ANNUAL **REPORT**

OF IHE

BOARD OF REGENTS

or THE

MITHSONIA INSTITUTION,

SHOW IN r,

THE OPERATIONS, EXPENDITURES AND CONDITION OF THE INSTITUTION

FOK THE

YEAR ENDING JUNE 30, 1983.

REFORT

OF THE

U.S. NATIONAL MUSEUM.

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GOVERNMENT PRINTING OFFICE.
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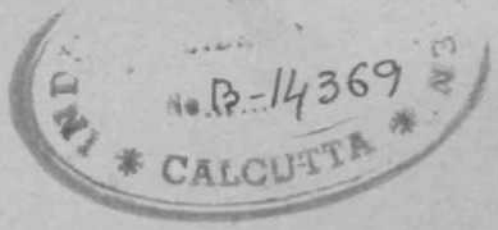

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REPORT

OF THE

U. S. NATIONAL MUSEUM,

UNDER THE DIRECTION OF

THE SMITHSONIAN INSTITUTION,

FOR THE

YEAR ENDING JUNE 30, 1893.

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ORT OF THE U. S. NATIONAL MUSEUM FOR THE YEAR ENDING JUNE 30, 1893.

SUBJECTS.

UNITED STATES NATIONAL MUSEUM,

UNDEK DIKKCTIOX OF THE SMITHSONIAN INSTITUTION,

Washington, December i, *1893.*

SIR: I have the honor to submit herewith a report upon the present condition of the U. S. National Museum, and upon the work accomplished in its various departments during the tiscal year ending Juue 30,1893.

Very respectfully,

G. BKOWN GOODE,

Assistant Secretary, in charge of U. S. Xational Museum.

Mr. S. T. LANGLEY,

Secretary, Smithsonian Institution.

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PAET I.

REPORT

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CONDITION AND PROGRESS OF THE U. S. NATIONAL MUSEUM DURING THE YEAR ENDING JUNE 30,1893.

JIV

G. BKOWN GOODE,

ASSISTANT SECRETARY OF TUE SMITHSONIAN INSTITUTION, IN rilAKiiK OF U, S. NATIONAL MUSEUM.

REPORT

UPON

THE CONDITION AND PROGRESS OF THE U, S. NATIONAL MUSEUM DURING THE YEAR ENDING JUNE 30,1893.

BY

G. BROWN GOODE,

Assistant Secretary, Smithsonian Institution, in charge of V. S. National Museum.

I.—GENERAL CONSIDERATIONS.

The work of the past year in the Museum, though in many respects unlike that of previous years, has nevertheless been the direct outgrowth of the activities of more than half a century, and it seems but proper, before describing current operations, to speak briefly of the origin and history of the Museum, of its aims and methods, and of its relations to other national institutions, especially the Smithsonian Institution, under whose control it was placed at the time of its formal organization.

A.—THE DEVELOPMENT OF THE MUSEUM.

The history of origin and development has been discussed in previous reports, and in a paper entitled " The Genesis of the National Museum." * It will therefore be sufficient for our present purpose to repeat a few of the most essential facts.

The idea of a national museum in the city of Washington was first suggested by the Hon. Joel E. Poinsett, of South Carolina, Secretary of War under President Van Bureu, who in 1840 organized, for the purpose of establishing such a museum, a society called "The National institution," afterwards "The National Institute," which was for four years exceedingly prosperous and active. By this society the nucleus for a national museum was gathered in the Patent Office building in Washington, and public opinion was educated to consider the establishment of such an institution worthy of the attention of the Government of the United States. In 1845, having failed in securing the public recognition at which it is aimed, the society became torpid, and passed out of existence.

* Report of Smithsonian Institution, National Museum. • Report of Smithsonian Institution, Part if v. 1, pp. 273-330.

In January, 1847, the first Board of Regents, after many weeks of consultation and deliberation over the plans for the organization of the Smithsonian Institution, unanimously voted the following resolution:

Resolved, That it is the intention of the act of Congress, and in accordance with the design of Mr. Smithson, as expressed in his will, that one of the principal modes of executing the act and the trust is the accumulation of collections of specimens and objects of natural history and of elegant art, and the gradual formation of a library of valuable works pertaining to nil departments of human knowledge, to the end that a copious storehouse of materials of science, literature, and art may be provided, which shall excite and diffuse the love of learning among men, and shall assist the original investigations and efforts of those who may devote themselves to the pursuit of any branch of knowledge."*

From 1844 until 1858, when the so-called "National Cabinet of Curiosities" passed into the charge of the Smithsonian Institution, the term "National Museum" was not in use. Prom that time onward, however, it was used, unofficially, to designate the collections in the Smithsonian building. After the "National Cabinet" was delivered to the Regents, appropriations were made by Congress for its maintenance. During the twenty-three years which followed, the collections were greatly increased and were made the subjects of numerous important memoirs upon the natural history and ethnology of America. The public halls, with their arrangements for the exhibition of a portion of the collection, also received a due share of attention, and a certain amount of instruction and pleasure was afforded to visitors. The appropriations, however, were meagre, the space limited, and the staff was so inadequate that little could be done except to keep the collections in good preservation.

The broad plan upon which the operations of the National Museum are now conducted was, however, anticipated as far back as 1853, when Prof. Henry wrote:

There can be little doubt that in due time ample provision will be made for a library and museum at the capital of this Union worthy of a Government whose perpetuity depends upon the virtue and intelligence of the people.t

The difficulties attending the formation of such a museum were appreciated by Prof. Henry, who already in his report for 1849, had spoken with much emphasis of the caution required in assuming under the direction of the Institution the care of the national collections.

Prof. Henry, in the report of the Institution for 1870,{ again carefully expressed his opinion as to the character which should be given to the National Museum.

There is [he wrote] scarcely any subject connected with science and education to which more attention is given at the present day than that of collections of objects of nature and art, known under the general denomination of museums. This arises from their growing importance as aids to scientific investigation and instruction.

*** ltepnrt of Committee on Organization, p. 20.**

t Report, Smithsonian Institution, 1852, p. 245.

***X* Report, Smithsonian Institution, 1870, p. 31.**

In the report for 1873 allusion is made to the enormous increase in the national collections, "requiring the utmost exertions of the limited force connected with the National Museum for its proper treatment."*

Although the appropriations for the Museum have of late years been more liberal, it is certain that, on account of the immense annual increase in the quantity of material received, quite as much care and caution is still needed.

The Smithsonian Institution from its foundation fostered explorations, and its Museum was enriched by the numerous ethnological and natural history objects brought home by the explorers. Many gifts were received from private sources, and valuable objects were deposited in its Museum for safe-keeping. The nucleus of its collections was a small but valuable cabinet of minerals formed by the Founder, James Smithson, who was himself a chemist and mineralogist of good repute, and a Fellow of the Royal Society of London.

At the time of the establishment of the Institution several naval expeditions and surveys of the public domain were being organized by the Government', and during their progress large collections of ethnological and natural history objects were made. Important foreign material was obtained by the Pacific Exploring Expedition, Perry's Expedition to Japan, and the other naval expeditions, while the naturalists attached to the Pacific liailrond Survey, the Mexican Boundary Survey, and the surveys under the Army Engineer Corps, brought together great collections illustrating the natural resources and ethnology of North America.

A new source of growth, subsequent to 1871, was the exploration of the waters of North America, by the U. S. Fish Commission, whose connection with the Institution has always been intimate.

At the close of the Centennial Exhibition of 1876 the exhibits of the United States Government, and those of numerous foreign governments and of private exhibitors, came to the National Museum.

A new period now began. The storage rooms and exhibition halls of the Smithsonian building were already overflowing with the accumulations of thirty years, and the small number of persons employed in caring for them were overburdened and unable to do the necessary work. The scope of the collections had become wider and a new and broader classification was found to be necessary. The growth of the country in wealth and culture was leading to the establishment of many local museums, and the educational influences flowing from these and from the Centennial Exhibition caused a demand for more efficient methods of musuem administration.

The exhibition of 1876 had been indeed an event of great educational importance to the people of the United States; and not the least of its

* Report, Smithsonian Institution, 1873, p. 48.

good works was the lesson it taught as to the possibilities for good in public museums.

The objects which at the close of the Centennial were given to the United States for its National Museum were of large intrinsic value, and were also very important from the fact that the necessity of caring for them led to the erection of a large building for the expansion of the Museum itself.

lu 1881, after the new building had been completed, the Museum was entirely reorganized.

Iu the early years Prof. S. F. Baird, then Assistant Secretary, with two or three assistants, was able to give all necessary attention to the care of the collections, and the Museum was not formally divided into departments.

When the reorganization was made in 1881, under the immediate care of the present Assistant Secretary, the diversity of the collections made it necessary to establish a number of departments, each of which was placed in charge of a curator, and the staff has since been constantly increasing. This is at present composed of the officer in charge and thirty-two curators and acting curators, twenty-two of whom receive no salary from the Museum. There are also eleven administrative offices, each under its own chief, while in connection with the general work of administration there is in the Museum a library, a chemical laboratory, a photographic laboratory, and various workshops for taxidermy, modeling, and for the preparation of skeletons lor exhibition.

THE DEVELOPMENT OF THE MUSEUM IDEA.

The history of the National Museum may, then, be divided into three periods :—

First, that from the foundation of the Smithsonian Institution to 18r>7, during which time specimens were collected purely and solely to serve as materials for research, no special efforts being made to exhibit them to the public or to utilize them except as a foundation for scientific description and theory.

Second, the period froir 1857, when the institution assumed the custody of the "National Cabinet of Curiosities," to 1876. During this period the Museum became a place of deposit for scientific material which had already been studied, this material, so far as convenient, being exhibited to the public and, so far as practicable, made to serve an educational purpose.

Third, the present period, beginning in the year 187C, within which the Museum has entered more fully iuto the work of gathering collections and exhibiting them on account of their value from an educational standpoint.

In the first period the main object of the Museum was scientific research; in the second, the establishment became a museum of record

us well as of research, while in the third period is growing up the idea of public education.

In closing this general statement it may be well to mention what seem to be the things definitely accomplished since the time of reorganization in 1881.

The definite steps of progress may be summarized as follows:

(1) An organization of the Museum staff has been effected, efficient for present purposes and capable of expansion and extension as occasion may require, and many capable museum-experts have been trained for work in other institutions.

(2) Through the agency of this staff the materials in the Museum, the accumulations of nearly half a century, have been examined, classified, and brought under control and arranged in such manner as to insure their safely and make them available for study.

(3) The collections have been increased to more than fifteen-fold their former extent.

(4) A considerable beginning has been made toward the development of a well labeled and effectively installed exhibition series, available for the instruction of the public.

(5) A thorough study of the organization and systems of classification in other museums throughout the world has been made, the results of which are beginning to appear in the work of the Museum staff and which will be made available for other institutions through a report upon the principles and methods of museum administration, now in preparation.

(6) Many new methods of installation have beeu developed by experiment in the Museum, and the best and most available employed elsewhere have been adopted. Our new methods are being adopted in many similar establishments at home and abroad.

(7) The art of taxidermy and the making of museum models have beeu advanced and dignified by the policy adopted in the treatment of the experts in the employ of the Museum.

(8) Science has been forwarded by the publication of some thousands of papers describing the materials in the Museum, while the work of specialists in the production of these papers has greatly enhanced the value of the national collections.

(9) Popular educational work of unquestionable value has been accomplished by participation in great expositions in Philadelphia, Berlin, London, New Orleans, Cincinnati, Louisville, Madrid, and Chicago.

(10) Hundreds of thousands of named specimens have been distributed to other museums and to colleges and schools.

THE POSSIBILITIES FOR THE FUTURE.

It is evident that a National Museum worthy of the dignity of the nation must always be maintained in the city of Washington.

Every country has a museum or group of museums in its capital

city—centers of scientific and educational activity—the treasure-house of the people, filled with memorials of national triumphs in the fields of science, art, and industrial progress. *

These are legitimate objects of national pride, for upon the character of its museum and libraries intelligent persons visiting auy country very properly base their judgment as to the nature and degree of the civilization of the people.

Washington may without question be made the seat of one of the greatest museums in the world. It may perhaps be neither practicable nor desirable to gather together in this city extensive collections of early works of art, but a representative series of such objects will undoubtedly grow up which will tend to educate the public taste, and promote the study of the elements of art and the history of civilization, and forward the arts of design. Attention must, however, be directed mainly toward the exposition of the geology and natural history of America and its natural resources, to the preservation of memorials of its aboriginal inhabitants, and the encouragement of the arts and industries of our own people.

It is evident that the National Museum of the United States will of necessity have features peculiar to itself developed in response to the peculiar needs of the people of this continent. .It should be remembered that the national collections of every principal European nation are divided into several groups, each under separate administration, though often within the general control of some central authority. In France, for instance, most of the museums are under the ministry of public instruction, and in England, to a less extent, under the department of science and art.

In the great capitals of Europe the public collections are scattered through various parts of the same city, in museums with distinctive names and independent in their organizations. Much of the work which should properly be done by such museums is omitted, because no one of them has seen fit to undertake it; while, on the other hand, much labor is duplicated, which is perhaps equally unfortunate, collections of similar scope and purpose beiug maintained in different parts of the same city. One of the chief objections to such division of effort is that much of the value of large collections in any department is lost by failure to concentrate them where they may be studied and compared side by side. In Washington the national collections are all. without exception, concentrated in one group of buildings. The Army Medical Museum now occupies a building side by side with those under the control of the Smithsonian Institution, and this proximity, in connection with the long-established policy of cooperation between the two organizations, renders them, for sill practical purposes, united in interest.

* Most of the older nations have museums devoted to their military achievements and triumphs, but our couutrv IUIH no nerd or desire to enter into this field of work.

Although the appropriations from the public treasury for the maintenance of the National Museum are small, compared with those in several European countries, the value of objects given by private individuals is proportionately larger. The actual value of sucli contributions for ten years past, has not, it is estimated, fallen short of $20,000 a year, and in some years has been greater.

Among important gifts may be mentioned such as the George Catlin Indian gallery, of inestimable value to the American historian and ethnologist; the Baird collection of North American vertebrates; the colleqtion bequeathed in 1887 by the late Isaac Lea, of Philadelphia, containing, besides minerals and other objects, about 20,000 conchological specimens, and appraised by the State at $10,000; the Bendire and Ralph collections of American birds' eggs given to the Smithsonian Institution; the Lacoe collection of fossil plants, and the collection of the American Institute of Mining Engineers, for the transfer of which from Philadelphia to Washington a special appropriation was made by Congress.

Some exceedingly valuable collections in this country and in Europe have been bequeathed to the Smithsonian Institution which have not yet come into its possession. It is estimated that within the past fifteen years individuals to the number of at least 2,000 have made gifts to the Museum to the value of $100 or more.

Almost every day strangers, pleased with the work of the Museum, voluntarily send in contributions more or less important.

The National Museum now contains over three millions of objects.

The late Prof. Baird was once asked whether the value of the collections in the National Museum was equal to the amount which had been expended in its maintenance. He replied unhesitatingly that, although it would be by no means a fair criterion of their value, he did not doubt that by a judicious and careful system of sale the entire sum could be recovered. What was said ten years ago by Prof. Bainl is more than true to-day.

One of the most striking features in the affairs of the Museum is the manner in which its collections are increasing. In 1893 the number of specimens is more than fifteen times as great as ten years before.

In the last fiscal year 1,200 new lots or groups of specimens were entered upon the Museum catalogues.

This increase, as has been shown, is, in large degree, spontaneous, only a small amount of money having ever been available for the purchase of new material.

As might be supposed, a considerable proportion of the objects given are duplicates of material already on hand, and although these contributions can, with the utmost advantage, be used for distribution to museums and schools, they do not materially increase the value of the collections for study by specialists and for general educational purposes. The need of a larger fund for the purchase of specimens is yearly more

manifest. Exceedingly important material is constantly offered at prices very much below what it would cost to obtain it by collecting, and in many instances, when refused, it is eagerly taken by the museums and institutions of Europe.

The Museum in its present condition may be compared to a book from which pages here and there have been omitted, so that the narrative is disjointed and incomplete.

lu certain museums of Europe more money is expended annually in purchases than is represented by the entire appropriations for the National Museum. There are instances even in this country in which more money is expended for the improvement of private museums. The officers of the Museum have repeatedly suffered the chagrin of being compelled to refuse the offer of specimens necessary to complete the collections, and to see them pass into the hands of private institutions in this country or the government museums in Europe. For the purchase of specimens for the South Kensington Museum, from 1853 to 1887, $1,586,634 was expended, or a yearly average of nearly $47,000.

England is equally liberal toward her other museums. Exact statistics are not at hand, but it is quite within bounds to assert that her average expenditures for the purchase of new objects for museums in London is not less than $500,000 a year.

The museums of Europe are rich with the accumulations of centuries. The National Museum of the United States is young, and has enormous deficiencies in every department. It needs, more than any museum in Europe, the opportunity to increase its resources through purchase. The total amount expended for the purchase of specimens for the National Museum since its foundation has not exceeded $20,000, and never in one year more than $8,500.

Our treasures are the result of the activities of an enlightened Government. Through a thousand channels materials for the formation of a museum come into the possession of the Government, and out of such materials our Museum has been built. A museum formed in this manner, however, suffers sooner or later from immense accumulations of objects of certain kinds and from the absence of others. This is true of the National Museum. At the outset no additions were unwelcome, and the expectation that all important deficiencies would be supplied might properly be indulged in. As the years have passed, however, it has become more and more apparent that many of these deficiences can only be supplied by purchase.

More striking present results might certainly have been attained by limiting the development of the Museum to special fields. We have, however, had in view the*future as well as the present, and no object has been refused a place in the Museum which is likely to be needed even in the remote future, in the development of whatever grand museum plans the nation may ultimately be willing to promote.

li.—ORGANIZATION AND SCOPE.

The National Museum is under the charge of the Smithsonian Institution, and its operations are supervised by the Board of Regents of the Institution.

The Secretary of the {Smithsonian Institution is by law the '• keeper of the Smithsonian Museum," and the Assistant Secretary, by the usage of nearly fifty years, its executive head.

In the act of Congress passed in 1846 to establish the Smithsonian Institution are contained the following provisions concerning the scope of the museum to be placed under its charge:

1. The act above referred to provides that " all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging, or hereafter to belong, to the United States, which may be in the city of Washington," shall be delivered to the Regents of the Smithsonian Institution, and together with new specimens obtained by exchange, donation, or otherwise, shall be so arranged and classified as best to facilitate examination and study.

2. It provides that, in proportion as suitable arrangements can be made for their reception, these objects shall be delivered to such persons as may be authorized by the Board of Kegents to receive them.

3. It provides that they shall be arranged in such order and so classified as best to facilitate their examination and study.

4. It provides that they shall thus be arranged in the building to be inclosed for the Institution.

5. It authorizes the Regents to obtain new specimens, by exchange of duplicate specimens, and by gift, and directs also that they shall be appropriately classed and arranged.

The National Museum thus became the authorized place of deposit for all objects of art, archaeology, ethnology, natural history, mineral°&yi geology, etc., belonging to the United States or collected by any agency whatsoever for the Government of the United States, when no longer needed for investigations in progress.

The collections in the Museum are intended to exhibit the natural and industrial resources, primarily of the United States and secondarily of other parts of the world, for purposes of comparison.

The activities of the Museum are exerted especially in three directions :

1. The permanent preservation of the collections already in its possession, which depends chiefly upon the vigilance of the curators aud the skill of the preparators.

2. The increase of the collections which are acquired—

(1) From the various Government surveys and expeditions, in accordance with law;

(2) By gift from individuals, from other institutions, and from foreign governments;

(3) By exchange for its duplicate specimens or publications;

(4) By the efforts of officers of the Museum, who make collections

in connection with their regular duties, or are detailed for special service of this nature;

(5) By purchase when appropriations are made by Congress for that purpose.

3. The utilization of the collections, which is effected by exhibiting them to the public, and by encouraging investigations on the part of the officers of the Museum and other suitable persons, and facilitating the publication of the results; also by the distribution to other museums and educational institutions of duplicate specimens, which have formed the basis of scientific investigation, these being identified and labeled by the best authorities:

The Museum by these means fulfills a threefold function:

1. It becomes *a museum of record,* in which are preserved the material foundations of a very great number of memoirs—the types of numerous past investigations. This is especially the case with those materials which have served as a foundation for the numerous Governmental reports upon the resources of the United States. Types of investigations made outside of the Museum are also incorporated.

2. It becomes *a museum of research,* by reason of the policy which aims to make its contents serve as fully as possible as a stimulus to and a foundation for the studies of scientific investigators. Research is a necessary part of the work, in order that the collections may be properly identified and arranged. Its officers are selected for their capacity as investigators as well as for their ability as custodians, and its treasuries are open to the use of any trustworthy student.

3. It becomes *an educational museum,* by reason of its policy of illustrating specimens of every group of natural objects and, so far as it may prove practicable, such other collections as may be found useful for the instruction of the public, which are explained by displaying descriptive labels adapted to the popular mind, and by its policy of distributing its publications and its series of duplicates named, classified, and labeled.

The collections of the National Museum are made up to a very large extent of the following materials:

1. The natural history and anthropological collections accumulated since 1850 by the efforts of the officers and correspondents of the Smithsonian Institution.

2. Collections which have resulted from explorations carried on more or less directly under the auspices of the Smithsonian Institution or resulting from explorations carried on by the Smithsonian Institution in connection with educational institutions or commercial establishments.

3. Collections which have been obtained through the courtesy of the Department of State and the cooperation of United States ministers and consuls.

4. The collection of the Wilkes exploring expedition, the Perry expedition to Japan, and other naval expeditions.

5. Collections made by the scientific officers of Government surveys, such as the Pacific liailroad survey, the Mexican boundary survey, and the surveys carried on by the Engineer Corps of the

U. S. Army, and by officers of the Signal Corps of the U. S. Army stationed in remote regions.

C. Collections obtained by the *U.* S. Geological Survey, the U. S. Fish Commission, and those resulting from the activities of the XL S. Department of Agriculture and other Departments of the U. S. Government.

7. The remnant of the collections of the old " National Institute."

8. The collections mnde by the United States to illustrate the animal and mineral resources, the fisheries, and the enthnology of the native races of the country on the occasion of the International Exhibition at Philadelphia in 187G; the fishery collections displayed by the United States at the International Fisheries Exhibition at Berlin in 1880 and at London in 1S83, and the collections obtained from various local expositions, as, for instance, the New Orleans Cotton Centennial Exposition in 1884 and in 1885, and the Cincinnati Exposition in 1887.

0. The collections given by the governments of the several foreign nations, thirty in number, which participated in the exhibition at Philadelphia in 187<s.

10. The industrial collections given by numerous manufacturing and commercial houses of Europe and America at the time of the Philadelphia'exhibition and subsequently.

11. The materials received, in exchange for duplicate specimens, from museums in Europe and America.

12. Collections received as gifts, deposits, or in exchange, from individuals, numbering usually from 1,000 to],500 each year.

In connection with the general work of administration there is in the Museum a library, a chemical laboratory, a photographic establishment, and various workshops for taxidermy, modeling, and for the preparation of skeletons for exhibition. In connection with the department of art and industry two preparators are constantly employed.

