylem groups on its adaxinl sidc\ In the outer cortex the leaf-trace is surrounded by a sheath of parenchymatons cells of the inner cortex, and this is sickle-shaped. There are four protoxylem groups on its adaxial side.

The roots leave the periphery of the stele singly or in pairs. In the centre of the root is a diarch vascular bundle surrounded by phloem, beyond which is a thick cortex of parenchymatons cells stained a deep brown and sharply distinguished from the cells of the inner cortex of the stem through which the root passes. A few of the outer layers of the cortex are very deeply stained and have brown contents; it is possible that they are thick-walled cells. *Zalesshya tiralica* is practically identical in structure with *Z. gracilis* and may be only a younger stem of that species. The difference consists in the smaller diameter of the stele, which is about 10 mm. broad, while *Z. gracilis* has a stele of 14 mm. and a narrower zone of inner cortex which reaches a breadth of 13 mm., while in *Z. gracilis* it is 20 mm. broad. The leaf-traces of *Z. uralica* are much smaller than those of *Z. gracilis* (PI. 34. fig. 4). *In* view of the difficulty of deciding the question of relationship, it is more convenient to describe the Denisov-Ouralsky specimen under a separate name.

KXPLANATIOX OF THE PLATES.

PrATK 32.

Fig. 1. *Thamnopteris Kidstoni* Zalessky. Transverse section of the upper part of the specimen. X 2'4.

Fig. ± *Thamnopteris Kiihtoni* Zalessky. Part of n transverse section ot me y xyle region of the stele and of the inner cortex, *o.xy.*, outer xylem ring; *ty.s* *, sheath; *ph.*, phloem ; *en.*, endodermis; *i.C,* inner cortex. X 50.

Fig. 3. *Thamnopteris Kidstoni* Zalessky. Portion of a longitudinal section of tn and outer xylem of the stele, *cry.*, central xylem; *o.:vy.*, outer xylem.

Fig. 4. *Thamnopteris Kidstoni* Zalessky. Transverse section of a leaf-trace in proxi the stele. -Y, outer xylem ring; *ph.*, phloem; *i.C,* inner cortex. X -°

Fig. .'). *Thamnoptem Kidstoni* Zalessky. Transverse section of a leaf-trace in the perip part of the inner cortex, x 25'o.

Fig. (i. *Thamnopteris Kidstoni* Zalessky. Transverse section of a leaf-trace in tne . cortex, x 25-5.

PLATE 33.

Fig. 1. *Thamnopteris Gtoynne-Vaughani* Zalessky. Trausverse section. X 2f4.

Fig. 2. *Thamnopteris Gwynne- Vaughani* Zalessky. Part of a transverse section o peripheral region of the stele. *o.xy.,* outer xylem ring; *ph.*, phloem. X

Fig. :J. *Thamnopteris Gwynne- Vaughani* Zalessky. Part of a longitudinal section o central and outer xylem of the stele, *cry.*, central xylem; o..iy., outer xy X50.

Fig. 4. *Thammpkris Gwynne- Vaughani* Zale^ky. Transverse section of a leaf-tiac<- proximity to the stele, *en.*, endodermis; i.C., inner cortex. X 25'5.

Fig. 5. *Thamnopteris Gwynne- Vaughani* Zalessky. Transverse section of a leaf-trace in peripheral part of the inner cortex. *s.C,* sclerenchymatous cortex. X 25'5.

Fig. 6. *Bathypteris rhomboidea* Eichwald. Transverse section of a portion of the ste cay., ceutral xylem; *o..ry.*, outer xylem ring. X 50.

Fig. 7. *Bathypteris rhomboidea* Eichwald. Transverse sections of leaf-traces in proxnm y to the stele. X 25*5.