The publications of the Museum consist of—

1. The Annual Report;
2. The Proceedings of the U. S. National Museum;
3. The Bulletin of the U. S. National Museum;
4. The series of Circulars.

The Proceedings and Bulletins, have in part, been reprinted in the volumes of the Smithsonian Miscellaneous Collections.

Papers prepared by the Museum staff, or based upon the collections, have been printed in every scientific periodical in the United States and in many of those of Europe.

THE RELATIONS OF THE MUSEUM TO THE SMITHSONIAN INSTITUTION.

The Smithsonian Institution, though it bears the name of a private citizen and a foreigner, has been for nearly half a century one of the principal rallying points of the scientific workers of America. It has also been intimately connected with very many of the most important scientific undertakings of the Government.

Many wise and enlightened scholars have given to its service the best years of their lives, and some of the most eminent scientific men

our country has given birth to have passed their entire lifetime in work for its success. Its publications, 070 in number, which when combined make up over 200 dignified volumes, are to be found in every important, library in the world, and some of them, it is safe to say, on the working table of every scientific investigator in the world.

Through these books, through the reputation of the men who have worked for it and through it, and through the good accomplished by its system of international exchange, by means of which within the past forty-two years 1,380,075 packages of books and other scientific and literary materials have been distributed to every region of the earth, it has acquired a reputation at least as far reaching as that of any other institution of learning in the world.

It is therefore representative, of what is deemed in other lands the chief glory of this nation, for whatever may be thought in other countries of American art, of American literature, or American institutions generally, the science of America is accepted without question as equal to the best.

In the scientific journals of Great Britain and other European countries the reader finds most appreciative reviews of the scientific publications of the Smithsonian, the Museum, the Bureau of Ethnology, the Geological Survey, the Department of Agriculture, and the Fish Com mission, and they are constantly holding up the Government of the United States as an example of what governments should do for the support of their scientific institutions.

It is surely a legitimate source of pride to Americans that their work in science should be so thoroughly appreciated by other nations, and it is important that the reputation should be maintained. Nothing can be more in consonance with the spirit of our Government, nor more iu accord with the injunction of Washington in his Farewell Address, admiringly quoted by Sir Lyou Playfair in his address as president of the British Association for the Advancement of Science:

Promote, then, as an object of primary importance, institution for the gtnvral diffusion of knowledge.*

In proportion as the structure of a government given force to public, opinion it should be enlightened.

No one has been able to show why Smithsou selected the United States as the seat of his foundation. He had no acquaintances in America, nor does he appear to have had any books relating to America except two. Rhees quotes from one of these (Travels through North America, by Isaac Weld, secretary of the Koyal Society), a paragraph concerning Washington, then a small town of 5,000 inhabitants, in which it is predicted that "the Federal city, as soon as navigation is perfected, will increase most rapidly, and that at a future day, if the affairs of the United States go on as rapidly as they have done, it will become the grand emporium of the West and rival in magnitude and splendor the cities of the whole world."

Inspired by a belief in the future greatness of the new nation, realizing that while the needs of England were well met by existing organizations such as would not be likely to spring up for many years in a new, poor, and growing country, he founded in the new England an institution of learning, the civilizing power of which has been of incalculable value. Who can attempt to say what the condition of the United States would have been to-day without this bequest?

In the words of John Quincy Adams:

Of all the foundations of establishment for jrioux or charitable usen which ever signalized the spirit of the aye or the comprehensive beneficence of the founder, none can be named more deserving the approbation of mankind.*

The most important service, by far, which the Smithsonian Institution has rendered to the nation has been from year to year since 1840—intangible but none the less appreciable—by its constant cooperation with the Government, public institutions, and individuals in every enterprise, scientific or educational, which needed its advicej support, or aid from its resources.

There have been, however, material results of its activities, the extent of which can not fail to impress anyone who will look at them. The most important of these are the library and the Museum, which have grown up under its fostering care.

The Horary has been accumulated without aid from the Treasury of the United States, It has, in fact, been the result of an extensive system of exchanges, the publications of the Institution having been used to obtain similar publications from institutions of learning in all parts of the world.

In return for its own publications the Institution has received the books which form its library.

This library, consisting of more than a quarter of a million volumes and parts of volumes, has for over twenty years been deposited at the Capitol as a portion of the Congressional Library and is constantly being increased. In the last fiscal year 37,982 titles were thus added to the national collection of books.

Chiefly through its exchange system the Smithsonian had in 18C5 accumulated about 40,000 volumes, largely publications of learned societies, containing the record of the actual progress of the world in all that pertains to the mental and physical development of the human family, and affording the means of tracing the history of at least every branch of positive science since the days of revival of letters until the present time.

These books, in many instances gifts from old European libraries, could not to be obtained by purchase, formed even then one of the best collections of the kind in the world.

The warning given by the fire of that year, and the fact that the greater portion of these volumes, being unbound and crowded into insufficient space, could not be readily consulted, while the expense to

be incurred for their binding, enlarged room, and other purposes connected with their use, threatened to grow beyond the means of the Institution, appear to have been the moving causes which determined the Regents to accept an arrangement by which Congress was to place the Smithsonian Library with its own in the Capitol, subject to the right of the Regents to withdraw the books on paying the charges of binding, etc. Owing to the same causes (which have affected the library of Congress itself) these principal conditions, except as regards their custody in a fire-proof building, have never been fulfilled.

The books are still deposited chiefly in the Capitol, but though they have now increased from 40,000 to fully 250,000 volumes and parts of volumes, and form one of the most valuable collections of the kind in existence, they not only remain unbound, but in a far more crowded and inaccessible condition than they were before the transfer.

This condition of affairs will happily soon be remedied.

The purchasing power of the publications of the Institution, when offered in exchange, is far greater than that of money, and its benefit is exerted chiefly in behalf of the National Library, and also to a considerable extent in behalf of the National Museum.

The amount expended during the past forty years from the private fii'id of the Institution in the publication of books for gratuitous distribution has been fully half as much as the original Smithson bequest.

These publications have had their influence for good in many ways, but, in addition to this, a library much more than equal in value to the outlay has, through their buying power, come into the possession of the nation.

In addition to all this, a large amount of material has been acquired for the Museum by direct expenditure from the private fund of the Smithsonian Institution. The value of the collections thus acquired is estimated to be more than equal to the whole amount of the Smithson bequest.

The early history of the Museum was much like that of the library. It was not until 1858 that it became the authorized depository of the scientific collections of the Government, and it was not until after 187G that it was officially recognized as the National Museum of the United States.

But for the provident forethought of the Smithsonian Institution, the United States would probably still be without a reputable nucleus for a national museum.

The relations of the Museum to the system of popular lectures, for many years established in Washington, which replaces the old Smithsonian courses, once so influential, and the assistance which it affords each year to students of science, is referred to elsewhere in this report.

.The Institution publishes many circulars giving information on scientific subjects, which are distributed gratuitously to those who write to make inquiries, and this system is being continually extended. In addi-

tion to this, a large correspondence is carried on with people in search of information on scientific topics. Probably 0,000 letters a year go out to people who write seeking to know the name of some object or other scientific fact. Inquiries of this kind are always answered promptly and fully; and frequently,to intelligent inquirers, books are sent which will enable them to find out such names for themselves in future. This work has not only an educational value, but often a great economic importance as well; as, for instance, when some common mineral has been mistaken for one of value, some useless plant has been wrongly identified and supposed to be of service in medicine, or some harmless animal feared as noxious.

The publications of the Institution and its dependencies reach every State and almost every county in the United States. A careful study of the subject, recently made by the president of one of the scientific societies in Washington, seems to indicate that there are several States which are reached by no scientific publications, whatever, except those distributed gratuitously by the Government.

Speaking of the Smithsonian Institution proper, and not of the Museum or any other trust which it administers, it may be stated that nothing could be so desirable for the Institution as that Congress should examine for itself whether, on the whole, in the execution of the trust of Smithson, more has been given to the Government than has been received; for if, in attempting to increase and diffuse knowledge among mankind, the machinery of the Institution's action has been such that it has incidentally paid over to the Government the equivalent of much more than the whole original fund, these facts should surely be known to those who have to ask themselves in what 8pirit as well as for what purpose the Institution expends money placed in its charge.

Mr, Langley has pointed out that "although by the judicious administration of the Smithson fund nearly $1,500,000—the fruits of its investment—have been applied during the past forty years to the advancement of science and education in America (in addition to the principal, $911,000, larger now than ever before), it should be remembered that the unrestricted income of the Institution is less than $50,000 a year, a sum much smaller in its power to effect results than ever in previous years."

Can the United States fail to recognize its obligation to supplement liberally this private contribution for public good, especially if it be borne in mind that, as Mr. Langley has recently shown, the Institution has left in perpetual charge of the nation, in the Museum alone, Property acquired out of its private fund (and to which it has apparently the same title) which is probably now more than equal in value to the whole amount of the Smithsonian bequest.

Every museum htfs its special characteristics growing out of its form °f organisation, its location, scope, and financial and other resources.

The character of the National Museum is fundamentally affected *])y* its connection with the Smithsonian Institution, its dependence upon Congress for appropriations annually, and the necessity, under existing laws, of its caring for all collections belonging to the Government.

Of the connection of the Museum with the Smithsonian Institution, it should be said that it is in the highest degree advantageous. It should be borne in mind that it is essentially a Smithsonian museum, since, especially in its earlier history, the Institution expended large sums of money in aiding explorations, with the distinct purpose of increasing the collections in certain directions, while of late years it has deposited all the valuable gifts and bequests of specimens it has received. It has had in addition, for nearly half a century, the use of the larger portion of the Smithsonian building, and what is of paramount importance, the guidance and influence of the officers of the Institution, and the very valuable assistance of its numerous correspondents.

0.—THE WORK OF THE MUSEUM IN PUBLIC EDUCATION.

The work of the Museum, if it only performed the functions of an institution for scientific investigation, would be of sufficient value to justify its maintenance and extension. The Museum, however, not only performs these functions, but also does a very great deal to render the resources of science available to the public at large.

Prof. Huxley's definition of a museum is that it is "a consultative library of objects."

The National Museum is a consultative library for the scientific man, and it is something more. It aims to be an agency for the instruction of the people of the whole country, and to keep especially in mind the needs of those whose lives are not occupied in the study of science.

In a recent address before the American Historical Association, I attempted to explain the idea of our work as follows:

(1) That public institutions of learning are not intended for the few, but for the enlightenment and education of the masses.

(2) That the public has a right to full participation in the results of the work of the scientific establishments which they are helping to maintain.

(3) That one of the chief duties of the officers of these institutions is to provide means by which such results may be presented in an attractive as well as an intelligible form.

No scientific institution is more thoroughly committed to the work of the diffusion of knowledge than is the Smithsonian Institution, and no department of its activity has greater possibilities in this respect than is the National Museum.

The benefits of the Museum are extended not only to the specialists in its laboratories and to the hundreds of thousands of visitors from ali parts of the Uuited States who pass its doors each year, but to local

institutions and their visitors throughout the country, through the distribution of the duplicate specimens in the Museum, which are made up into sets, accurately named, and distributed to schools and museums.

In the next annual report it will be shown how many hundred thousands of objects have been thus distributed during the past twenty years. Every museum in the United States has profited in this way, and by its system of exchange the Museum has, while enriching itself, contributed largely to the stores of every important scientific museum in the world.

Not only are specimens thus sent out, but aid is rendered in other ways. Within the last year not less than forty local museums in the United States were supplied with working plans of cases in use in the Museum, and similar sets of plans have been supplied within the past few years to national museums in other countries.

Not only do the people of the country at large profit by the work of the Smithsonian, as made available to local institutions, but also to a very considerable extent directly and personally.

The curator of each department in the Museum is expected to be an authority in his own line of work, and the knowledge of the whole staff of experts is thus placed without cost at the service of every citizen.

It is much to be regretted that many specialists, intent chiefly upon the study of certain scientific problems in which they individually are absorbed, are disposed to neglect the claims of the educated public to the enjoyment and instruction which museums afford. They do not hesitate to say that scientific museums should be administered for the benefit solely of persons engaged in research. Such men would find no welcome among us.

At a recent meeting of professional naturalists an eminent investigator in natural science publicly expressed his opposition to exhibiting certain scientific collections to "the gaping clowns who form the majority of the visitors to our museums." Such a spirit defeats its own purposes and such a remark deserves rebuke. The experience of Europe with its magnificent educational museums and the history of the several expositions in the United States should be quite sufficient to satisfy any one who has studied the matter, that the museum is an educational power of no slight potency.

The venerable director of the South Kensington Museum, the late Sir Philip Cunliffe Owen, speaking from an experience of thirty-five years, not only in his own establishment, but in the work of building up the score of sister museums now under its wing, located in the various provincial towns of Great Britain, remarked to the writer:

> We educate our working people in the public schools, and give them a love for refined and beautiful objects, and a desire for information. They leave school, enter town life, see only dirty streets and monotonous rows of buildings, and have no way to gratify the tastes which they have been forced to acquire. It is as much the duty of the Government to provide them with museums and libraries for their higher education as it is to establish schools for their primary instruction.

In the same conversation, Sir Philip insisted very strongly that a museum not actually engaged in educational work of some kind could not long survive, and as an example of one such field of activity pointed to the great system of lectures and examinations connected with the Science and Art Department of the Council of Education, of which the South Kensington Museum is one of the chief agencies.

II.—RECENT ADVANCES IN MUSEUM METHOD.

The importance of tlie Museum as an agency for the education of the young and for the culture and enlightenment of the x>ubli<5 in general is each year becoming better understood.

The control of all museums is passing out of the hands of mere caretakers, or showmen, and is being assumed by men of intelligence and enterprise, whose purpose it is to elevate this agency of public culture to a plane of higher usefulness.

Museum-practice has become to such an extent an art that some years of training and experience in a well-organized general museum are almost essential. Intelligence, a liberal education, administrative ability, enthusiasm, and that special endowment which may be called "the museum sense"[1] are simply prerequisite qualifications.

Any museum which employs an untrained curator must expect to pay the cost of his education in delays, experimental failures, and waste of material.

A museum without intelligent, progressive, and well-trained curators is as ineffective as a school without teachers, a library without a librarian, or a learned society without a working-membership of learned men.

Such facts as these are gradually becoming impressed upon the public mind, and although the community within which a given museum is located may not for a time concern itself actively about its shortcomings, all the good work which it does is at once appreciated, and if advances are in progress, their results are eagerly awaited.

The "Museums Association," recently organized in England, is doing excellent work in that country. Such an organization is perhaps not yet necessary in the United States, where local museums are so few, but in time one will doubtless be organized. In the meantime the American Society of Naturalists is so situated that it can perform a part of the work proper to such an organization.

Sir W. H. Flower, the superintendent of the British Museum of Natural History, in his address at the last meeting of the "Museums Association" remarked:

> Of the museums of the United States of America much may In- rxpuciet L. They are starting up in all directions, untramelled by the restrictions and traditions which envelope so many of our old institutions at home, and many admirable essays on Museum work have reached us from the other side of the Atlantic, from which it [a]Ppoars that the new idea has taken firm root there.*

* Report of the Museums Association, fourth general meeting, 1893, p. 42.

It is gratifying to know that even in the smaller towns of Europe the ideals which we hold before us in our work are appreciated and quoted. The "Brighton Herald"' of August 18, 1804, contained the following editorial comment:

All those remark a bh constituted persons v lm jn.uniniii that we do not want a mu sen in in Brighton wonld do well to read a well-written little brochure by Dr. Charles A. White, of the U. S. National Museum, entitled "The relations of biology to geological investigations." It is a philosophical subject, philosophically treated, demonstrating the important relation that museums hold to science and to civilization as centers of learning and conservatories of the evidence concerning acquired knowledge. Museums [he concludes] should not only be made safe treasure-houses of science, but they should be what their name implies, temple** of study perpetually open to all investigators.

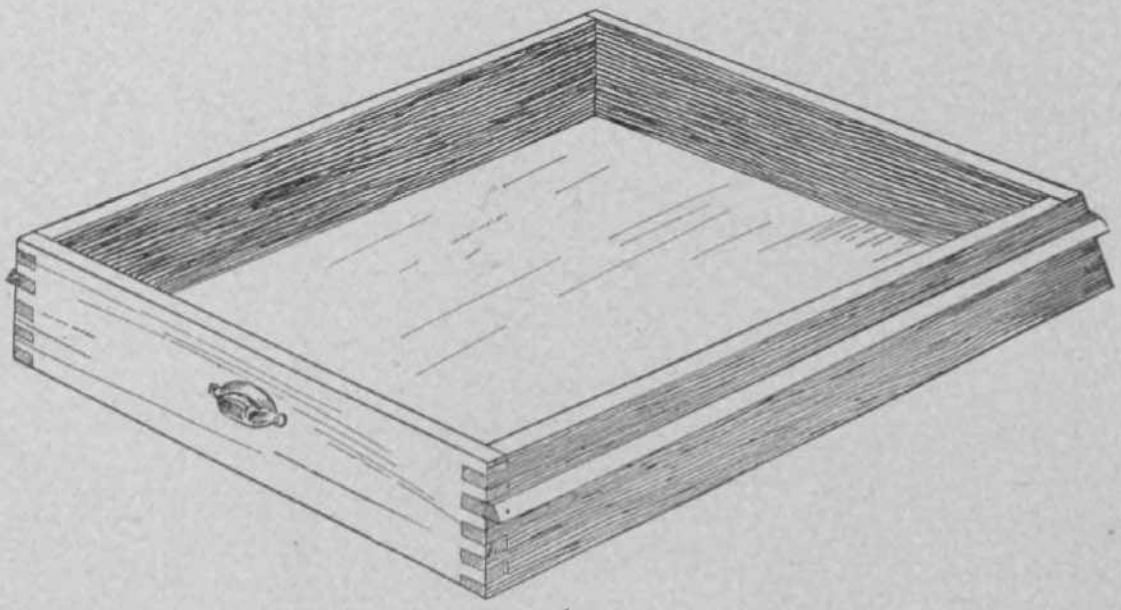
In our own country the spirit of museum extension is spreading, as is shown by such articles as that by Prof. Morse in the "Atlantic Monthly," entitled "If Public Libraries why not Public Museums," which is reprinted in a subsequent part of this report. It is the highest ambition of the National Museum to be associated actively in the work of museum reform, and to feel that we are standing shoulder to shoulder in this respect with the older institutions of Europe, and that this fact is recognized by them.

As we have worked along from year to year, always striving to do the best thing possible under the circumstances, we have always taken first into consideration the plans in use in other museums, and have either cast them aside as unavailable, modified them for our own needs, or frankly adopted them.

So it has come to pass that we have a large number of forms of cases and devices for installation, fitted to meet almost every need of museum or exposition administrators. These are always placed freely at the disposal of those who need them. Working drawings and photographs of cases, and samples of fixtures of every kind are freely lent. When the museum has had made, for its own use, expensive tools, such as molds for specimen jars or pedestal tiles, or dies for corrugating metal for the sliding-racks of storage cases, these are placed without charge at the service of public institutions, and the use of blocks for illustrating reports is always accorded.

In this way the entire resources and. experience of the National Museum are placed at the disposal of even the smallest country museums, and this policy has, we hope, been very beneficial.

In pursuance of this policy some of the most instructive of our recent experiments are described in this report, in advance of a fuller discussion in a comprehensive work on the i>rinciples and methods of museum administration, which has been in preparation for some years. This is done with less hesitation because of the example set by Dr. A. B. Meyer, whose papers on the methods of the Royal Zoological and Anthropological-Ethnographic Museum in Dresden have proved so interesting to all museum workers, and who, rightly thinking that museums are doing too much in the way of experiment and too little in utilizing the



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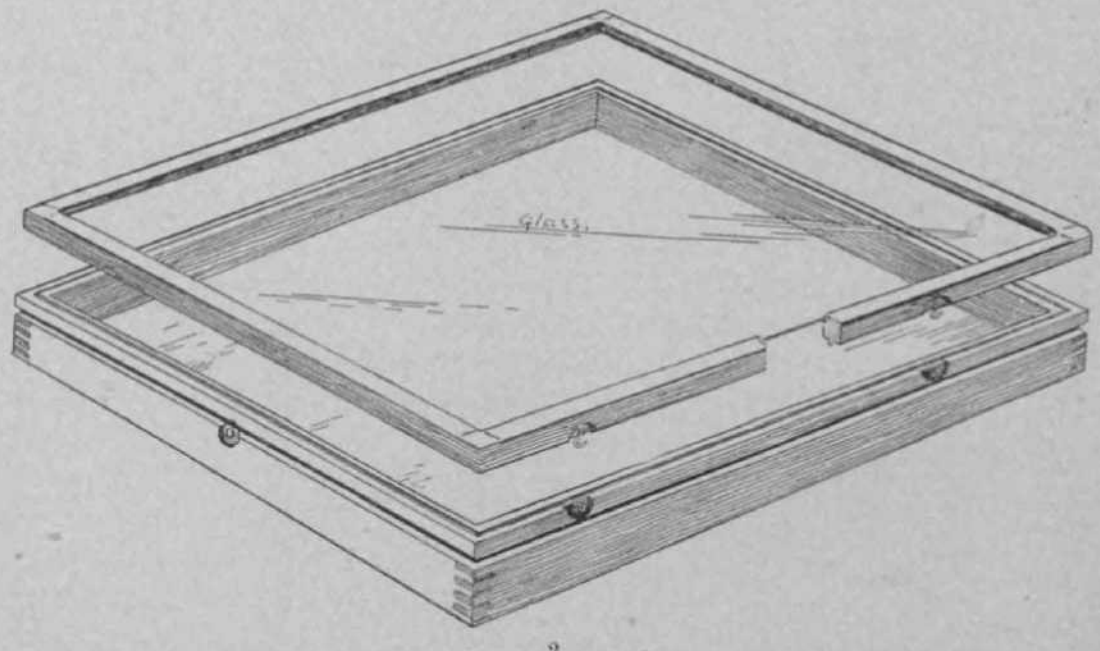


2

UNIT DRAWERS.

Fiif. **1. Storage drawer.**

F\g. a. Exhibition **drawer** with Klasa front ; i* by 80 ini'hes.

experience of others, publishes his own experiences for the good of other workers in the same field.*

MUSEUM CASES.

Of all the practical questions which confront the museum administrator those relating to the form and construction of cases and the methods of interior fitting are among the most perplexing and, so far as the relationships of the museum to the public are concerned, the most important. Each well-arranged case with its display of specimens and labels is a perpetual lecturer, and the thousands of such constantly on duty in every large museum have their effect upon a much larger number of minds than the individual efforts of the scientific staff, no matter how industrious with their pens or in the lecture room.

Ever since the occupation of our new building very special attention has been given to improving the cases, and a system, peculiar in the beginning to the National Museum, though since adopted by others, has grown up—a system based upon a fixed and interchangeable unit of construction; so that, to a very large degree, it is possible to transfer cases from one department to another. This fixed unit is the storage drawer or " unit drawer," 24 by 30 inches in dimensions (PI. 1, *lig.* 1). Modifications and extensions of this unit are very generally in use in many forms of cases, both for exhibition and storage. (PI. 1, fig. 2.)

Exhibition cases.—The various kinds of cases now in use are indicated in a general way in the two accompanying plates. (Pis. 2 and 3.) Fuller descriptions of the cases and their manner of construction will be reserved for a future report. It may be said, however, that the tendency has been toward the use of the very best of glass in the largest possible sizes, the woodwork being; as a rule, restricted to bases, corner pieces, and cornices. The top of the case—no matter what its size—is of glass. When possible, where two panes of glass are used in a single case front, a narrow motnl fonnecfing strip is used instead of a wooden bar.

The theory which has led to the development of this form of case is that collections should be so arranged that each surface of glass, or each panel of a long case, stands by itself, its contents being grouped with reference to a general descriptive label, either placed in their midst or in the middle of the case-frame above. It is not considered legitimate to arrange series of specimens on long shelves extending from one end *to* the other in cases whose fronts are broken by panels or doors; but, as has been said before, each panel or door stands for rtself, like the page of a book, the arrangement being without exception from left to right, as in a book.

* MKYRH, A. B. Zweiter Jterieht iiber einige neue Einrichtigungen des kongliclljen zoologischen und anthropologisch-etlinographischen Museums in Dresden. *Jbhandl. *** Herichte K. ZooL Anth.-Ethnog. Museums Dresden,* l892-'93; Dresden, 1894. No. * PP. 1-28, Pis. i-xx.

The breaking of the view of a specimen or an exhibit by a horizontal bar is also avoided, and when horizontal sash-bars are necessary (as in a cheap case where small- panes of glass are used) the situation is relieved as much as possible by placing a shelf behind this horizontal bar, so that it is in effect a part of the shelf.

The form of case with which we are at present best satisfied is shown in the illustrations of some of the groups of Indians. (Pis, 51 and 52.) Where smaller objects are shown, a large proportion of the height of the case is occupied by the base in which " unit drawers " are fitted.

We have also introduced an inexpensive and practical adjustment of the doors of the larger cases, by means of which these may be raised instead of swinging upon hinges, thus doing away with the exceedingly objectionable swinging doors, so undesirable in narrow aisles and so inconvenient to curators. With the new system the cost of the mechanical appliances for swinging the sash is almost compensated for by the saving in hinges, wrench-locks, clamping-bars, and special contrivances for dust-proofing. The general appearance of these cases is shown in the accompanying plate. (PI. 4.)

So perfect is this adjustment that a glass door weighing more than one hundred pounds may be lifted with one finger. The complicated arrangement of cranks and levers used in many old-fashioned cases is entirely unnecessary.

The advantages of iron and steel exhibition-cases have been urged with so much enthusiasm of late that it seems proper to say that the question of the use of iron has been constantly under consideration here since 1879. All the different forms of iron cases have been studied, including the Dresden cases constructed by Prof. Meyer which were inspected by the writer in 1880, and the wooden-sheathed iron cases in the American Museum of Natural History in New York. This was before the system of wooden cases, which we now use, had been adopted. When the new Museum building was finished, in 1881, the use of iron cases was practically decided upon, and sample cases were made, in general accordance with the Meyer plans. They were found, however, to be much more expensive than wooden cases, heavier, and less easy to adapt to special uses. They offered no material advantage, except, possibly, a greater durability. The limitations of iron in the matter of design are manifest, and the impossibility of securing the polished surfaces of wood, which add so much to the attractiveness of a museum case, was another reason against iron construction.

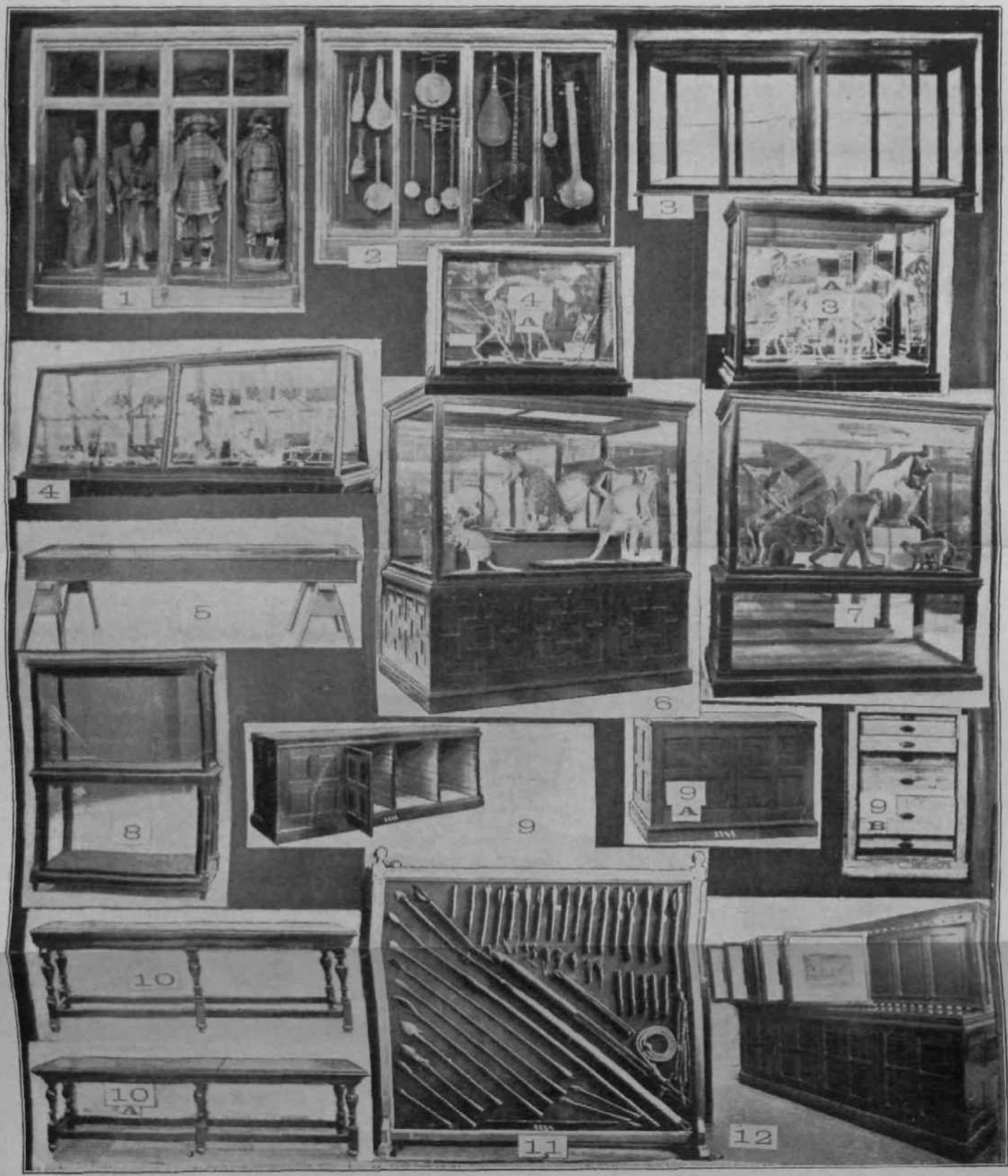
L* Looking back fourteen years to the time when iron was rejected, no reason appears for regretting the decision then made.

The use of Mexican or Frontier mahogany which is well known us softer and straighter grained than the West India variety so popular for furniture, has been continued, and no other is so thoroughly suitable, so far as color is concerned, though the oaks when used have, in other respects, given great satisfaction. When black eases are required, cherry wood is employed and an ebony finish added.

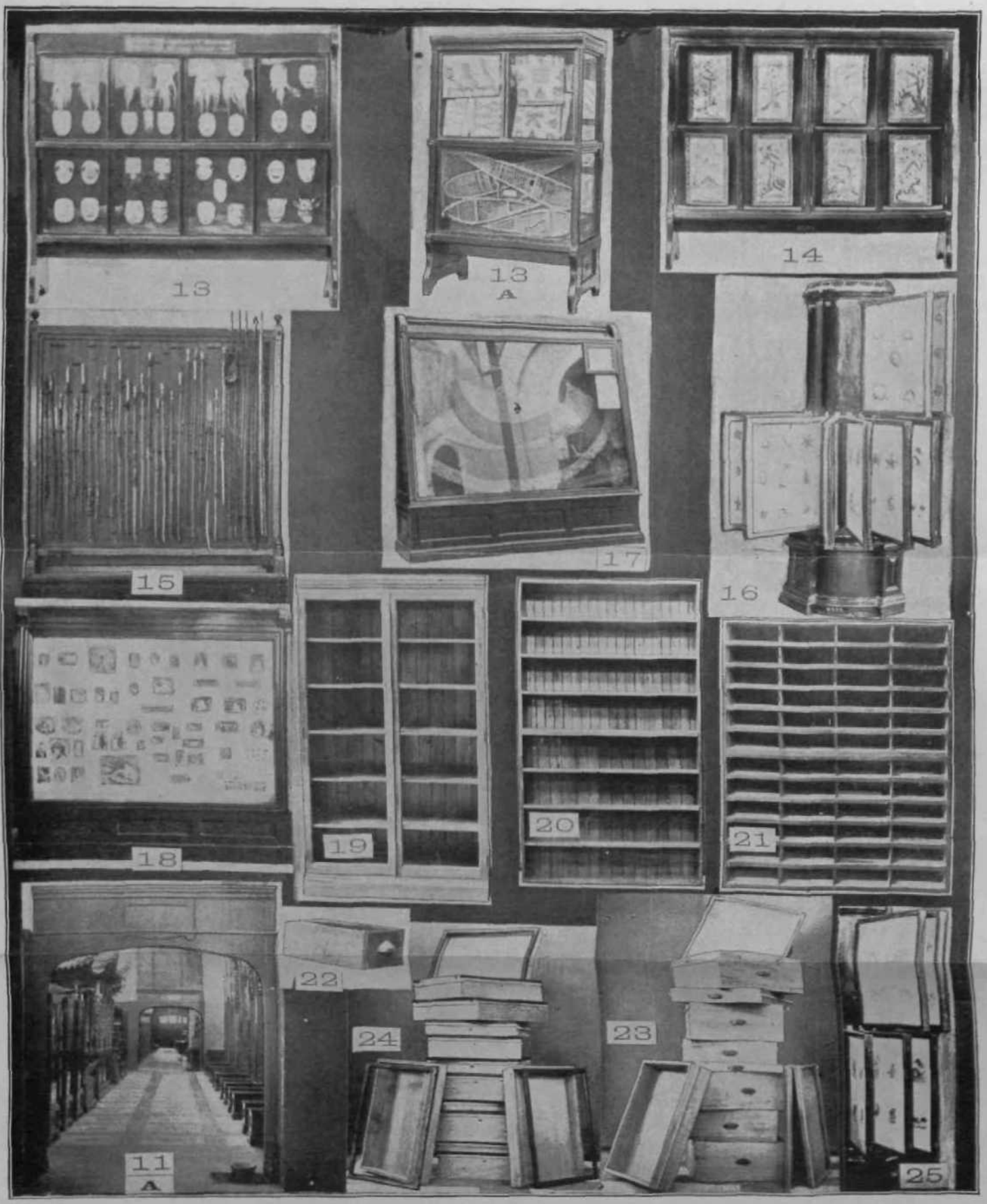
EXPLANATION OF PLATES 2 AND 3.

STANDARD FORMS OF CASES USED IN THE U. S. NATIONAL MUSEUM.

Fig. 1. PIER CASE.
Fig. 2. ALCOVE CASE.
Fig. 3. TABLE CASE (UPRIGHT).
Fig. 3A. TABLE CASE (UPRIGHT), HALF SIZE.
Fig. 4. TABLE CASE (SLOPING).
Fig. 4A. TABLE CASE (SLOPING), HALF SIZE.
Fig. 5. TABLE CASE (FLAT).
Fig. 6. TABLE CASE (GRAY PATTERN), STORAGE BASE.
Fig. 7. TABLE CASE (GRAY PATTERN), GLAZKD BASK.
Fig. 8. KENSINGTON CASK (GRAY PATTERN).
Fig. 9. UNIT TABLE.
Fig. 9A. UNIT TABLE (HALF SIZE).
Fig. 9B. UNIT TABLE (QUARTER SIZK).
Fig. 10. BASK TABLES.
Fig. 10A. BASK TABLES (DWARF SIZE).
Fig. 11. FLOOR SCREEN.
Fig. 11A. ARCH SCRKKN.
Fig. 12. TABLE SCKKEN.
Fig. 13. SLIDE SCRKKN CASE.
Fig. 13A. SLIDE SCRKKN CASK (HALF SIZE).
Fig. 14. DOOR SCREEN CASE.
Fig. 15. CASK TOP SCREEN.
Fig. 16. HALF COLUMN (FOR WING-FRAMES).
Fig. 17. GLASS SCRKKN (SLOPING).
Fig. 18. GLASS SCREEN (UPRIGHT).
Fig. 19. STANDARD BOOKCASE.
Fig. 20. STANDARD SHELF-STACK.
Fig. 21. STANDARD PIGKON-HOLE STACK.
Fig. 22. STANDARD CARD-CATALOGUE DRAWKR.
Fig. 23. UNIT DRAWERS, 2" TO 12" DEEP, 24' ' WIDE.
Fig. 24. UNIT BOXKS (GLAZED), STANDARD.
Fig. 25. WING FKAMKS (STANDARD).



STANDARD FORMS or CASES USED IN U. S. NATIONAL MUSEUM.



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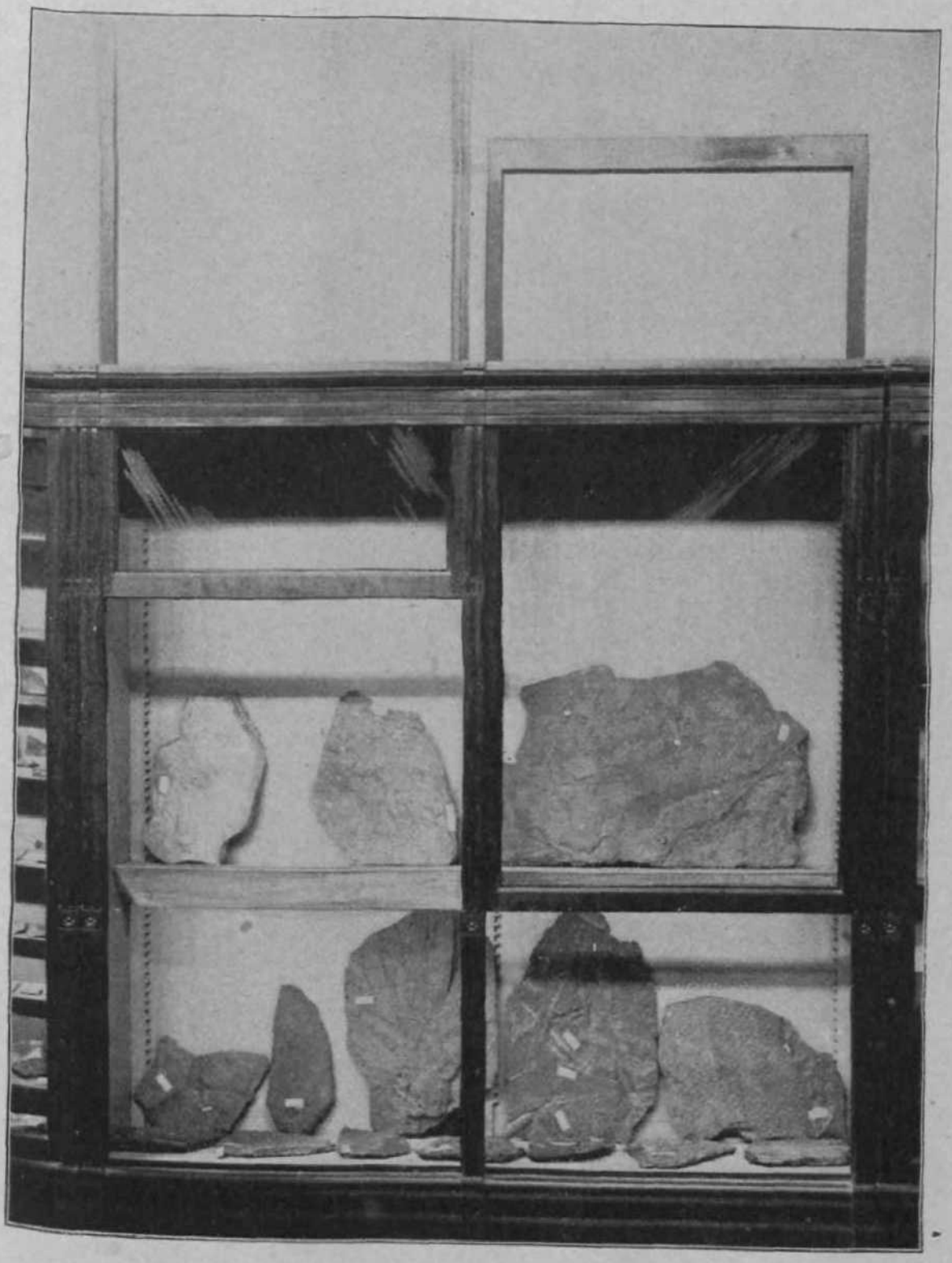
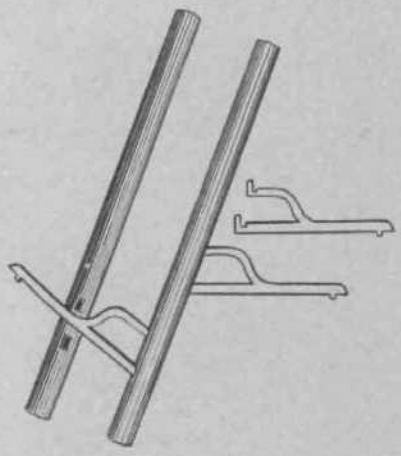
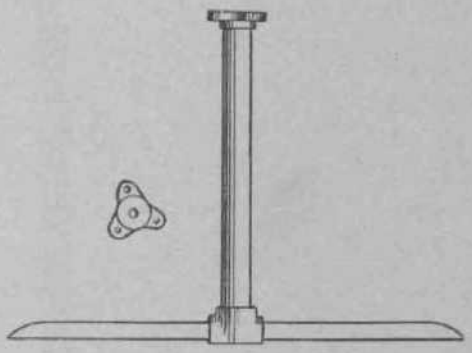
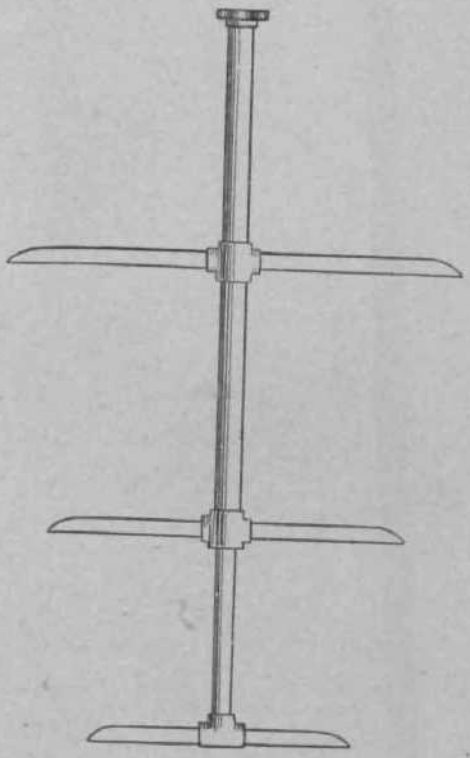


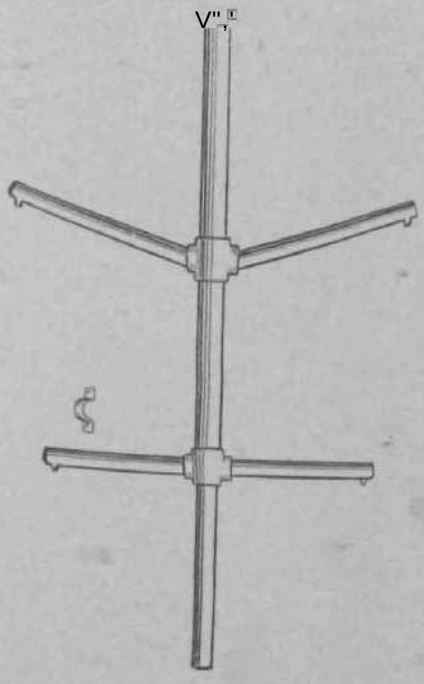
CASE FOR PALEONTOLOGICAL SPECIMENS, WJTH SUSPENDED DOOR
SI/.-..I' -1,1- In floor, *t&i by* KT; H..ches.

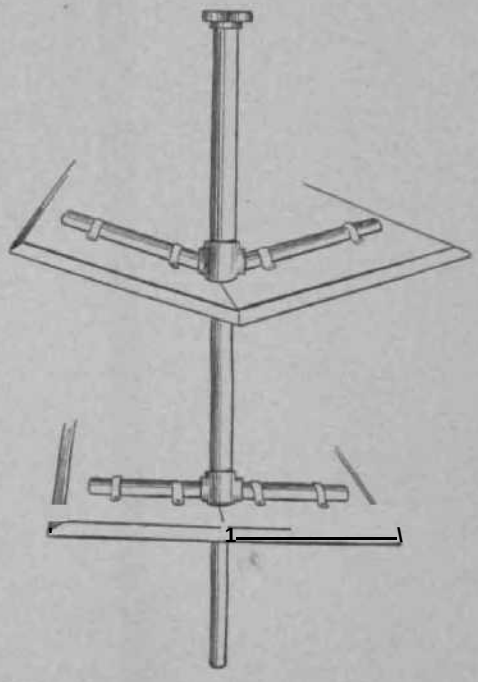
CASE OF PLATS GLASS WITH MOLDINGS REDUCED TO MINIMUM OF POSSIBILITY.
Size of (jlasA IT hy 44 inches.











BRACKET SUPPORTS.

(See p J5.)

Some cases have been made in which corner pieces of wood or metal have been entirely dispensed with, as in that containing the reproduction of the Bryant Memorial Vase (PL 5). This ingenious method requires mechanical skill of the highest quality, and the expense is so great that it is only justifiable in the case of very precious objects which require to be hermetically sealed. The cost of this special receptacle was $395. It is the most expensive case, for its size, in this museum, and is an exceedingly beautiful piece of work.

In fitting cases with shelves the so-called " Gavit bracket," invented by Prof. Edward S. Morse, of thePeabody Museum, in Salem, which is supported upon racks secured to the side, of upright bars, in the back of the cases, has always been thoroughly satisfactory. In some instances where heavy objects, like minerals, are to be shelved and the question of protection against insects is not involved the " Jenks bracket," which fits with a triangular knob into an aperture of similar shape in a metal plate secured to the back of the case, has been substituted.

Another kind of bracket support which seems *to* have great possibilities is the invention of Mr. Henry Horan. It is constructed of iron pipe and is exceedingly light and strong. The essential features of this contrivance are shown in Plate 6.