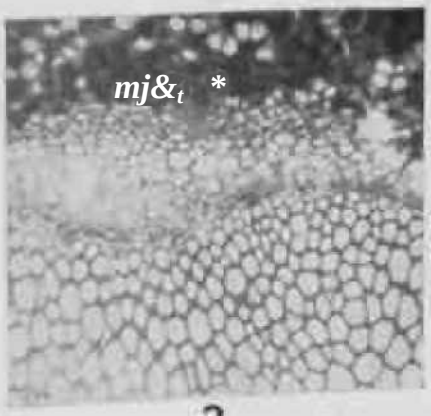
PLATK 34.

Figs. 1-3. *Zalesskya uralica* Zalessky. Fig. 1, transverse section, nat. size. Fig. 2, transverse section of the peripheral part of the stele and the adjacent inner cortex. X 25-6. Fig. 3, trans\erse section of the peripheral part of the stele. X o *o.xy.*, outer xylem ring; *ay.sK,* xylein-sheath; *ph.* phloem.

Figs. 4-5. *Zalesskya gradlis* Kidst. & Gwynne-Vaughan. Fig. 4, transverse section of peripheral part of the stele and adjacent part of the inner cortex. X 2o". Fig. 5, transverse section of the peripheral part of the stele. X *> *xy.*, outer xylem ring; *xy.sh.*, xylem-sheath ; *ph.*, phloem.

Figs. <)-7. *Thamnopteris Kidstoni* Zalessky. Portions of the central part of the stele in transverse and longitudinal section, x 27. cry., central xylem; *o.xy.,* inner part of the outer xylem ring; *p.c,* the cells with brown contents are parenchymatous (the « primitive fibres " of C. E. Uertrand).

1



2

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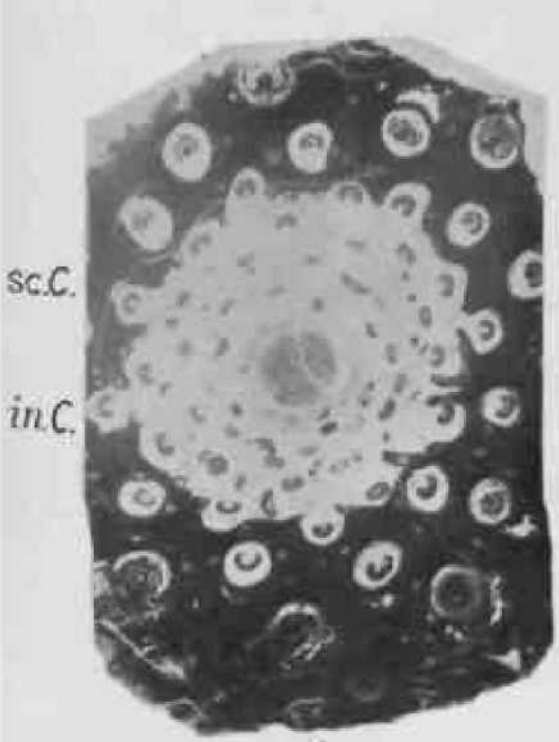
6

o.xy c.xy

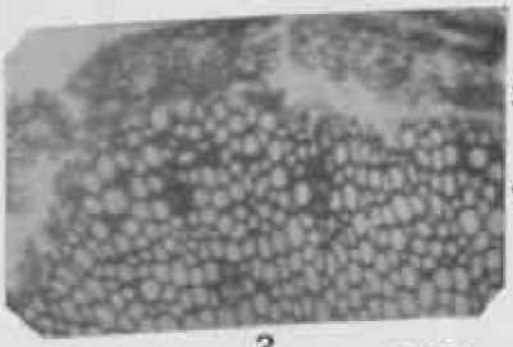
5

3

NEW SPECIES Of PERMIAN OSMUNDACE*.



1



o.xy 2 c.xy

3

4

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7

NEW SPECIES OF PERMIAN OSMUNDACEÆ.

1

c.xy p.c.