The use of clear, strong colors for backgrounds is continued; the only changes having been in the direction of better and purer pigments. Many experiments have been made and the number of colors used have been reduced to two—a maroon corresponding to that customarily seen on the walls of art galleries, for large cases in brilliantly lighted halls where the installation is not crowded, and a light, warm buff, somewhat resembling in tint the Solenhofen lithographic stone, but somewhat warmer, iu cases and halls where specimens are crowded or where much light is for any reason desirable. This luminous butt" is also used very largely upon ceilings and the upper parts of walls, while the maroon is used on walls up *to* the *level* of the tops of the cases, harmonizing admirably with the mahogany furniture. Glass shelves are used when possible, even in cases for natural history objects.

The influence of the National Museum system of case construction and labeling was manifest every where throughout the American exhibits ut the World's Fair, particularly in the Government building, the Liberal Arts building, the Fisheries building (where Norway also had in part adopted our style), the Woman's building, some of the State buildings, and particularly in the exhibit of the Pennsylvania Kaiiroad, where our cases and labels were adopted under the direction of one of our curators.

Storage cases.—A modification of the English form of sliding mechanism, by means of which drawers of different depths are used interchangeably throughout a long series of storage cases, has been iu use in the Museum since 1882. At least 30,000 of the standard drawers, 24 by 30 inches, are iu use for the reception of minerals, fossils, aud zoo-

logical specimens of all kinds, as well as in the departments of ethnology and archeology.

Besides these there are over 10,000 unit boxes fitted with glass fronts, which also, when necessary, are worked into the same system.

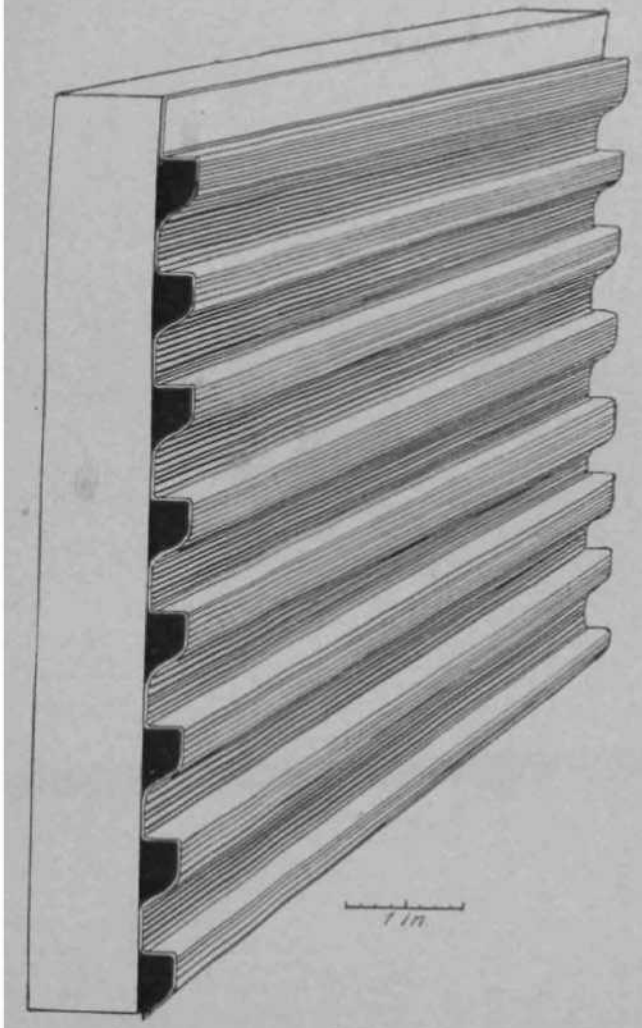
The storage 'case, from which the idea was originally taken, was, I believe, first invented by Prof. Strickland, of Cambridge, Eugland, and afterwards modi tied by Mr. Osbert Salvin. As at first constructed in the National Museum, the sliding strips in the storage cases were triangular pieces of hard wood, 1 inch in width and one-half inch wide at the top, sloping to one-eighth inch at the bottom. (PI. 7, fig. 3.) These were nailed horizontally close together upon each side of the case, while in the grooves thus formed were received the corresponding strips nailed upon the two sides of each drawer—strips originally of the same size but trimmed slightly in order that they might run smoothly.

The top, or thin edge, of the slide-strip was always placed 1 inch below the top of the unit drawer, or 2 inches below the top of the glass-covered unit box, and since the depth of these unit drawers and unit boxes was always an even number of inches, a drawer of any depth could be used, from 2 to 14 inches, and a corresponding drawer of any depth could be placed above or below it. Any compartment could thus be filled with unit drawers of any desired depth.

The first.iinprovement in this mechanism grew out of the desire to secure still greater tightness. The interior of the compartment was lined with zinc, and the strips were nailed on the inside of the zinc. This proved objectionable on account of the nail-holes.

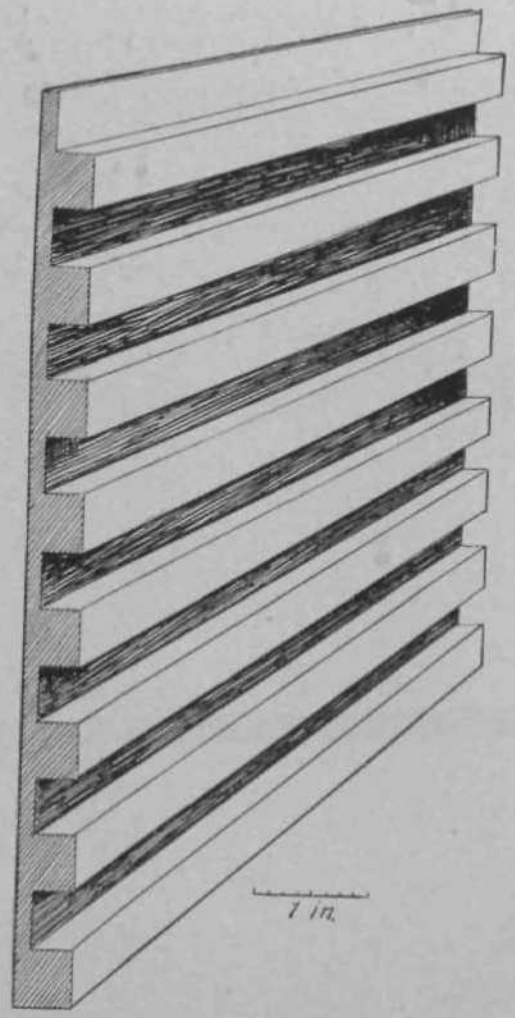
The next step was to make the slide-strips at the sides also of metal, and to accomplish this many experiments were tried, and finally arrangements were made with a firm in Philadelphia engaged in manufacturing corrugated iron. It was necessary for the Museum to have especially constructed a set of dies and rolls for rolling the metal into the desired shape (PI. 7, fig. 1), and also to import Florence tin of extraordinary thickness, the kind ordinarily used in the [Juited States not being sufficiently strong. This experiment proved satisfactory, and 150 cases of this type have been for four years in use in the Museum, and have stood the test of wear. The only objections arise from the slight roughness where the sheets of tin are joined together, which is not serious, and the fact that the outer ends of the metal ridges, which were of course hollow, had a tendency to bend when the drawers were drawn so far as to make a strong leverage upon the points. This, however, has been satisfactorily remedied by the use of triangular plugs of hard wood, technically called "dutchnipii," which an* driven into the openings.

Out of these experiments still another lunuoi storage case resulted, in which the metal was placed outside of the woodwork instead of inside, being soldered upon the outside of a substantial framework of wood, while the strips upon the inside were of wood arranged in a new way.



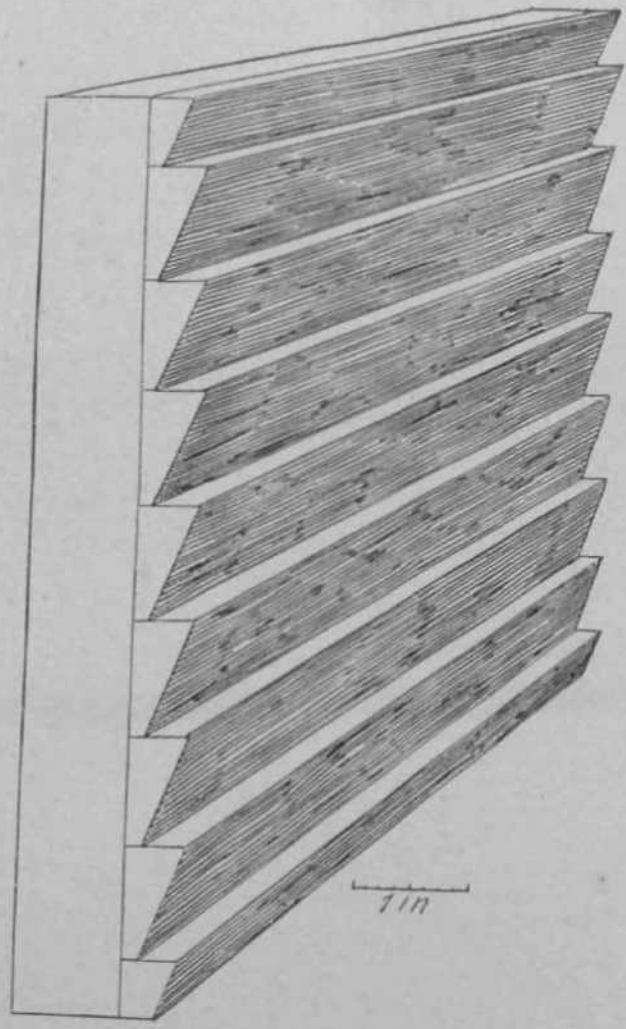
1

Fig. 1. Metal runners.



2

Fig. *a.* Urooved strips.



3

Fig. 3. Triangular strips.

SLIDING STRJPS TO SUPPORT UNIT DRAWERS IN UNIT TABLE-CASES

Instead of separate triangular strips, 8-iuck boards of oak or ash, one-half inch in thickness, are glued and nailed close together iipon the sides of these strips. In these boards are worked at intervals of every half inch grooves one-half inch in width and about one-half inch in depth. (PI. 7, fig. 2.) The sides of the case are thus provided with a series of parallel, horizontal grooves separated by half-inch bars, which represent the triangular strips formerly described. To correspond to these grooves a new device is employed for the support of the trays. Instead of the strip which was formerly nailed at the side, the lower edge of the tray projects with a triangular section beyond the plane of the sides, as shown in the diagram. (PL 8, fig. 1.) This device is applicable to light drawers not over 4 inches in depth. The drawer of the old type, however, works advantageously in the same groove.

In both the metal-lined and metal-covered cases, as just described, a very effective means of closing the front is secured by the use of rubber tubing fastened in a groove in the zinc-covered front edges of the opening, against which a solid wooden door is firmly pressed by means of a special form of combined bolt and lock, as shown in the accompanying sketch.* (Fig. 1.)

Many improvements have been made in the paM UMI y^ars, not only in the sliding mechanism, but also in the methods of making the cases moth and dust-proof.

One moth-proof case is a modification of the form originally devised by Mr. William Brewster, of Cambridge, Mass.

The most perfect example of the mothproof case which has been produced, is one especially modified from designs by Mr. J. S. Goldsmith, for the reception of the type specimens in the mammal collection. This case contains 8 drawers, 3 by 4 feet. Most of the drawers are 2 inches deep, but others of any required depth can be used. The drawers are of pine and have a solid wooden bottom, although one of three-ply veneer would doubtless be an improvement. The system of construction i* that already described, with grooved wodden boards inside of a zinc cover. The drawers are provided with the ordinary triangular slide-strips. The frame of the case which supports the slide-racks inside is covered with zinc outside, and is of pine 3 inches wide and seven-eighths °f an inch thick. The frame is covered with sheet-zinc, weighing 16 ounces to the square yard. The zinc-covered case, which is 38 inches long, 5i inches wide, 31 j inches high, is then placed in a case of hard ^ood, whose dimensions in the clear inside are 2 inches longer and li ilJches higher than the case, which, when pushed into place, fits against f^e back of the wooden case—the front edge of which projects about 3£ toches beyond the outer edge»of the zinc case—but is separated by seven-eighths of an inch from its sides, bottom, and top. This space is filled V pine strips, 3 inches in width and seven-eighths of an inch in thick-

*The text figures have been grouped into plates, following Plate 57.

iiess, which are necessary for use in connection with the device for dust-proofing.

The device for dust-proofing is dependent upon a double door and a double system of rubber tubing. The system by which the double doors are made is shown in the accompanying sketch (Fig. 2). These doors are separated by an air space of 2 inches. The inner one is of soft wood, paneled, and lined with zinc. The outer one is of hard wood, paneled. The pressure against tbe rubber tubing, which is necessary for absolute tightness, is secured by three sets of stubs and plates, at the bottom (Fig. 3), and by two bolts, one in each corner above. These are so shaped that, when pressed, they have the effect of wedges (Fig. 4).

The outer door has the same system of stubs and plates, and a rod lock of the ordinary type, fitted with a Yale key for the greater security of the precious contents.

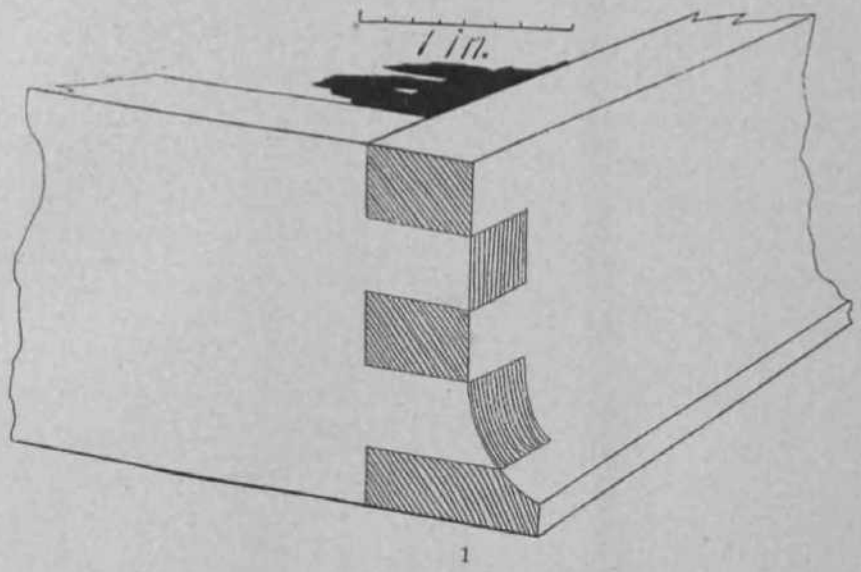
This case has been used for some months and has proved thoroughly satisfactory, being practically air-tight, while its construction is such that it will doubtless be as good fifty years hence as it is now.

Improvements have also been effected in tbe construction of the unit drawers. At first these were joined at the corners by dovetailing. This proved unsatisfactory, and the device of "fingering" was substituted. (PI. 8, fig. 2.) Tbe fingered corners have been secured in two ways, one by wooden dowels, the other by the ordinary process of gluing. The doweled trays were exceedingly strong and satisfactory, but it has been more convenient to use the other method and this is now exclusively employed.

The bottoms, which are inserted in grooves about a quarter of an inch from the bottom of the tray, are of three kinds:

(1) Of pineor of poplar, seven-eighths of an inch in thickness, for the minerals and heavy specimens and three-eighths of an inch for light specimens.

(2) Of " three-ply veneer," such as is used for the seats of chairs and for the lining of cars and in other kinds of cabinetwork. These are made of three layers of very thin, straight-grained wood glued together, the central layer being of pine, the outer layers of ash, maple, or other hard wood. These layers are so adjusted that the grain of the center layer runs at right angles with that of the two outer layers. They are solidly glued together under heavy pressure, the thickness of the whole not exceeding a quarter of an inch. Although somewhat more expensive than the plain wooden bottoms, they are stronger and very much lighter and have the positive advantage of never cracking or shrinking. The plain bcttoms, it has been found, often shrink away from their attachments to the sides of the drawer, even when thoroughly kiln-dried lumber is used. Many thousands of "three-ply" bottoms are in use, and they have satisfactorily stood the test of hard use for ten years or more.



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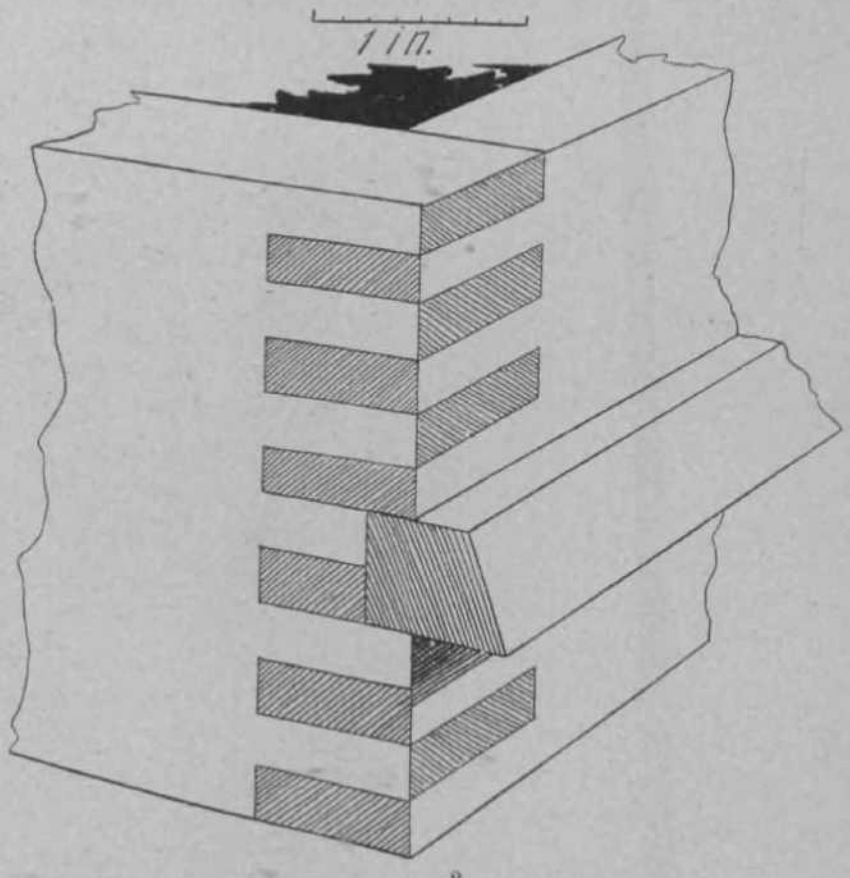

2

DETAILS OF CONSTRUCTION OF UNIT DRAWER.

Fig. I. Triftiifjular section of unit iimver.

Fig. B. "•"•"er sewn of fiiiKCTwU drawer. ahowInK triangular strip on side

(3) Of paper. This form ol bottom grew out ef the desire **for a lighter** and cheaper form **of** tray.* in **the early storage** cases **deep drawers were ased, chieflyfor reasons of eooriouiy,** ami **small pasteboard-bottomed** trays, tour of which **covered** (he bottom **of** a unit drawer, W(i<' **used** to contain **birdakina and other** small objects, **bhese being** piled one above another in several **layers.** This was **inconvenient** and **detrimental to the specimens,** and the **real desideratum proved to** be a **l%btshallow** drawer **of moderate eost,** in which **specimens** could be **stored in H. single layer.** It should **be said thai the old** system of deep **drawers was also** in **part the outgrowth** of the **necessity for making the** drawers **themselves dust and moth** proof. This was in **the da**ys before **air-tight** cases **had been developed,** and skins **of birds** and **mammals were kept m glass-covered boxes, similar to the** unit **box.** The **development of the** light paper-bottom **tray was** simultaneous **with thai** °*t* the **moth-proof ca**se.

In the Bearcb for a **light** and **doraNe** drawer **of** this kind **many** e**xperiment8 were** made. The **ftrsi stage** was **thai of binders'** board. **then followed tin, then tight three-ply veneering, bheii wire-gaaze cov* Bred with** paper, **then** cotton cloth painted, then **cotton cloth covered** wifh **paper,** and **finally the** bottom made oi[1] paper alone. **These bottoms are** made only in the **Museum** workshops, it never **having been found possible to gel a contractor sufficiently carefa!** to furnish **satisfactory drawers.** Tlie materials **nsed** and **the process employed are as** follows:

Material*.—(1) Brown maniht **paper, L50** pounds **to** the ream. The **size of each sheet (from which two bottoms** are **made)** is in by 48 inches j C-) **common flour paste; (3)** brown shellac **of** commerce, dissolved **in aleohoL**

Tools.—The **tools** arc **a** bookbinder's knife, **abroad, fiat** paste brush, ;i s tont wooden **stretcher,** 27 **by 33** inches, **which is** the size **of** the **bot**-"Hi **before** it **is** trimmed. This stretcher is of **pine,** at least 1£ inches '•' thickness, in order to resist **the** strain of **the shrinkage of the paper *hen drying, There** should **be, of course, a considerable** number of **these stretchers (PL 0, *Qg. I),***

***The process.—A* sheet of** paper is pasted **to** the **large** wooden **stretcher,**

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* *This* size mid **estimated** t-cMt. •»(' iii.- trays with paper bottojtis **now** in **one** in the M**ttemn und of the strefr**hers **uted in mating** *x\w* **tmya** *&r&* here **indicated :**

Department in which used.	SJK,	estimated cost.
Ma ,,,,,,nix.	*Inthts.* Mby»	*Cents.* 25
Ornit Do	24 by 36	30
nologj	22 by 28	25
1 1 , .	,, ,, by 44½	30

Siz**set of stretchers for making trays w**>tii **paper bottoms: 27 by ;J3** inches, 29 by 4(1in**••li.'s. 27 by :t:! Lucbeaj and 81** *i>y W,-* **incbea.**

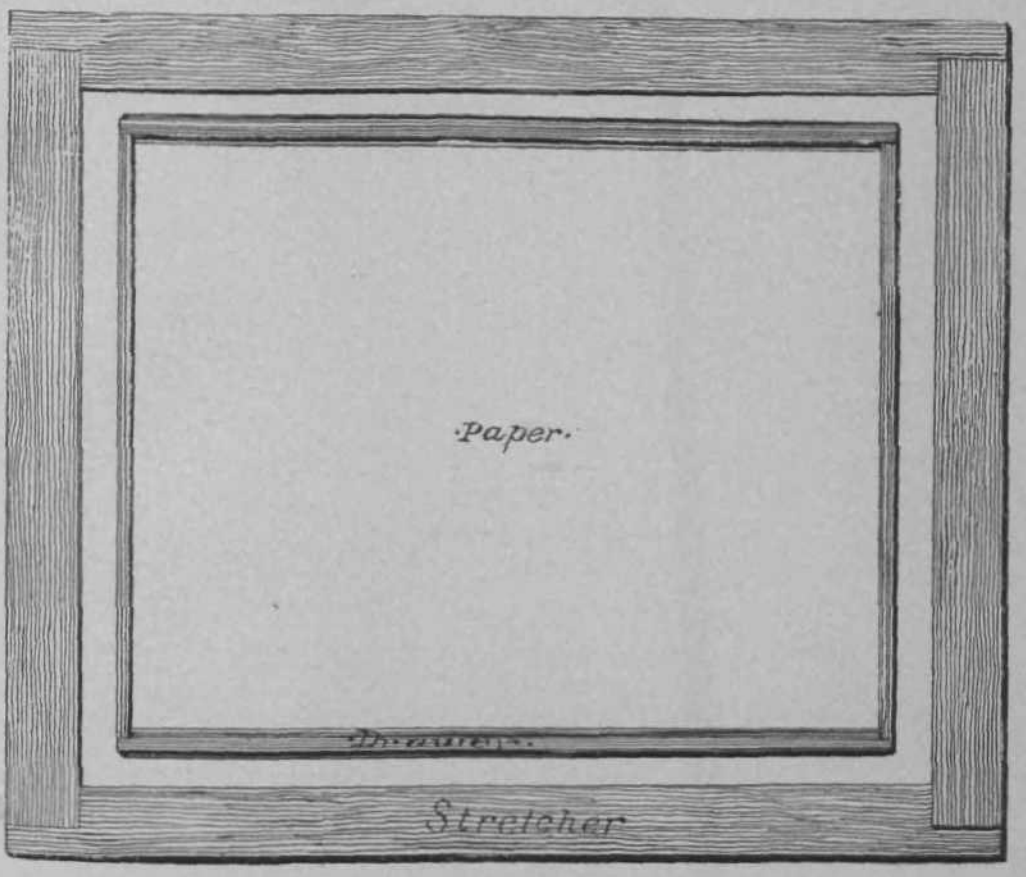
extreme care being taken to avoid wrinkling, and is then set aside to dry for a half hour or more. It is then taken up again, and another sheet is pasted to it, after which it is again set aside to dry. This is repeated until four or five thicknesses of paper have been joined together, five thicknesses being necessary for tbe heaviest drawers. Each sheet, before being pasted on, is thoroughly soaked in water. The combined sheets thus forming the bottom of the drawer are then allowed to dry for twelve to twenty-four hours, according to the moisture of the atmosphere. The inside of the bottom of the drawer is then thoroughly coated with shellac. Then, without removing the sheets of paper from the stretcher, they are tacked to the bottom of the frame of the drawer with 6-ounee Swedish tacks, placed about a quarter of an inch apart (PI. 9, fig. 2). Then another sheet of paper is pasted over, thus covering the heads of the tacks. This not only improves the appearance of the bottom, but prevents the tacks from drawing out. Then the bottom is also thoroughly shellacked, and the edges of the paper trimmed close to the edge of the drawer, which is then complete. The weight of the lightest 24 by 30-inch drawers for small bird skins, 2. inches in depth, is about 31i ounces, and the cost is about 25 cents.

The ordinary pine storage drawer, 3 inches in depth, costs on the average about 50 cents; a 4-inch drawer, 55 cents; a 5-inch drawer, 60 cents, and so on in proportion. This, of course, refers to prices where a large number of them are made by machinery at the same time.

Another feature in our cases, peculiar to this Museum, it is believed, is that every case, no matter how large, is placed upon rollers, or can be lifted from the floor on adjustable rollers of various forms. Even the long wall cases, 9 feet in height, which have been recently constructed, are made in sections, so that they can be moved without the assistance of carpenters.

The largest case in the Museum—that containing the group of buffaloes—is undoubtedly the largest movable show case in the world. It is 16 feet 6 inches by 12 feet 5j| inches by 11 feet 1£ inches in dimensions, and the weight of the case, with its contents, is about 9,300 pounds. This is supported on 10 rollers, which are of the kind used on the heaviest rolling platforms in warehouses, and are made of iron, the wheels being 4£ inches in diameter, with rims about 2 inches wide. They are of a pattern called the " auti-friction[7]' castors, the bearing of the axle being upon an arrangement of several wheels. This case can be readily moved from one end of the Museum to the other by eight men.

There are other cases almost as large, and still others—in the mineral hall—much heavier in proportion to their size. The mineral storage case, 8 feet 6 inches long, 4 feet 4 inches wide, and 3 feet 3 inches high, filled with unit drawers, loaded with minerals, has an estimated weight of 2,000 pounds. Such cases as these are supported on 4 or 6 anti-friction castors of the pattern and size just described, one at each corner, and can be moved by four men.



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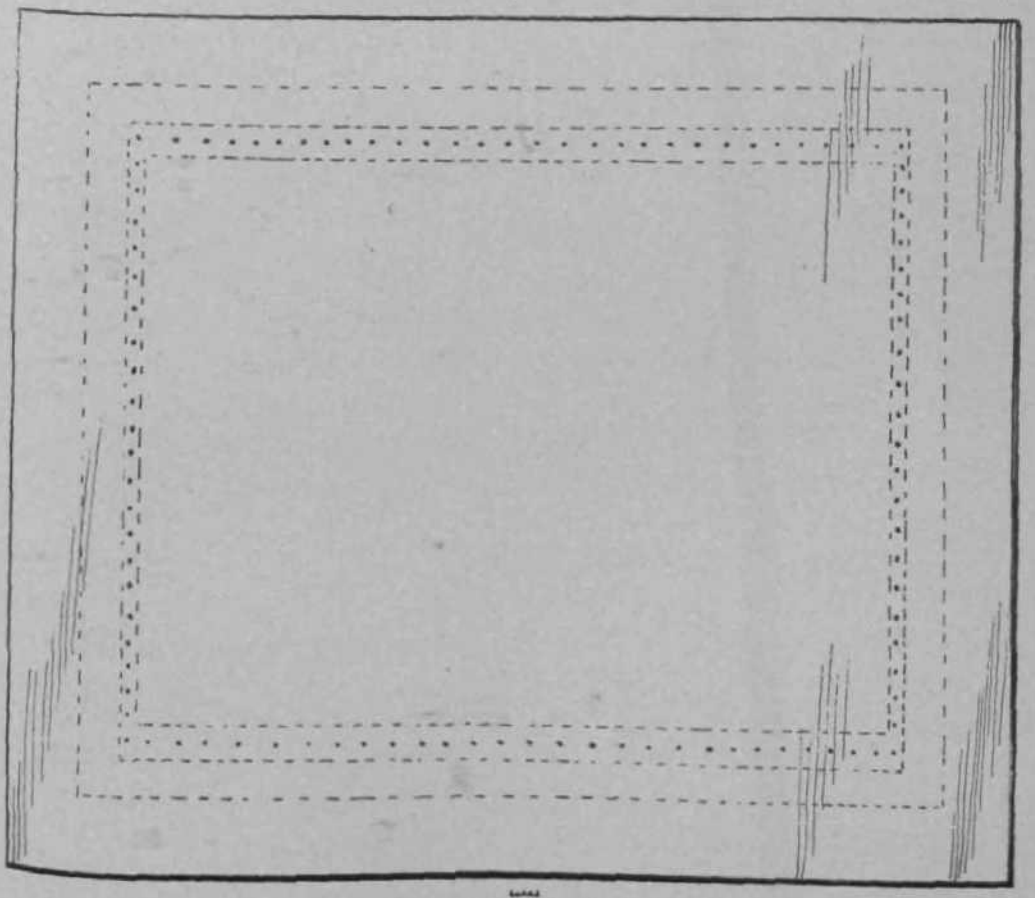


2

DETAILS OF CONSTRUCTION OF UNIT DRAWER WITH PAPER BOTTOM.

Fig. I. PtnestreteberHad d r * i w ffnmi rtew>

Fig. ••>. Tint- stretcher, showing paper tacked te drawer (back view).

The ordinary lighter type of exhibition case is not provided with independent rollers, but can be raised by wooden trucks with rubber tires about 44 inches in diameter, and movable in every direction, like furniture castors. There is an attachment of levers so TM*TMTMy adjusted that a case full of bottles can be moved from one end ot the building to the other without disturbing labels or specimens. . .

This system of trucks has been found of the greatest service in the exposition work, in which the Museum is often called upon to take part, since the cases can be arranged in-cold or bad weather in sheltered, warm rooms, and carried to their places on the floor. . . .

Another form of case especially advantageous lor exhibition ^ is what is called the « knockdown » case' in which the part*j1aretot-ened together by pins and escutcheons, These oases have al the permanence and strength of fixed cases, and can be put toother and taken apart with great celerity.

MOUNTINGS FOK INDIVIDUAL SPECIMENS.

One of the most convenient and ingenious devices is that invented by Prof. Merrill for placing geological specimens, jars, ami other similar objects upon sloping shelves, in such a manner that both specimen and laoel shaU be easily seen, while at the same ^resting on a £e. surface; the objects are not in danger of sliding forwaid. This system is shown in the accompanying illustration. (*ig. u.)

In the plate referred to (PI. 10) the appearance of a numberof spec, mens thus arranged upon the shelves is shown, though .* otwell. The arrangement of this case is in many respects <>De of « ie „10S* satisfac-tory pieces of installation which has ever been effected m the National

M ITblock or tablet has tacked to its front a small strip of tin sq benta^"Live and hold the label and to allow Us ready^removal when desired. This is painted the same color as the bkrck, mnd " thereby rendered quite inconspicuous. To prevent the sliding of the specimens of the front row, which, in order to bring them below the level of those in the back row, are without blocks, a continuous strip of tin is tacked along the front edge of the shelf, bent as shown in the cut The full width of the Btrip is the average width of the labels, m tMs series Us abont one inch. The elevation of the back edge, which of the specimens, is from one-eighth to one-fourth inch, while the front edge is folded over just sumcient to hold the label in place, as b ore.

Among the Mother devices which have recently been adopted in the department of geology two may be mentioned:

The first is the curator's plan for showing the appearance of a cave by setting up in its natural position a miniature grotto, with diminutive stalactites and stalagmites, which he was so fortunate as to secure from the Marengo Cave, in Indiana (Pl. 11), placing at the sides of the

case mirrors by whose reflections the general effect of an extended miniature cave is produced. This is a very effective way of mounting exhibits, and the use of the mirrors seems to be an aid to the imagination of visitors, especially to young people who have never seen a cavern.

Another is for storing the great series of microscope slides of thin sections of rocks which belongs to this department. It is thus described by Prof. Merrill:

AH it happened, we had in stock a number of pasteboard boxes, some 93 mm. wide, 143 mm. long, and 48 mm. deep, all inside measurements. The dimensions of our standard slide are 48 by 28 mm. By means of two wooden partitions some 3 mm. thick, running lengthwise, each box was divided into three equal compartments, the partitions being held in place by glue reinforced by two small tacks at each end. Heavy manila wrapping paper, such as we also had in stock, was then cut into strips 25 mm. wide and as long as the sheet of paper would allow, in this case about 7 feet. These strips were then bent into a series of folds, as shown in the accompanying illustration, the apices being rounded, not pinched flat. If carefully done, the folds when crowded gently together act as a spring. Two of these folded strips were then placed lengthwise in each compartment, and the slides introduced., standing on end, between the folds at the top. A box as thus prepared readily holds 3 rows of DO slides in a row, or 150 altogether.

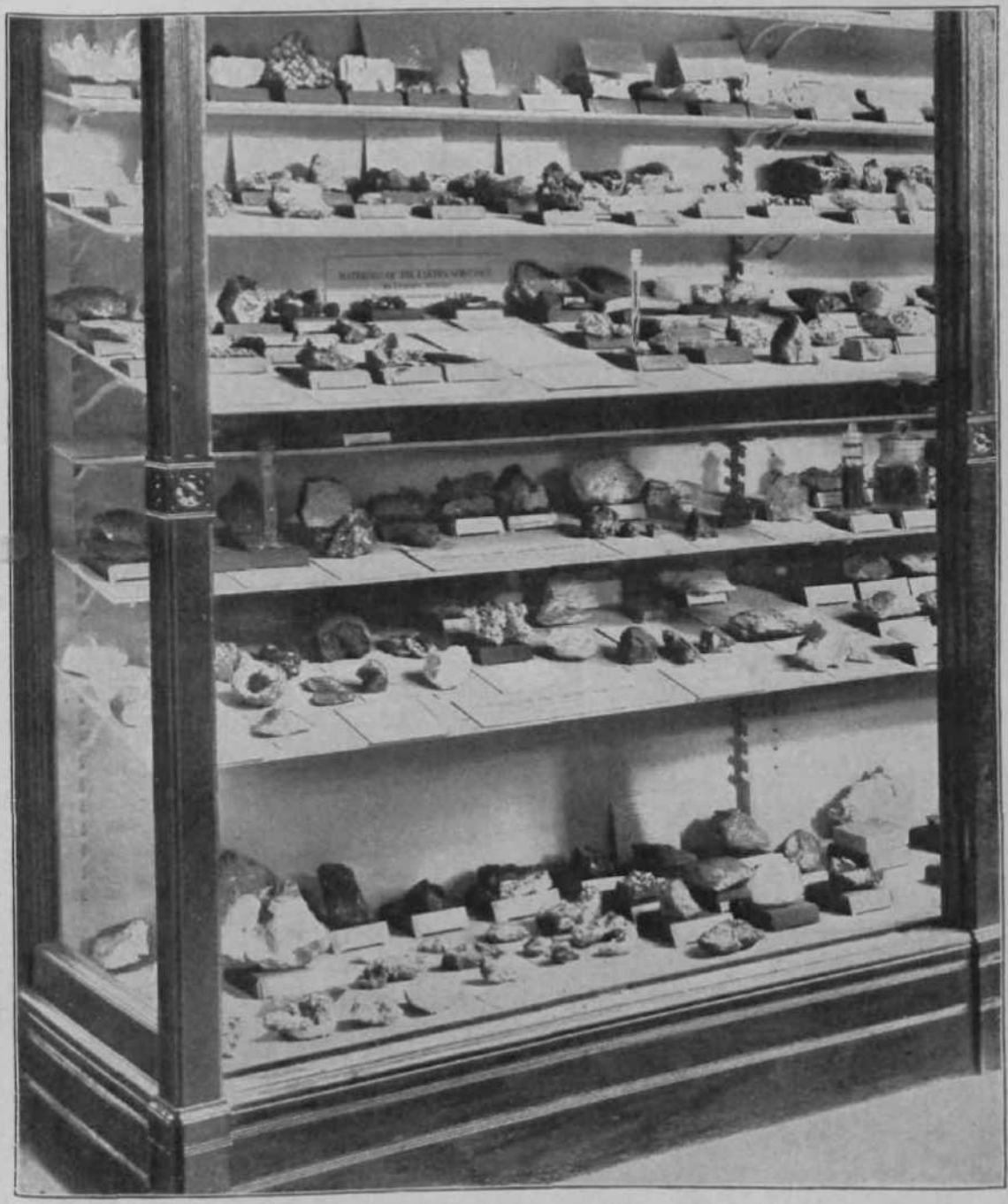
Each slide is separated from its neighbor in the same row by a double thickness of manila paper, which, owing to its manner of folding, acts as a spring, and avoids all possible danger o^breakage. When all the compartments are filled, the space between the tops of the slides in any row is but about 2 mm., but there is, nevertheless, no difficulty in removing a slide or in getting at it to read the label without removal, since, owing to the yielding nature of the paper, the top may be readily drawn apart. In this respect the box offers a great advantage over those with rigid compartments, such as are commonly in use. The first box was made merely as an experiment. It proved so satisfactory that, for the time being at least, it is the form adopted for storing the several thonsand slides forming the museum collections.

I have attempted to show the arrangement as above described in the accompanying drawing (Fig. 6). In reality the slides are held much more firmly than indicated, since the paper bulges and comes against both the front and back of the slides the full length of the fold, instead of merely at the bottom. It will very likely strike the reader that a better material than paper might be found. I can only state that after considerable experimenting the paper was, all things considered, found most satisfactory.*

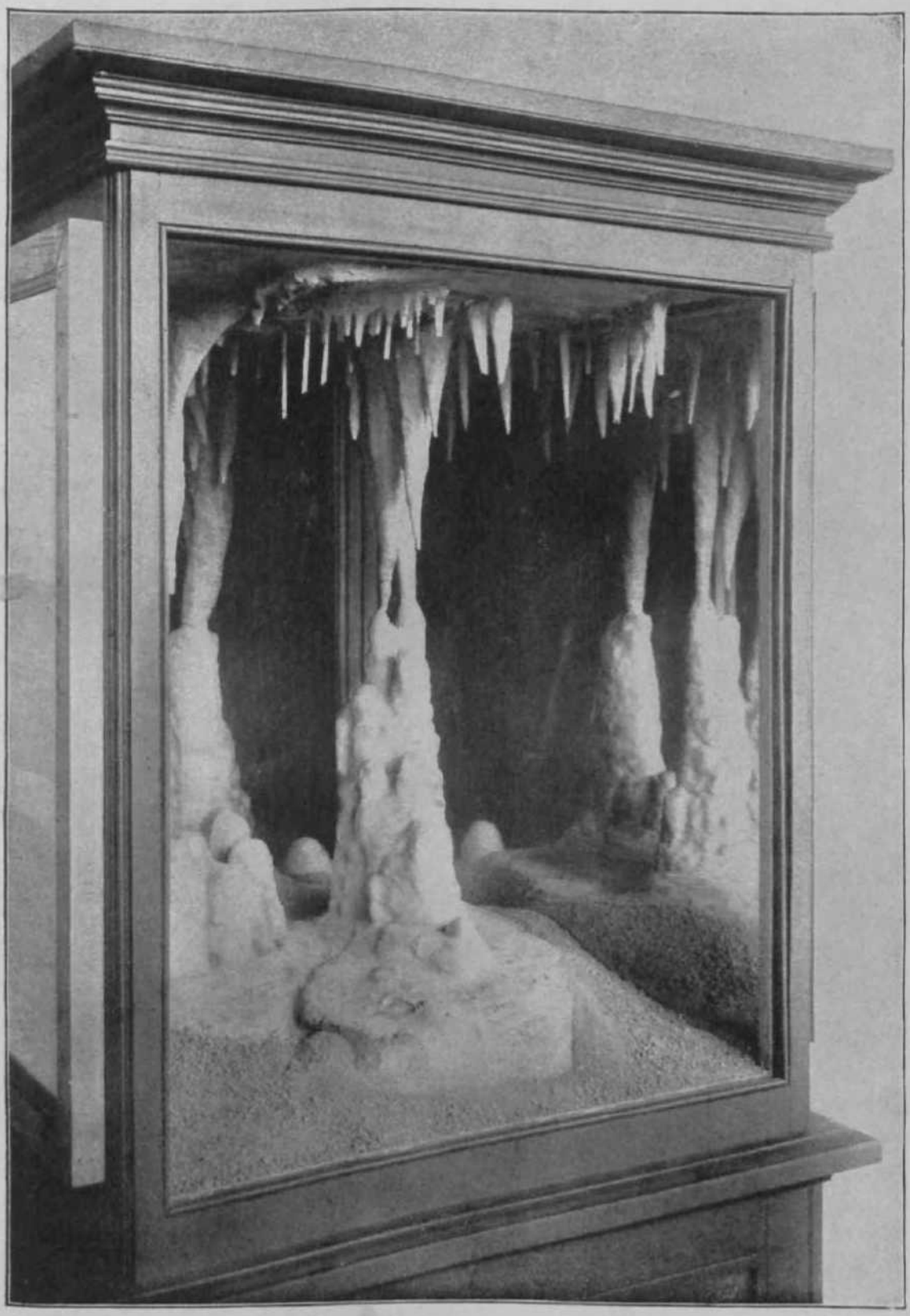
The adoption of unglazed tiles, instead of wooden or paper blocks* to support minerals, shells, and other small objects, is being considered, and experiments, the result of which will be announced later, are being made by Mr. Charles Schuchert, of the Paleontological Department. These tiles are rectangular, and of a soft buff' color, corresponding closely to one of the standard shades used in the interior of our cases.

A form of exhibition tray which has been in use for a number of years is provided with a bevel front of peculiar construction, as shown in the accompanying plate (PI. 12). These trays are covered with black binder's-board, and a piece of colored paper or fabric is placed on the bottom. This form of tray may replace the very objectionable

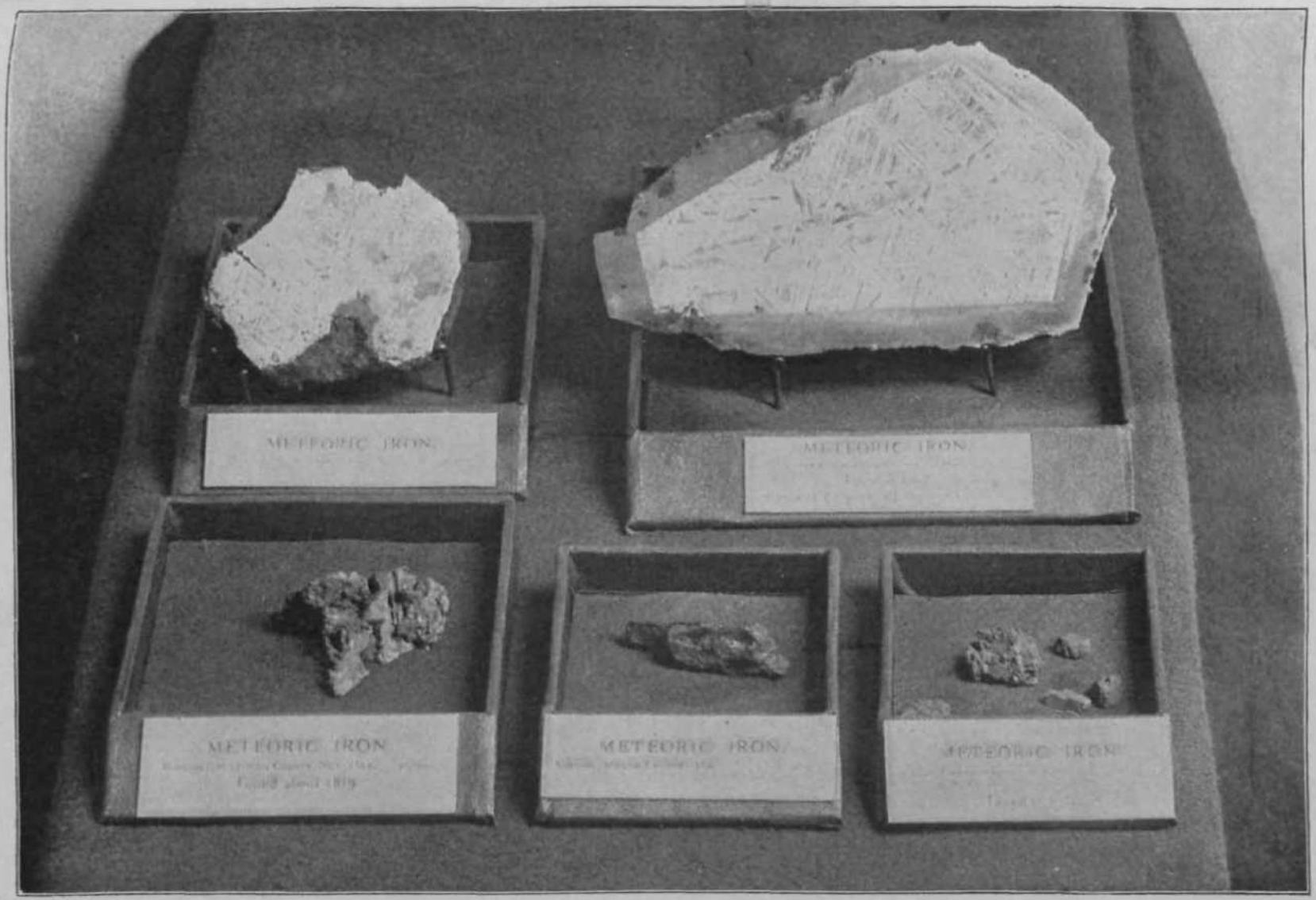
* This notice was printed in " Science/[1] November 25,1892.