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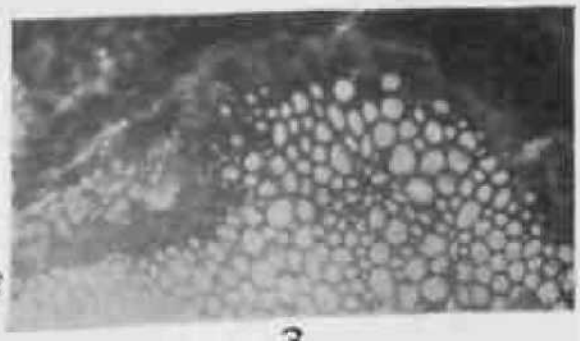
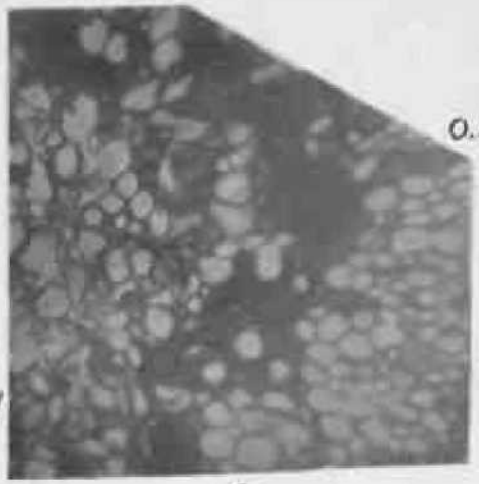


o.xy

3



o.xy

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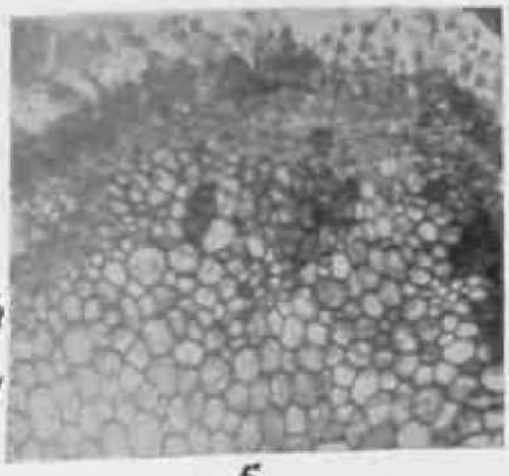

5

NEW SPECIES OF PEKMiAN OSMUNDACEÆ.

Notes on Indian Charophyta. By JAMBS GROVES, F.L.S.

(PLATES 36,36.)

[Read 3rd May, 1923.]

IN 1849 in a paper entitled "Characeae Indise orientalis et instilarum maris pacifici," published in Hooker's Journal o£ Botany, vol. i. pp. 292-301, Alexander Braun gave an account of the Charophyta then known to occur in India, enumerating eleven species. In 1873 he contributed a list of four species collected by S. Kurz in Burma to a paper by G. H. Zeller in the Journal of the Asiatic Society of Bengal, xlii. p. 193. The " Fragmente einer Monographic der Oharaceen," compiled by Dr. Nordstedt from Braun's MSS., and published in 1882, contained a number of additional Indian records.

Since the last-mentioned date many botanists have collected these plants in India, and the present paper is based on the examination of specimens which have passed through the hands of my late brother and myself in the interval, so far as we have been able to identify them.

In 1882 representatives of the two large genera *Uiara* and *Mtella* only were known from India. Since that date *Nitellopsis, Lychnothammu,* and *Tolypeila* have been found, the last-named being represented by three species.