ARRANGEMENT OF GEOLOGICAL SPECIMENS ON SLOPING SHELVES.



CASE OF STALACTITES, INSTALLED WITH MIRROR AT BACK.



BLACK PASTEBOARD TRAVS WHH LABEL-BEVELS.

and unsightly pasteboard tray, usually white, which is so often seen in collections of shells, minerals, and fossils. It is particularly well suited for coins and other single objects which it is desired to dignify by placing on a special mount with a pleasiiig back-ground.

The tray of sheet iron used in the Dresden Museum is much stronger than the pasteboard tray customarily used in other museums, and for large study collections is undoubtedly preferable, although less desirable for exhibition purposes.

For very precious objects, such as small bronzes, ivory carvings, and small examples of metal-work, which lie flat upon the shelves, or at the bottom of table case, our curators occasionally use cushions of maroon or dark blue plush, bound with silk cord; this, however, is a refinement in installation which is not recommended for use except in very special cases, as when it is desired to install a loan or gift collection very elaborately, or when the objects exhibited are of the greatest intrinsic worth. Such cushions may be used to excellent advantage on glass shelves.

EXHIBITION JARS.

The necessity for rectangular jars for the exhibition of alcoholic preparations has long been felt, and for many years our people have been in conference with the glass-blowers concerning them; but the difficulties in the way of securing satisfactory results seem almost insuperable.

The most desirable form of rectangular jar—one with a wide aperture of the "salt month" pattern—seems to be unobtainable. This is to be regretted, since a jar which can be closed with a circular ground-glass stopper is the most convenient for museum purposes. The plan of a round opening closed by a stopper was proposed, and experiments were made for improving the ordinary type of anatomical receptacle, long in use in this country as well as in Europe, in which the large opening at the top is closed by a flat*plate. Such receptacles as this have been used for a number of years in the Museum of Comparative Zoology and in the Army Medical Museum, and they have also long been in use in Europe, both for round and rectangular vessels.

A modification of this device, by Mr. James E. Benedict, is described as follows:

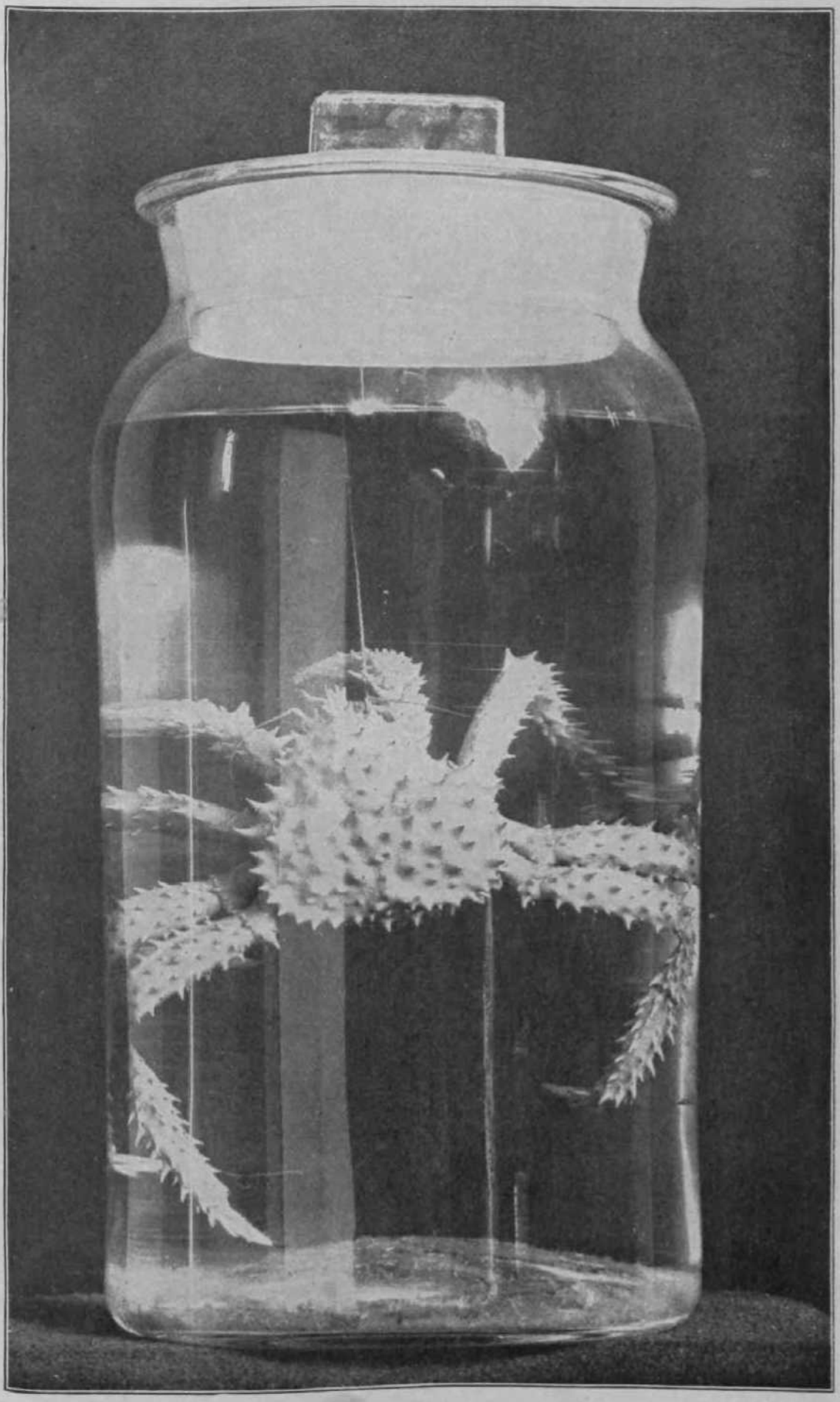
The lip is ground to a perfect plane, and the openiug, closed by a sheet of glass annotated with vaseliue, ia held in place by a cover which just completes the rectangular shape of the jar, its edges filling the shoulder, which is blown on the outer margin of the top of the jar, as shown in the accompanying diagram (Fig. 7). This cap is sufficiently heavy to hold the cover plate in place, and it takes the place of the unsightly mechanical clamps of the jar customarily used in museums for anatomical preparations. The arrangement is thoroughly satisfactory for exhibition purposes, and the cover being made

of common window glass, which is somewhat irregular in its surfaces, enough small openings occur around the edges for the escape of gases, so that the somewhat unsightly vent-hole, usually made in hermetically sealed jars to allow the escape of gas and the introduction of alcohol without removing the luting, is dispensed with.

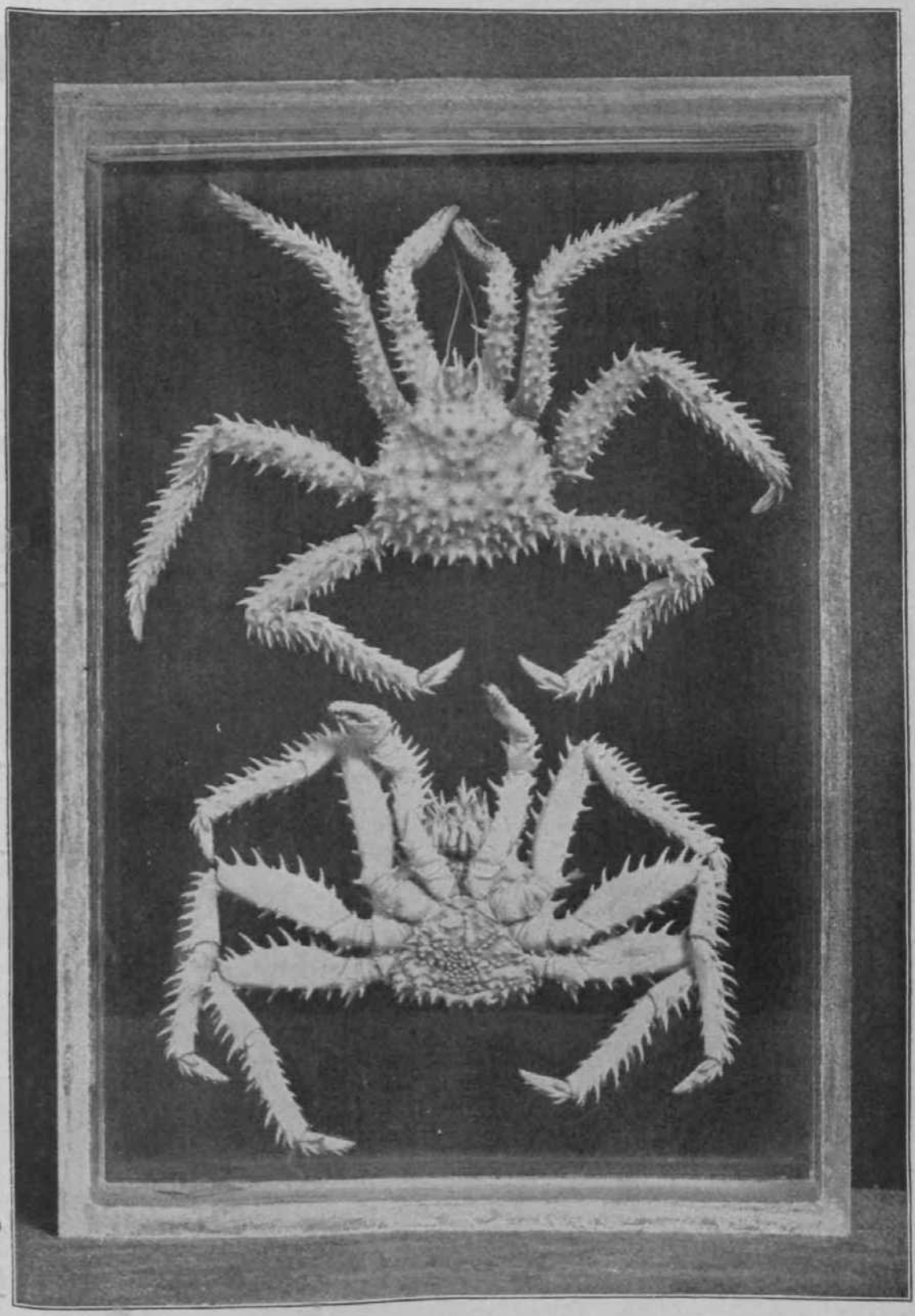
The most serious difficulty, however, has not been in regard to the cover, but rather in securing at the front of the jar a face sufficiently smooth and well polished to display the specimens clearly and without distortion. Some of the samples made for us by the glass manufacturers had this surface polished on the buffing wheel; but the grinding was not sufficient to remove the inequalities in the glass, and the corners, furthermore, are not rectangular, but rounded to such a degree as to cause some distortion of the specimens. Besides this, these are irregular and unsightly, and even to secure this imperfect result the glass is so thick that its transparency is somewhat impaired. This method of polishing the front surface of the receptacle has been used also in Europe. It is an alleviation but not a remedy for the evil, and, furthermore, is exceedingly expensive and beyond the reach of a museum which has to provide for a large number of wet preparations. Jars of this type, made in Edinburgh, are used in the Army Medical Museum in Washington. The cost of these jars, 9 by 12 inches, at the factory was about $105 a dozen. A firm in this country tried to produce jars somewhat similar, but was unable to make them at this price.

Every important factory in the United States which would undertake work of this class has been consulted, and Mr. Benedict was sent on a special mission to visit them and study in person the possibilities. He soon became satisfied that in the present state of the glass-blowing industry nothing more can be done with blown jars, and began investigations in another direction.

Experiments have been made by Mr. Benedict with a view to the possibility of building receptacles out of plate glass. Something of this kind had already been tried in Germany, with receptacles in metal frames, and constructed on the principle of an aquarium tank. The plan adopted here has been to dispense with entirely metal, and to use silicate cements which are insoluble in preservative fluids, and which unite so closely with the glass as to become, practically, a part of it. The recipes for these cements used are, unfortunately, the property of private individuals. In the process of manufacture the receptacles are exposed to a heat of 350° F. for several hours. It is impossible at the time of writing to say with certainty that these experiments have been successful, although one large jar has been filled with alcohol and specimens for eleven months and twelve others for six months. In jars of this particular form the top is made of two pieces of plate glass, the lower one being smaller, and so attached to the other as to form a shoulder all around; and the cover thus formed is luted to the opening



CYLINDRICAL JAR FOR PREPARATIONS IN SPIRITS, SHOWING DISTORTION DUE TO FORM OF JAR.



SQUARE JAR FOR WET PREPARATIONS, SHOWING ABSENCE OF DISTORTION.

with vaseline. The junction thus formed is so perfect that it is necessary to have a vent-hole in the top, though much smaller than is customary, it being only one-sixteenth of an inch in diameter. Jars made in this way, of the size already alluded to as costing more than $100 a dozen, can certainly be had for a little more than half the price and, if they prove permanent, will be in every respect better.

Photographs have been made from jars filled with alcohol and specimens, and the peculiarities of the two systems are shown without distortion or exaggeration in the accompanying plates (Pis. 13 and 14).

A small built-up jar, made in Germany, has been in use in the Army Medical Museum and elsewhere as an accessory to the microscope. These jars will hold all liquids and acids used in microscopic work, and careful examination shows that the cement used is subjected to a vitrifying heat. The use of hot water in the jars breaks them in the corners, which make natural lines of cleavage. Just how large a jar can be made in this way we have no information, but some of the experiments tried by us demonstrate that they are not as reliable as those made with cemented corners.

A convenient way of mounting specimens for the rectangular jars is shown in fig. 8. The fish or other object to be mounted is fastened to a pane of common window glass by means of threads passed through the object, ordinarily by the use of a surgeon's needle. These are drawn through holes bored in the glass at the proper places, and fastened by breaking off a soft wooden peg in the hole, biting and fastening the thread in place. The holes are readily bored by aid of a solution of turpentine and camphor used as a lubricant, and a small file as a drill, held in a small drilling machine. Any jeweler's supply store can furnish the requisite material.

THE PREPARATION OF LABELS.

The preparation of labels is one of the most difficult tasks of the museum man. The selection of the descriptive matter to be printed requires the best of judgment and the widest and most accurate information; while to determine the form and size of the different labels in a series, and to secure the best typographic effect, is equally difficult, and requires abilities of quite a different order.

A label may contain a vast amount of exact and valuable information, and yet, by reason of faulty literary and typographic arrangement, have as little significance and value as a piece of blank paper.

Before a specialist is prepared to label a collection he must be a complete master of the subject which the collection is intended to illustrate. After he has written the series of labels, if the collection is complete, he will have the material under control which would enable him to write a very complete book of reference upon the subject.

No task is more exacting than label writing. Not only is it impossible to conceal any lack of precise knowledge, but the information must

be conveyed in a terse, concise, and definite phraseology, such as is ttoi demanded in any other class of writing, unless it may be the preparation of definitions for a dictionary. He who writes definitions 6r a dictionary, however, baa usually the advantage of haying before him numerous other definitions of the same term, which he needs only to ci.liate and rearrange. A good descriptive label, furthermore, should do something more than impart information. It should be so phra sed as to excite the interest of the person who is examining the specimen to which it is attached; to eall his intention to the points which it is moat important that he should observe.; to give him the informal ion which lie most needs while looking at the specimen, and to refer him !« the books by means of which lie ran. if s.i disposed, Irani all that is known upon the subject illustrated.

The labels describing the specimens in ;i collection are intended to take-, the place of the curator of the. collection when ir is impossible 6M him to personally exhibit tin- i bjects and explain their meaning. When collections were small and visitors were tew, the curator or owner of a cabinet was accustomed, in person, to conduct -w-itojs among the msrs. to take the specimens in his hand, to tell their names ami where they came from, to indicate features of special interest, and to answer <jiiestion>.

This was in some respects an ideal way, when tin* curator was a man of wide knowledge ami BO much of an enthusiast that he took pleasure in talking without limit. The method was not without <1 fects, how-rvti, since the lecturer (for such h*[1] wa>. to fact) selected tin- exhibition a limited number of objects which interested him, or which he supposed might interest the visitors, and gave the latter no chance for selection. Furthermore, the arrangement could not be such as to oon-\ey ;t sequence of ideas, such as a selected ami well labeled series of specimens can do. and the spoken descriptions, being as a rule full of unfamiliar words, were not remembered. The printed label of to-day may be read over again and again, and is often copied into the visitor's note book. Again, under the old system, examining a eollectkm i as looked upon rather in the light of amusement than of study, and what might have been possible in the way of instruction was rarely attempted.

In these days, when the curator attempts verbal instruction, it is by means of a lecture delivered in the Museum lecture hall. or. if a tloor-lecture. among tb- cases, surrounded bj scor 88 or hundreds of auditors, who may either take notes or And the substance of the lecture in some syllabus or printed text-book.

While one visitor might listen to the Museum li ctures, tens of thousands pass through the halls without a guide. They must depend entirely upon the labels for information; for guidebooks. If such have been printed, are rarely bought, still more* rarely nseH in the presence of the specimens, and. though often taken home with the Intention of

studying them, art only hi the rarest instances ever opened after their purchaser has left the fcTnseum,

The function of the label, then, ta ;i most important one, since it is practically only through the aid •f the labels that visitors derive any benefit whatever from ;> visit to a museum.

What has already been said indicates to a general way t U** ofB ce of the descriptive label, and may be expressed more concisely as fol ows:

The label must—

(1) Tell the name of fcheobjed : Its exact and technical name ahvays, and if there be one, its common name.

(!• It most eaU attention to the features which it is important for the visitor to noti ce.

(3) It must explain its meaning audits relations to the other objects ni riie series. If it accompanies a natural history specimen, it should explain its geographical distribution, which, it' possible, should be plotted on a .small map, forming part of tin- label, and mentioning peculiarities of structure <>r habit.*

If an ethnological object, then its ages anil construction should be explained, its materials named if tiny are not ObviOUS, ami >upp!e inciitary information gives by means of pictures : and, where pictun es are better than ivords, these n 183 be substituted.

(4) Tin.' exact locality, date of collection, ami source of the specimen extorted should be mentioned.

(5•: For the conyenienee of visitors it is well, in many i ases, to give the dimensions or weight of tin- specimen.

Tli: art of i label writing is in its infancy, and there are doubtless \possibiliti es of e(rucatkmal results through the agency of labels an d specimenswhicli arc nut s yet at a id understood. It is clear, however, thai the advice <>\ the uegro cook in regard to making soap applies equally well to a good label; to wit, that much more depends on what you leave out thau mi what yon pm in. The value of this method of instruction is perhaps better understood by the most advanced writer* of sclmo! text books and dictionaries tlian even by tiie average museum worker.

lit Dr. Edward Eggleaton'a new "School History of the doited Stafo s," eugravings are plentifully interspersed through the text. A< well as in the margins,—portraits, pictures of historical localities, building s, costiuues. and arohffiological o jec and each of these lias a label of the museum type, surrounded by rules, ami separated from tin text vjth which it tias usually only incidental relationship. T!e orig Inals which arc thus iliustrated, if brought toget MT would make an admirable

* We have used in the National Museum, in years gone by, labels of different colors to indicate geog; i].tii.-:i! ^nrc«i, and have also used for the s;iiiiit· purpose [abeb wall printed border* of tliff<:ent colors. This, however, hu Id g since been aban'Iuiicll :i>* cumbersome and impracticable. In most cases a word upon the label is sufficieni to convey this idea. Hut wliei, it is desired to convey fi lUeriafoi mation, a l»:ljt lliils great possibilities, for even the exact range of each species may be shown in lliis w»\ without materially increasing the size of the labels.

museum of American history, and the book itself could hardly be improved upon as a handbook to such a collection.

The modern illustrated dictionary owes much of its success to the adoption of museum methods, due, perhaps, to the fact that so many men, trained in museum work, have been engaged upon the preparation of the latest American publications of this kind, the Century Dictionary and the more recently published Standard Dictionary. These works impart instruction by methods very similar to those in use in museums, except that they arc placed much at a disadvantage by reason of their alphabetical arrangement.

There is, of course, one respect in which the museum exhibition-case lias the advantage over the lecturer, who can only present one subject at a time, or over the writer of books, who is prevented by the size of his pages from bringing a large number of ideas into view at once. This difficulty has been in part overcome by the editor of the Standard Dictionary, in the large plates, where are shown, in one case all the principal varieties of precious stones; in another plate, all the races of the domesticated dog, and in another, the badges of orders of chivalry. Even this, however, is far from reaching the possibility possessed by the Museum (with its broad expanses of exhibition cases) of showing a large number of objects so arranged as to exhibit their mutual relationship, and so labeled as to explain the method of their arrangement.

As has already been said, the size and typography of the label are of the greatest importance. The best written label may be ruined by the printer. Not only must the letters be large enough to be legible from the customary point of view, but the type must be pleasing in form, and so arranged as to lead the eye of the reader with pleasure from one line to another, and so broken into paragraphs as to serrate from each other the topics discussed.

Furthermore, a system of subordinate sizes of type is essential, so that the most important facts will first meet the eye. In many of the labels shown in the accompanying illustrations type of four or five different sizes is used, the largest giving the name of the object, the next size the name of locality and donor, the next its distribution, and so on, much in the order of importance of the topics already proposed, while the least essential illustrative matter at the bottom of the label is placed in the smallest type. The theory is that the largest type should give the information desired by the greatest number of visitors—by every one; the next size, that needed by those who are studying the collection in a more leisurely way, and so on.

Too much can not be said of the necessity of breaking the descriptive matter into short paragraphs, which should never be more than half a square in length. Where a label of great width is printed, it is our experience that it is better to arrange the matter in two columns, as is shown in one of the accompanying plates, rather than to weary the eye by requiring it to follow back and fro across the card.

Family CHINCHILLID/E
The Chinchillas

\r AKCiE or moderate-sized rodents, with clong;iitd ^ hind legs, bushy 4ai]s, and lofig and extremely fine fur.

The family includes three genera, each tfith a single species-the[1] chinchilla, prized for its fur, I!K-viscacha, one of the most characteristic animtils of the Smith American pampas, nnd a third species, Cuvier's chinchilla

The common chinchilla .in<1 Cuvier's chinchilla inhabit the Andes ol Peru and Chili. The viscacha digs extensive burrows on the pampas.

THE GREAT AUK

Plautus impennis (LINNI-:)

FUNK ISLAND. OFF THE (.OAST OF NEWFOUNDLAND. 18.117

Collected by F. A. LUCAS.

The Great Auk was formerly common on the coast of Iceland, and found in vast numbers off the coast of Newfoundland, especially at Funk Island.

It formed an important article of food for the early navigators and fishermen. Being incapable of flight it was easily captured on land and was taken in great numbers at its breeding places. Systematic slaughter of the bird for its flesh and feathers caused the extermination of the Great Auk about 18+0.

(This skeleton is composed of bones from various individual)

COVER FOR COFFIN OR ALTAR.
Made in the iSth century; used in the Russian Church.