In the past, difficulty has been experienced in dealing with the specimens available, especially those of the Nitelle*, so many of them being gathered at haphazard and imperfectly prepared. Of late years this is being largely remedied by the selection of healthy fruiting specimens, and still more by the preservation of portions in formalin. While even poor specimens of the Chiree can by treatment usually be sufficiently restored for identification, I h-ive not found this to be the case with the more delicate Nitellen. In dealing on this side with the more variable plants of the group, one is at a disadvantage in often having only a single specimen to examine, whereas on L spot an examination of a series might lead to a different conclusion. It « therefore in the hope that it may be of some little use in assisting and

Λ S - T i - w . J - * - ** ndk to te y c t n r r up tl the

present paper has been written. Very much still remams to be worked out, Lecially in the direction of clearing up the limits and relations ol the

S S f i — '» « tangled groups. Thee , « • - " • « •* «

8pecies to bo found. Within the past two years Mr. fr. 0 Allen· has Succeeded in adding three tvell-marked species to the list, collected within quite a small area.

[lnve included in the paper references to the species previously recorded so as to make it an enumeration of all those known to occur within the

Indian area, as laid down in 0. B. Clarke's paper on the subsubarea* of Briti* India in th S et 's J M; Clark ' i T: f . 0Uma1, XXXiv P" X, 1898 r •*» I • » « made _ of Mi. Clarke s districts m arranging the records.

I have added a rough key to the g«IIera and species for the benefit of those to whom Braun and Nordstedt's invaluable [illegible] not accessible. Like a ke / th v k US ns " ud y Ca) f n or it ma isiead in the case of extr I added a few j e of use.

Under each species indications of Ule knowu "JiBtribution outside the Indian area been ' rfe T ' " I J"-d6riB « the ma^ —tries which have still to Att Z u d T e i lleir dirta P»W- -newhat ,, remature may d sc ica o? tlle vari0lls elements *h k -p« « IudiaB Charophyte-flora. Z fr . V ff tlmt ^e particulars furnished

I divis 1 ^ f h y e l e x a t i n g to the first on of Braun's main rank the sections *Homæocl* hd *Hetero* (*Homœophyllæ* and *Heterophyllæ*, Braun). The characters on which these are based appear to represent a more important and constant structural difference than the number of cells of which the ultimate ray is composed. Professor Ernst's paper "Die Stipularblätter von *Nitella hyalina* (DC.) Ag." (Viertelj. Naturf. Gesellsch. Zürich, xlix. 1904) has largely influenced me in coming to this conclusion.

My best thanks are due to the many friends and correspondents who have sent me specimens, to Sir David Prain for the opportunity of eviminin" the entire c s Calcutta Botanic Gardens, and to the official for referring specimens Z ZT^f** $*? *?** Museum, th kl d aSsistiince in consuiting the herbaria. I n al so u ^ * friend Canon Bullock-Webster f o r h s h U i i t nination of the oospore-membranes, to which difficult ecial attention.

KEY TO THE GENERA.

Coronuk of oogomuin composed of 10 cell, in •> *r* usually furcate. S..e a"d branehlL e J i l. T ^ hlata

A„th«idia terminal (i„ -, *i* J TM? T *' ' »o..t cortex ..... Nitelleæ.
the <orb of u,e biofcCT S i ^ Pr0dUOed betWe<,,1
compre^d, hence eUiptic in ^ Z T T o o ^ llrteml! y

Antheridia produced laterally M Z7> T 1 ..... *L X«nu'*
Oogoni ana oospore. J £ £ ^ l ? * »"-*'*•
Iranaverse section. ..... «o«iT»esw(l l lonce terete in

2. TOLYPELLA.

Coronula of oogonium co,np«e».fj5 H l j , , ... antheridia pnKlurrf LteralV *'Ih. nod«. '7\. oOROnb ilm1 Oogonia and oospores m laterals bran(!l1 l«t- bmnchletecorticate™corticate C lll ^ « > - Sten, nnd

Stildod absent. Stem ami b w ^ ' ^ C 1 ..... J"..... Chare*.
-' 3 ve0- loug .e.g.ne,^ Braet-ceU. l ^ f Brin1<:lllctn of a'. very l(m?... 3 NITELLOPSIS.