PROVINCE OF EKATEKINENBOIIRG, URAL MOUNTAINS, ASIATIC RUSSIA. 134,78+.

Collected hy Mr. GEO. F. KUNZ.

FOX TRAP (MODEL).—Wood, with cord ot vegetable fiber or sinew.

Length, i L ins. Breadth, 4 ins. Height, 5^ ins.

BRISTOL BAY, ALASKA, 1882. 55,879.

Collected by CHAS. L. MCKAY.

Used by* Tinneh Indians. Consists of a stake-pen dosed at one end by a net, in which the fox, **becoming** entangled and caught, is killed by the hunter who watches from "blind."

TOBACCO POUCH.—Made of small, various colored glass beads closely woven in a regular geometric pattern, fringe of similar beads strung on v arie'gated worsteds. Suspended from neck by a cord.

Uength, **including** frinye, 5Ml ins. Width, 5 m .

KHU1LCHAN INDIANS. ALASKA. 1881. 72,841.

(iift of IVAN **PETROFF.**

This pouch came from the Khuilchan (dfhabusAan) tribe of tlic interior *of* Alaska: this tribe has no connection wiih the sea save through the Atwah, or Copper River, natives, from one of whom il was'procured in 1881, at Huchck, Prince William Sound.

GROUP OF

ORANG UTANSORMIAS.

SIMIA SATYRUS, LINNH.

DISTRIBOTIOK: BORNEO AND **EASTERN SUMATRA**

This group represents a scene among **the** trees of a Bornean forest, at a height of about thirty **feet** from the ground.

The group consists of the following **individuals:**

Two adult male Orangs (13,962-63}, represented as righting in their characteristic manner.

An adult female (1 31965) escaping from her nest, **with** a nursing babe (1 3,92 1) about eight months old, clinging to her body in the position usually adopted when the mother is traveling.

A young male of two years (13,964), represented as aroused trom sleep and lucking down trom his nest.

These specimens **were** obtained on the Sadong River, Sarawak Territory, Borneo, **in** September and October, 1878, by the naturalists of an expedition sent to the East Indies by Professor Henry A. Ward.

MOUNTED BY WILLIAM T. HOKNADAY.

SUN BEAR.

HELARCTOS EURTSPILOS, HORSF.

Malay Peninsula, Java, **Borneo,** Sumatra.

'4.332.

Gift of BARNUM, BAILEY AND **HCTCHINSON.**

SPECIMEN FORMS OF LABELS.

CORNELIUS VANDERBILT.

Cnpin to **brnue of the** gnM mcibJ awn tied *by* att of Ccmgre't January **28, *iii>4,* to Cornt hut Vamfteihilt " for his unmue man iff station of a fi-rvid .md large vmleil paLrioiUm in pc*cnlin£ a* a fine £ift lu ttie** Government" ***hn*** **itrw gcAnsAhjp '* VauJcrbilL"**
Received from BUKEM; 01 TOB MINT, 1S.S4.

75,302

POET, SCOTCH.

WILLIAM DRUMMOND, OF HAWTHORXDEN.

Born at " Hawthornden," near Edinburgh, Dec. 13, 1585 ; d- Dec. 14, 1649, [ant]^ buried at Lasswadc, two miles from his birth-place.

Descended from an ancient Scotch family of noble blood. Educated at the University of Edinburgh (M. A., 1605), and in Law at Paris and Bruges; a man of wealth and a Royalist, resident at Hawthornden, except from 1635-30, when travelling on the Continent.

A Scotch poet of the Spenserian school,—author, among other works, of *Twres an the Death, of Mwliades,* **1613:** /-'• •(*ins,* 1616 ; ***Faiik*** *r casting,* 1617; *Flo'vcrs of Sioii* and *The Cypresse Grove,* 1623; and some forgotten historical and political writings.

••DiUMMOND **wwestentiaOy** a follower of Spenser, delighting in **ihc** description of outer nature, bu(. amid all his **teiunoiUHU,** and even in those lines most Conspicuously laden **with** lustrous beauty, there is a clash of melancholy ihought-/ulnei*—a tendency deepened by the death of hi* first tove. He was so jiut cessful as a writer ot sonnets that he **was called** 'tile Scottish reir.ircli,' and **hit** sonnets art still rankyl immediitelv jflcr Shakespeare's, Mtlion's and Wordsworth'i. Hii poems .1e distinguished v pensive oeauiy, fiweemess of vei-ificalion and nicely-worded descriptions, l.ut lack ripour ami originality. ***Tit Cjffrast Grove***. one 01 illu noblest prose poems in liier.ituie, exhibit* grf.it wealth of illuv trjdon, much nne thinking and an extraordinary command of musical English."

THOMAS (JILHAV.

Sec *Drummend uf Harjithvrnittn,* by David Maswn, 1873.

Feast of Tabernacles (Photograph).—Sltowini; the offering of fraee before ihe intal {knowci as *JCtdJittA* **or Mnvtificatjon]** in a lent. The feast of **tabernacles** takes place mi ihu **tsth** of Tishr, **(SeptemberOctober**Urf c•••ntimiL-s according to **Levrticus itxiii, 30-4*.** seven days.

fbe important feature ot the celebration was the com-**mand** to dwell **hi** Ugoths. a practice **still** kept **up in sneient** times tins feast which was coincident **with** the harvest **time, was** the most important of the three nilgrim age festivals.

154,472.

Photograph^ from the original drawing by permission the CENTURY Co., New York.

KORAN STAND Inlaidwith mother-of-pearl. Inscribed with the usual Mohammedan invocation before any religious act: "In the Name of God," and the date A, H. mo.

CONSTANTINOPLE, TURKEV. IS+-7 57-

The Koran, the sacred book of Islam, is treated by the Mohammedans with great **external** veneration and reverence. They generally take care **ncvet** to hold it, and they deposit It upon a high and clean place, and never put another book, or any-,hing S* on top of it. When read ,t is placed on a stand. Tru: reading of the Koran should com-mcncc with legal ablution and prayer. The usual oravcris- "I seek protection with Cod against Satan the accursed," followed by the invocation : « In the name of Cod the Merciful, th« Compaq sionate" In the services ot the mosque it U chanted by the *imam,* or the leader in prayer.

1

VOTIVE RELIEF DEDICATED TO CYBELE

(Cast)

FOUND IN ATTICA, GREECE.

R g the goddess seated on a throne holding in one hand a :r the flattened drum or cymbal, with a lion at her feet. a woman holding a bundle of twigs, and part of another figure holding an amphora.

OtlGIKAL OF M«»L$_E$ IX THE RovAL MuttBU OF B«UN. 154,656.

C le or Rhea was called the "Great Mothei
rfhei worship was in Phrygia, (Asia Minor), in the **were cddMated** with wild dances.
Her priests were wll.d Corybantes, and her festivals
h"f orgiastic excesses amid the resounding music °f d^ms **ud** cymbals. From Mia
e worship came to Greece, and at Athens she had , tomplc *M* the Mctroun, the
temple of the great mo r.

In Rome her w a S p »» .ntroduced durin, th, second Panic war in 204 **B** C
A yearly festival was ' **S t e d** m h.r honor (Aprifa-4) " H ^ the /!/«»**« and **under**
the empire another in ' March, which was elebratcU with the observance of mourning
followed by the most extravagant joy. lnthcseooodc<:ntury^D,thcfcstlV3ls r„K*
robolia and *Criobolia* were added.

—— the ceremonies observed in the« * * * * * a kind of baptism with the
M^^Wi n J rams kille d m sacrifice, with the object oftleansmy and bnnpng
blood of W k.n d **rams** Tht oak a d the nine, as
about a nc«-tanh " r d ri on a lion, or in a chariot drawn bv lions.
was supposed to rse the mount aind hon$. with a d«d™ on her he»£»d a
She is usuall nted enthroned between used in her rites, in her hand.
small drum or cy^mtal. iht M W «

FIRE-DRILL.—Used to make **sacred Sre.** Lower piece of agave stalk, a soft, pithy wood, with harder longitudinal fibers, rendering it a good medium for the **purpose** of making fire. Spindle, a smaller piece of tin.: same material.

Length of lower piec;, 10^ inches; length of spindle, 18 inches.

ZUN1 INDIANS (Zunian Stock), New Mexico.

137,708.

Collected by JAMKS STEVKSSON.

With thii set sand was used hy the Zuni in ih. **fire-cavity** tij **incrpAM** the friction. The tire is preserved in a piece <*Jf* decayed wo* id. **It** is the **custom** of the priests to moisten the sticks **before** btcinmi];; **to drill ou! fire** This renders **the RDtccsis** nim-h more difficult and there-**fore more meritorious** in the sijjht of their i,'*ds-

PRINTING BLOCK (Ban-jul-pan).—Wooden block; ends wedge-shaped for fitting into a holder. Engraved.

Length, 17^ inches; width, 3 inches.

SEOUL, KOREA, ii>8$_5$. 77.°»8-

Collected by Ensign J. B BERNADOI;, U. S Navy.

Blocks and movable type are both used in Korea. This is a common block for printing the alphabet sheet from which children learn the on-moun, or native Korean character. The characters are arranged in vertical **columns,** and above each is a rough pictorial rep re sen tat ion of something containing the initial consonant sound of the characters in the column. **The** writing on the **left** is astrological.

Satow says, "There are some Korean books dating back to 1317 and 132.lt printed with movable type."

HOATZIN.

***OJ>JST/fOCOAfVS CJUSTA** TVS* GMELIN.

BERBICE, DEMERAKA. tS.siS.

Gift of DEMERAKA **MIMEUM.**

The moat striking feature of the skeleton, awl one **w**culiai to Uw Hoatzin, is the stupe of the bltaM-bone. the keel being cut away in front where it is usually deepest.

The food of the Hoatiin **conswta** m.iiniy of **leant** of the arum, and ns lar^- **quantities** of leaves are eaten, **i** large crop is **required** foi their reception, and this crop completely fills **the space** beluw the **uernum** where the keei ***a* lackins.**

The tower end ef the fnrcub (wish-bone) is **united** with the sternum, and its upper ends with I he coracoitls—the bones to which the wings are articulated.

The Htttlzm is ite sale mcnibcr of the order *Opiithotomi,* and is probably the representative of a once more numerous group of birds of generaliwd structure.

\1

SELENITE CRYSTALS.—From cave in what is locally known as the South Wash, in Wayne County, Utah. 60.881.

Received from J. E. TAI.MAGK, 1893.

The crystals occur in a cave which is inclosed by & thick shell forming a mound which stands in relief on ;i **hillside at** shown in ihe phoio$;raph. The crystals **vary** greatly in size and weight, some being over four **feel** long. Owing to the vandalism of visitors, it has be< **a** found necessary to remove the finest specimens to the Dcseret, Museum, at Salt Lake City, to prevent their complete destruction (See ScieiK-e. Feb. 17, i8nj.)

CORRODED STALACTITE.—The specimen is partially dissolved by the corroding action of water from the roof. It illustrates one of the latest stages in the life history of a cave. The lime in the overlying roof has been so far removed that ihe water percolating though It is stilt acid and attacks the material of the stalactites as it drips over them.

ROBERTSON'S CAVE, Springfield, Missouri. 68,tS6.

Collected by GEORGE P. MERRILL, 1892,

VOLCANIC DUST.

VOLCANO OF KRakATo*, **Strata of Sands.** J[rt]-974-

Gift *oC* F. W, Hm C.HTON, 1889.

This.ish was showered for three days in September, anil *sx* the tile of one inuli]icr hour, on boatil ship Beaconsfield **while** in biitufie 0° 14' S., longitude 9;[0] E., and al *3* distar*itx* of 855 mil« from ihe source of **eruption.**

ORTHORHOMBIC SYSTEM.

DISTINCTIVE CRYSTALS ON MATRIX.

A combination of the lima] ['I.me (out, *O)* mn<! a Biiicltypmm (I Jo.ii) mth i Btafhytlcnw (041, 4 *1)* and l«o Pynnudt (jji. ![;,inj 111 |), ih^ly modified by the L'mt rtumjito. /).

TOPAZ

with Albite, MuMorite and Smoky Quarti.

ALHVII[s-1]-'. MKA, OJI Motinuin^, SiWKa

LEUIV COLLECTION,

SPECIMEN FORMS OF LABELS.

COLLECTIONS OF THE Hl'KlvU' OF f-THNOLOGV.

STORAGE BASKET IDJRLO).—Warp of osiers; **weft of the sides oi** split **pine** root, weft of the bottom of osiers, both in twined weaving. The **weft** -araml-; are overlaid **with** bright straws to form the pattern. Margin strengthened on **the** inside by a hoop ot hard wood.

Height, 3 feet; diameter, sS inchest.

ML l'A INDIANS, CALIFORNIA, 18H9. 11 1433.

Collected byjERtin*n Cuttm*:

After the<;e baskets arc made they are filled with hot wet sand to give them a yood form. They are set around the wall of the sf-nu-s.ubtorrai»ean houses of tin: Hnjias upon a banquette of earth and filled with acorns for winter food. As many as twelve may be seen in one h<>.se.

CMSH1NG CANOE (MODI- L].—Wood, dug -^ out; sloping sides, slightly flared at top, flat bottom; sharp end--, long overhanging bow. terminating in a point; straight stern.

Length, *a]-*, inches. Beam, 5^J inches. Height. Lnclui!ing figures, 6 inches

NEAH BAY. WASHINGTON TEKRITOKV, 1^8,3. 72.907.

Collected by JAMKS G. SWAN', Fort Townsend. W. T.

Made *[>y* MJIKXH **Lvnum,** of Cape **Battery. Perfect in** all its **appoint'** ment-, with fis"[esof two Indians seated fnee In fKtr, the position alwa>» **tiflh.** Cont.nhs *(wo* **paddlet; two Qshing-lines completes** 1^0 ttaskt-is (or spare hooki and Hnw, **two** clubi *(nt* killing fiih. five haithni liooki; one bailer. two halibut. None of the objects *ite* made to a wale to compare with tlte canoe or with each othet. th« purpuie <il IIIL' Indians *\wn$* **timptyto »how** tltr various aniclei wuhoui ruganl tii **relative -.lie.**

SPECIMEN FORMS OF LABELS.

HOM0L0GIES OF THE PRINCIPAL BONES

The series of which this S[>ecimcn forms a part is intended to show the corresponding bones in the different classes of vertebrates. **The** spaced skeleton **should** be compared with the mounted skeleton.

SKULL OF SHARK, *Cartianas*sp., an example >>l **the simplest type of cranium. It** consist* **entire])** of calcified cariilaye, is immovably **connected with ihe backbone,** anil does run **completely** inclose the brain. **Neither cartilage** liuncs nor nu-mbrant? bones arc developed.

26.164

THE DOMESTIC FOWL

THE **ANATOMY OF THE DOMESTIC FOWL** as shown on a lar^e scaltr **by the Turkey,** ***Mtiengris gaUopavo,*** one of the largest of **the** Gallinaceous Birds.

Model, natural *me,* t > *M* /< >L \. Paris.

MODEL

Showing structure of

PRECIOUS CORAL, *Coraltium rubrum.*

GREATLY ENLARGED.

l-Axial skeleton.

2. Friable crust or Camosarc, in which lie the tubes connecting the body cavities of the individual polyps.

3 Individual polyps.

ECCLESIASTICAL HISTORY AND ART

COSTUME OF THE MISERICORDIA OF TUSCANY

THIS COSTUME consists of a simple hooded cassock of black, worn over ordinary citizen's dress, and a broad brimmed felt hat, used in outdoor service.

SIENA. 1892. I53.893-

Collected by G. BROWS GOODE.

The FRATERNITY *OP* THE **MISERICORD1A** ***[Pia*** *Arcicm-* ***/nttrmHa*** *de Santo Maria detia* ***Misericort&a)*** is a great society, **with** br.iuchesi in Siena, Florence, Pisa, and **the** inlier cities and towns of Tuscany, **which** has for its sole object the **alleviation** of suffering and the furtherance of all works of benevolence. Its most striking **characteristic** is th.it its active work is carried on by its member^ in person, and noi by paid **deputies.** On its rolls arc found the names of 3 large proportion of me adult males of the community, without regard to rank or wealth. A certain number of these are assigned to duty for each day in the year, ami are expected tn respond **it** once to any call from the officer of the day, and while on duly are under strict discipline.

' The personal relationship of the wealthy and **the powerful** to the charitable work of the community is productive of much ^ooJ. All di>-tmaions of rank are ignored in the organization, **and** lo this end a costume of the cheapest material is used, to disguise figure and face, and members while on **duty** neither speak nor are spoken to. except as *a* matter of necessity. The money needed for the wort; is obtained by the mute appeals of the members in public places and at the doora of churches, and from **the** fees of membership. Each local society **bas** iis **chapel f>r funeral** services, and all funerals with but few exceptions, are conducted by this organization, the coffin being borne by its members in their peculiar dress

One of tht oMest of the* mclfteA ih.it la *v'n.-h* the cbtttrme eihilpittd Le; -IL^ \ h that *ct* S.ena. Thfo vi. firjrvkil it the end ^f the fourteenth century by iWnirduvr AlWte^ In flSan lieminiinij JI * •ocpety to ptrfurm vrutkv of mercy Anil *m* aul f-hvinm tn 1564 *A* iutice [ires-iibed tht manner in which tl.cir (luiifj^ile ulfuft might lie varnitrd- It was ttifipreued in toe llane *f Leopold 1, and rei'J* lUMeil t> rpyjt **itr,i.* j'*n in 1794 Tli JS19 tt *wiz* reurfimfeil unun Ihf model of thov in Pm *tati* FlipKIU^, and iti ilt^i *l,\ jK^julii* wlnffi^lpoh An mlMHIMail of rsf^ooa tjra [Xj,t,ooa} wat tfrtircd, whir h hit uncr T*rm intifMcO. L^ uther ilumt^um. Ill rnemljrrfthifi •> **ttg* "tri'p mOudjnf in a city of *fitly* thwoaAd [AhlbrUatk, Ann three tbouanci arlne mentLenw

Insta)' iniludnrtetitliini *rntuttl* i^Jiue* ».lhin tht t^nn chanty—Ihc (ctlef nf time nru-lien Ly I .nun* of *my* kinij ji jiiy 11,1,1- 11,- plat*, Owing in ill; |mtinnout ihir.iL'ter o(mtny of the vtlrtH, hot*?* jte csmtuoiinl) fe» ia Sarj. ami ml |*i)|ik, iMietl u tsfHn>, niuj le catfieil D^sjfi i fh-uMcn Inmlnit ale *u,* H . |i:ul, tlirce milt* from the city, in.1 1 h-) line Lnntml ul u o H i rmtnlt lie nude. A («HJ|i of nicml.riv *a* m n > .«KICI the nun of visitors to the sick (Concittatori f o/nwsu). 'IVy (rndct jid lu da til it h«ne. infilling them «uh loh, uadrrctehin;. tun I ^ c, hiuht, uiy ehuni. Raaej, mil VJKXTI ur *ui -^ mineral •ritcr lai tM d Imlb, ji»t when ncmui^ left»u(«;nj litajtn.niiKi.'i, rinenu!- :!.; city iml Tlit turruuniliitg In Ihr 1 1 kind, *A* tput nf memlien it ^Kpn (he ip« to render lain, In ulliet [omrnurntm r.<rUfrl Imu IIK ralu and Until ol :

f a Udher talterl ilv *frwamJaut,* Ons Jireiidet at tin nteet-l«m of 1 he la mil nup^i! ⊳f t»etif Unihert tilled CiHrn tmt alrt tW of tb. «o«o..l.< «.p« : ultbtri} A Nil finlncial r* printnl ncA (ui •hith 11 not tin!, a rtugirl, but a vau nidi, - 4 (• lba titciMinrtut ilieir t«.-k—: • (. .,, 1 , -.,. .. ..|.iuncei,—aid *I^KM* IUWI, urr.niiiiled or cuittmttk. in whichjfar <H*X«J of U« oion[«n ate it[< mily 10 be put on when iie» are hixily luoununed to dut. from *timt*).Li«. of t«uo«.

I a(* the Sucict]f JIT an unneulor *{iifrmnty* »K,P cunttuf. il« ni :. y-T,^r.. a to(Luiinew, J ..-titjundeiMe, *x* tfiawtrj (Vln^,/,,,), and a who hu etui)*; «l all linfn, luraitaR, jml nhet [TOrOq tn tin- wjrehmMC. Ilirr.: Ihe tijjnf. *ta in turn, djy lif djj(Ilirouttliiul ilie par, Mi(tm>* I he |>UMK: .ere..,?., jn-J uine-fiole. JJ mm) ai thter butldml or Ilir ineiuben .ue in , . ungit day, under the tharet ol <HK O' thnc oditirrv All omtm KIW (ratiulumljr eiurj* OK ici.reuij, 4 jthfticLm, [•<> imoii, m temnu iftd a

SPECIMEN FORM OF LABEL.

COSTUMES OF CHINA.

NINGPO BRIDE.--.-Crimson robe embroidered with the dragon.

Gift of CHINESE CENTENNIAL COMMISSION, 1876. 127,561.

When the **Imperial family** • >(ilu- Sun^ Dynasty **were** fleeing **before** the **Km Tartars,** who **carried** away ihv Chinese **Emperor** Hwaitsung (A. D. **1125) and established** .1 Tartar Dynasty at the mouth **of** th< rivtr L-iugt/. **the** heir **apparent, then quite .1 lad, was for .1 year 01 so kept concealed** in **;i private** family about a mile ;m<t **a** half from **tJic** city of Ningpo. The **house** is siill **Icnuwn** .is the house of the **"yellow gateway."** Here he formed an **attachment to a daughter of the** family, "I **'he same** age **as himself.** The troubles of the times drove him **from ihis** asylum but sonic **years afterwards,** |"eace having been made between the Tartar and **Chinese Dynasties and** iln **lad having succeeded** to the Imperial seat, he sought to find hi- **youthful Im e,** but she and her family had **disappeared** and **he was** never **able to** tnitl **anj** trace of **them.** In honor of the memory n| **his lost love the Emperor ennobled her country women** in the **department** cit Ningpa, by **authorizing them i'> wear** at tlu ir **marriage** a re• **I n<l)L- embroidered with the** Impabl **dragon. The** l>riiK- i> **carried to the house (>i her husband** in n yt>rv;i'inis se<!:in chair, with lutir **bearers, prccjjdwl, when** tliv **famjly** (.in aff<ir».l **jt,** by **musicians, and** men ln-;inntf **the insienia »l** dfiice **which have belongt'9** to **my of her ancestors,** and **followed 1>\ two female servants and by porters carrj m^ hand-barrows** wiih **bedding, furnituw ant) other** articles. The **highest official,** when **meeting** MILII **J** bntlal **pivcession, will yield** the **«** ay.

SPECIMEN FORM OF LABEL.

ANCIENT COSTUME OF JAPAN

Figure of lady of royal lineage in court dress

PROCURED FOR **THE** UNITED STATES NATIONAL MUSEUM BY

CENERAL HORACE CAPRON IN (878 92,426

Order

CLECOMORPHJE

GULLS

Family

SULIDJE

GANNKTS

SPECIMEN FORMS OF LABELS.

Labels, as a tale, seem to be most satisfactory when nearly square, or with the height less than the width.

The relationship of the objects in a aeriea to each other may usually be indicated by the size of the labels, which shun Id be aniforin Tor objects of tin- same general character in the same fuse. When adevi ation from this rale is necessary^ if the size of the type remains the same, more space may be obtained either by slight widening or Blight lengthening; bril in the same series we must alwayslengthen on always widen. Classification labels, which are placed, unattached, among the specimens, increase in size with the importance of their grade in the plan «>r classification, as is shown in the family labels illustrated.

There ore limits bo the possibilities of making labels speak by their size. An object on the top of a case, or on B pedestal, or in a wise by itself,is always regarded as"on1 of classification," and its label arranged solely with reference i> its appearance *(a* utility in tin- place whereit is to stand, It- is also necessary to vary the size somewhat in the same series, when, as in a long ease of mammals, a small sperms and a large one are placed side by side. Here, for {esthetic rmsons, the role of uniformity is usually set aside.

Much attention lias been given t» Hie selection of type and color for labels,it having been Pound that labels printed on white cardboard become dirty or turn yellow, besides bWu# dazzling and hard to read. Many Urns of cardboard which would otherwise be available may not \n- used, because of their tendency to fade—objectionable in itself, ami doubly objectionable when it becomes necessary to put a fresh, bright la in-! by the side of one which has become laded in use. Almost every Sample of colored board which lias been tried in the National Museum has gaded after a time. The most satisfactory has been one of greenish gray. This is temporarily in use in the geological and mineralogical collections, when ;i Light .may color for the interior of the cases and shelves -..•ems preferable, and also in tin- collection of birds, which is installed by preference in a somewhat dark apartment.

The standard label-board, however, is a. rough-faced tnanila, The color, being thai natural to the fiber, is quite unchangeable. There is u» fading, little tendency to become dirty, and its soft, rich, brownish-yellow tone sets nff admirably the aea\ y black lines of the antique-faced type which is used, ami Ir.iriiLiitii/rs well with the bulls and inaionns which are our favorite colors for case interiors. The material at first used was a somewhat soft though thick paper, made specially for genns-covers in the herbarium. This did not prove thoroughly satisfactory, since tin* labels, unless wn small, had to be glued or tacked r» some solid support to prevent their bending and winding, ami even then the corners frequently called.

We now hav a special cardboard of the material just mentioned, heavily pressed, very stiff, and durable, which, though its surface lacks somewhat the desirable softness, proves \fiy satisfactory.*

*Samiplesof tliis board will be sent to :iny mageum worker who may request it.

It may be added that cartridge paper, such as is ordinarily used for wall decoration, in any tint of gray or light brown, is an admirable material for labels, especially large ones. It must, however, be glued to a tablet. If this is made of dark wood with a bevel retreating from the edge of the label, forming a dark border, the effect is very pleasing. Labels tints prepared, and mounted upon metal rods, are used by us for general classification htliels in tin- interior of cases.

It is the plan in the National Museum to have a large label, ginzed and framed, at the top of each case, or iu front of each panel. These are printed on black or maroon paper in gold or silver letters.*

The labels in gold on black are printed from large wooden type, and are used to indicate the general system of classification of the cases upon the floor. When it is desired to use outside labels, glased and framed, which are not in this general-classification series, we print with heavy-Diced type in black upon maniia or cartridge paper, such a- have been already referred to, since the black upon yellow is more legible with comparatively small typo than the gold upon black.

The National Vuseinn owes many most important Lessons in the matter of Labeling and the interior fitting of cases to the Art Museum at South Kensington. Their system was >tnilied with the greatest <:a. by the writer in 1880 and dining a residence of seven months at South Kensington in 1883, ami, as will be evident to anyone who knows their system, it- influence has been *wry* great upon that to use m Washington.

In the accompanying illustrations (Pis. L5-26) are shown ;i number of the forms of labels adopted in the National Museum. Others are being developed from day to day: but it is thought advisable to place these upon record as an indication of what has already been accepted as measurably good.

ADVANCES IN <;rcNERAL INSTALLATION.

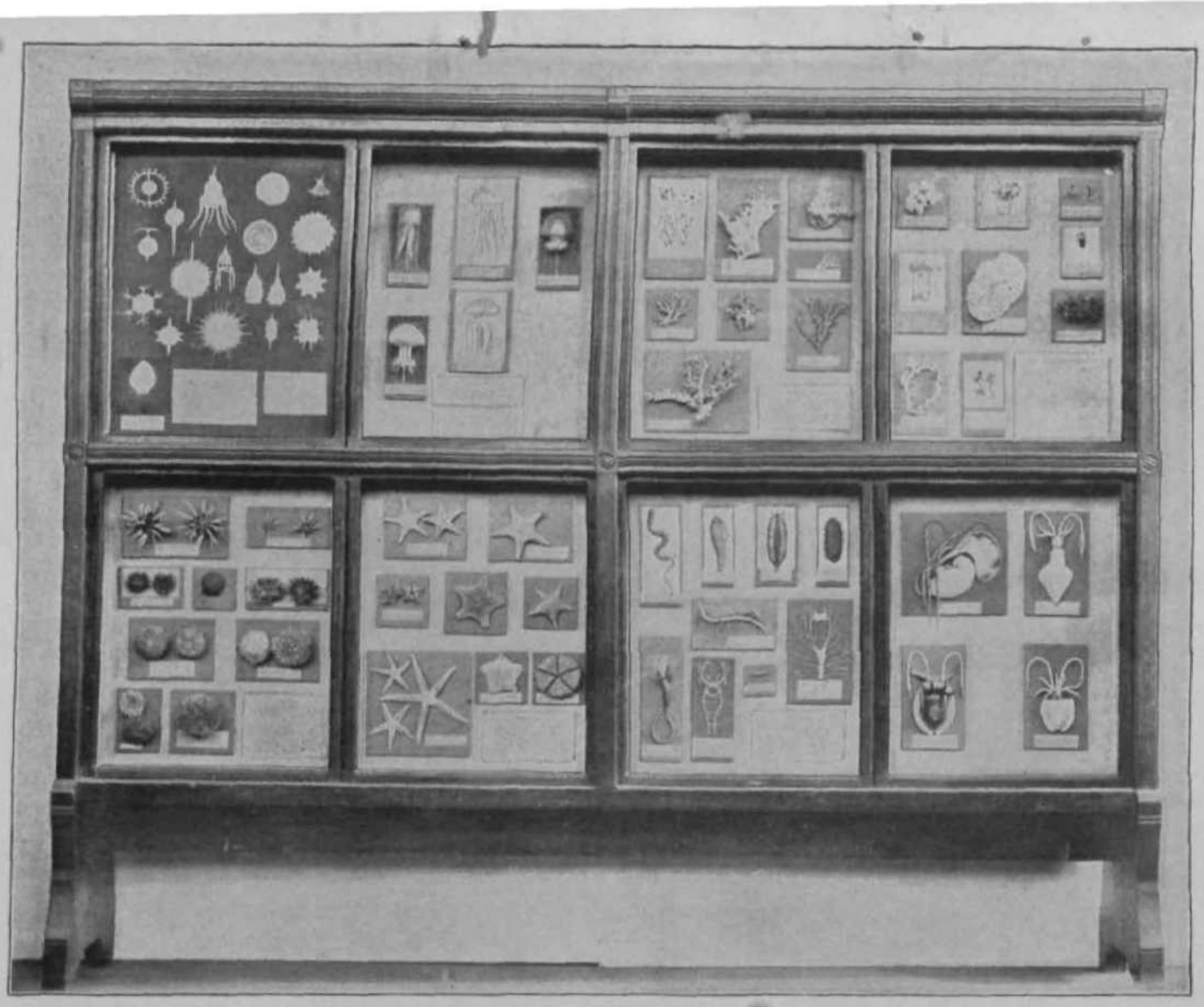
The map devised by W. M. Davis to show the extent and location of the great iee sheet in North America during the glacial period is described further un in this report

The Bynoptica] collection of invertebrates prepared by Mr. Lucas also marks a positive advance iu methods of mounting and Labeling, to say nothing of the success attained in showing the structure of certain representative forms. This work will be described in the report for 1893. and a mere mention must now suffice.

The accompanying illustrations (pl>. 27, 28, 29), however, tell the story better than words can do.

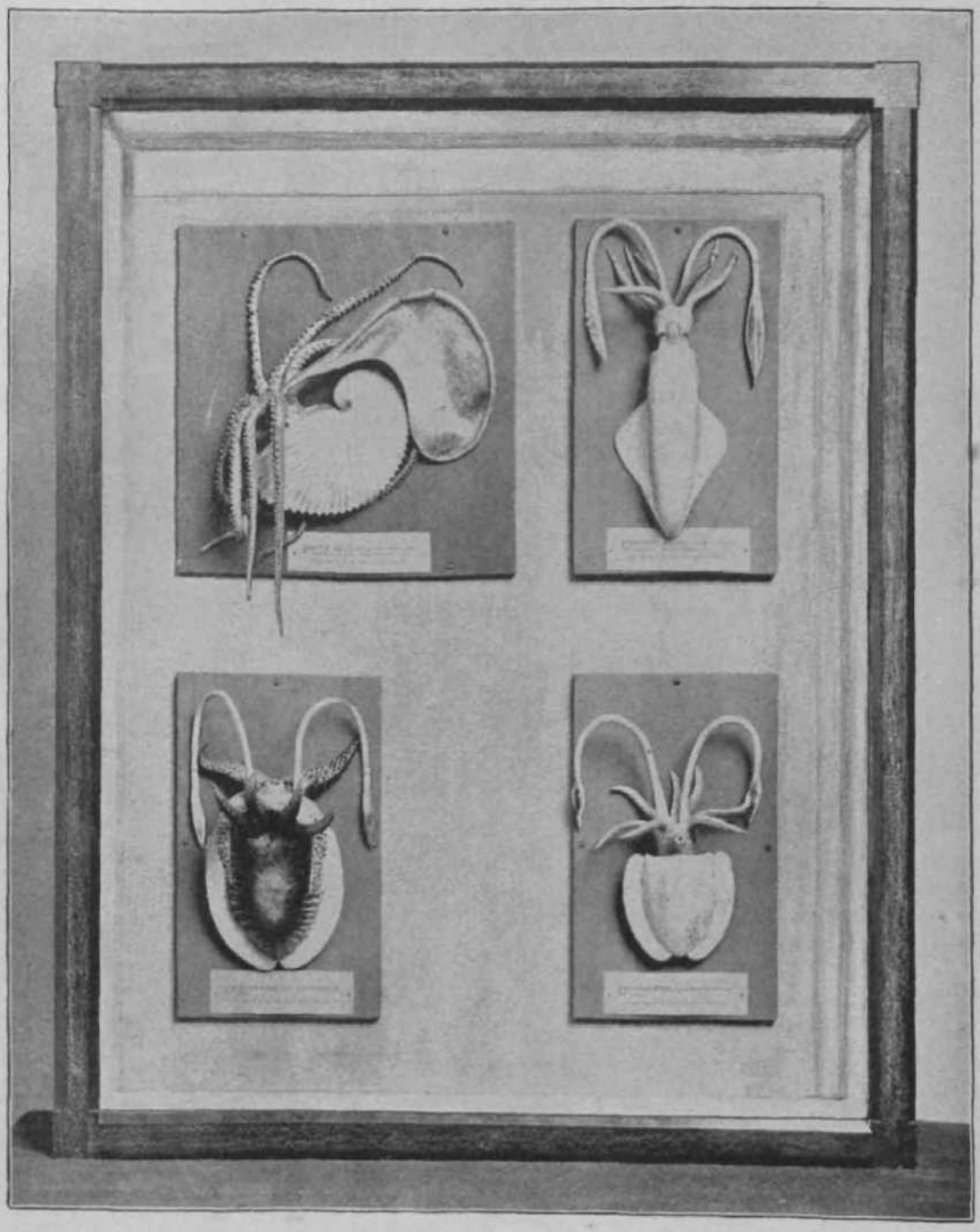
We have adopted two idrns already well carried on* in the British Museum of Natural History, and original with its director, Sir William Flower, to whom we are indebted for other ideas equally valuable soon to

* To produce silver letters, size is used instead of printer's ink. The powder is applied before the size is dry. The nickel is unchangeable and very effective.



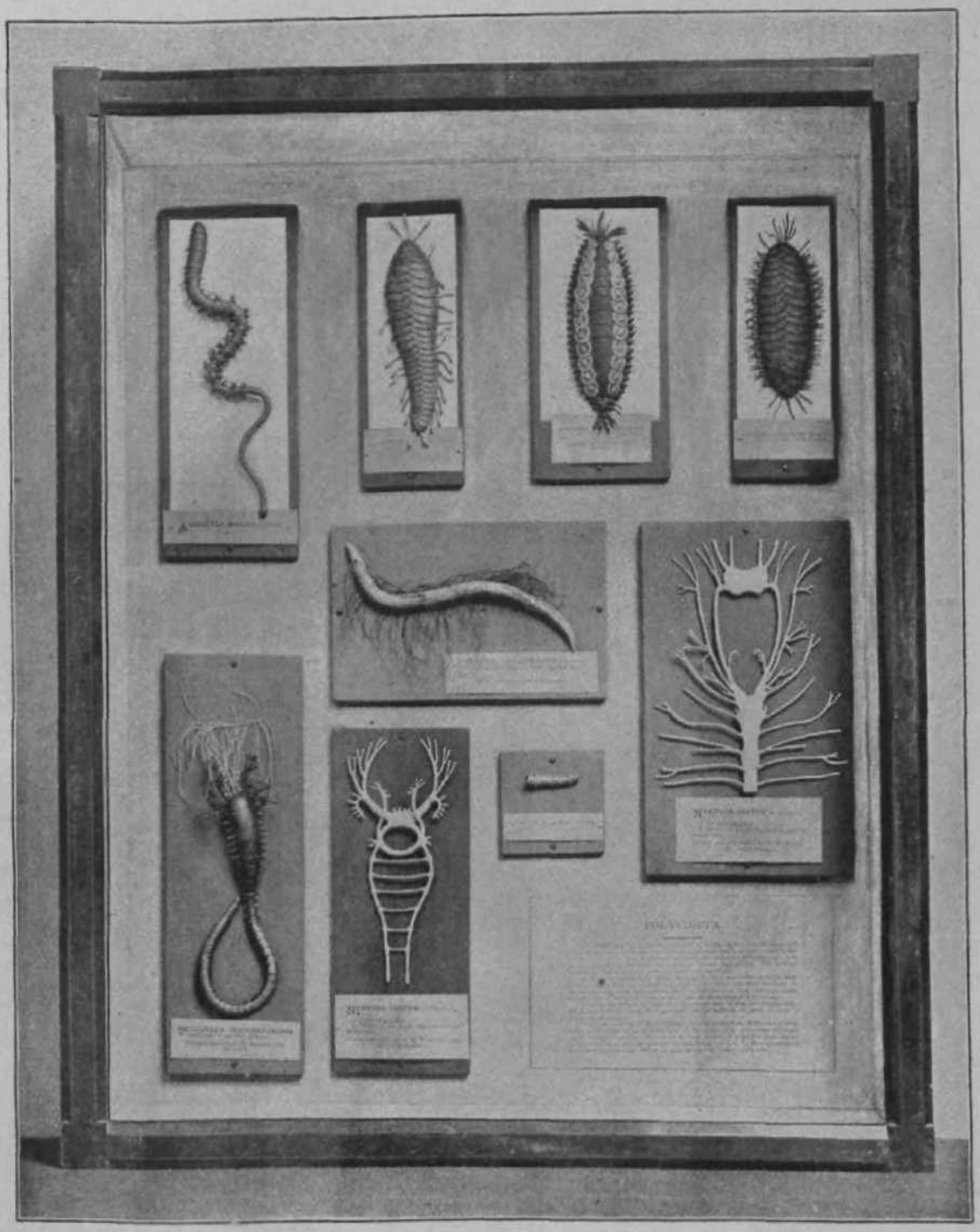
UNIT SLIDE SCREEN HAVING EIGHT GLASS-COVERED UNIT BOXES, CONTAINWQ SPECIMENS FROM THE SYNOPTIC SERIES OF INVERTEBRATES.

The boxes are W by JO inches, outside measurement.



GLASS-COVERED UNIT BOX CONTAINING MODELS OF CEPHALOPODS.

Size of box, *24* by 30 inches, outside measurement.



GLASS-COVERED UNIT BOX, CONTAINING MODELS OF MARINE WORMS.

Size .i' iiox, -*n* by 3d **Inches, outside ateasanmeal**.

be materialized in Washington. Oue is the exhibit of skeletons of man and horse (PL 30), shown side by side, with the liomologies of the bones indicated by a parallel system of labeling, the other the mounting of the races of domestic pigeons in one case upon a stand in the form of a dovecote, the specimens being so arranged as to show their relationship to each other and to the parent form, the rock dove.

A similar project is being worked out for tho domestic fowl, but is not yet in final shape.

Another advance is that effected by Mr. Lucas in showing, side by side, all the principal variations of the vertebrate skull, the homologies of the bones being indicated by a system of coloration modified from that already in use in the Natural History Museum in Milan, Italy.

A minor feature which seems to add materially to the comfort and convenience of many visitors is the reading table, a sketch of which is here given as a substitute for a detailed description (Fig 9). There are some thirty of these tables, one for each department, and about 500 books are thus placed at the service of visitors. The books on the tables are text books, bibliographies, dictionaries, and standard works of reference, and each table is devoted to the subject illustrated by the special collection in the midst of which it stands. In the rotunda is a bookcase containing cyclopedias, and visitors who desire fuller information are at liberty to go to the Museum library, and thence, if need be, to the sectional libraries in the curators[7] laboratories.

It is pleasant to be able to say that although over a thousand volumes are thus exposed without surveillance in the public halls, not a single volume has been stolen, though many of them have been "read to death."

TAX1DKHMY IN THK MrSEUM.

Allusion has been made from time to time in the reports to the work of the Museum preparators in preparing objects for exhibition or study, and the time seems now to have come for a consideration of what has been accomplished and how this has been done.

As early as 1875, when, by means of the appropriations for the exhibit of the Museum at the Centennial Exhibition at Philadelphia, it became for the first time possible to employ competent taxidermists, an effort was made to secure the very best men available, and to have prepared better specimens than were at that time to be found in any American museum. Mr. Joseph Palmer and Mr. Julius Stoerzer, excellent workmen of the old school, were the chief agents in the preparation of the exhibit of mounted animals and casts shown in Philadelphia, and the results, though, so far as accessories are concerned, far below the present standards, were in many instances quite equal to what has since been done, as is indicated by the accompanying plate of the group of fur seals (PI. 31). Their work was greatly admired, and the influence of the movement then just beginning soon spread to other institutions.

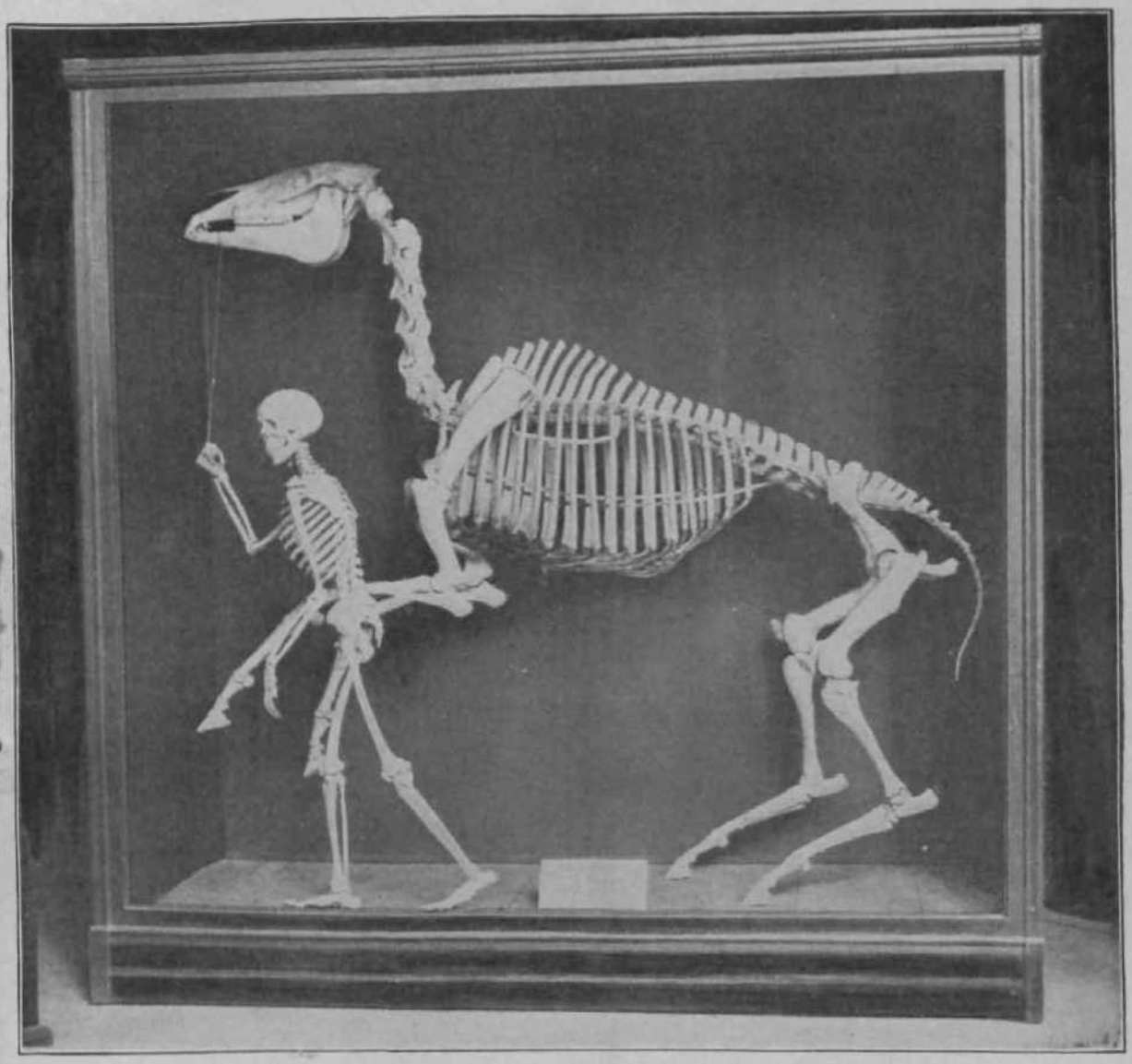
The ideals in the Natiomil Museum were as high then as at the present time, and Professor Baird, himself a very skillful taxidermist, was not only the best of critics, but enthusiastic in the extreme upon the whole subject. The time of preparation for the Philadelphia exhibition was so short and the appropriations so limited, however, that it was not possible at that time to accomplish the results desired.

In this same connection should be mentioned the very important influence of Prof. Henry A. Ward, who, in the conduct of his natural history establishment at liochester, was always evidently actuated quite as much by a love for natural history and the ambition to supply good material to museums, as by the hope of profit, whieh was always by him subordinated to higher ideals in a manner not very usual in commercial establishments.

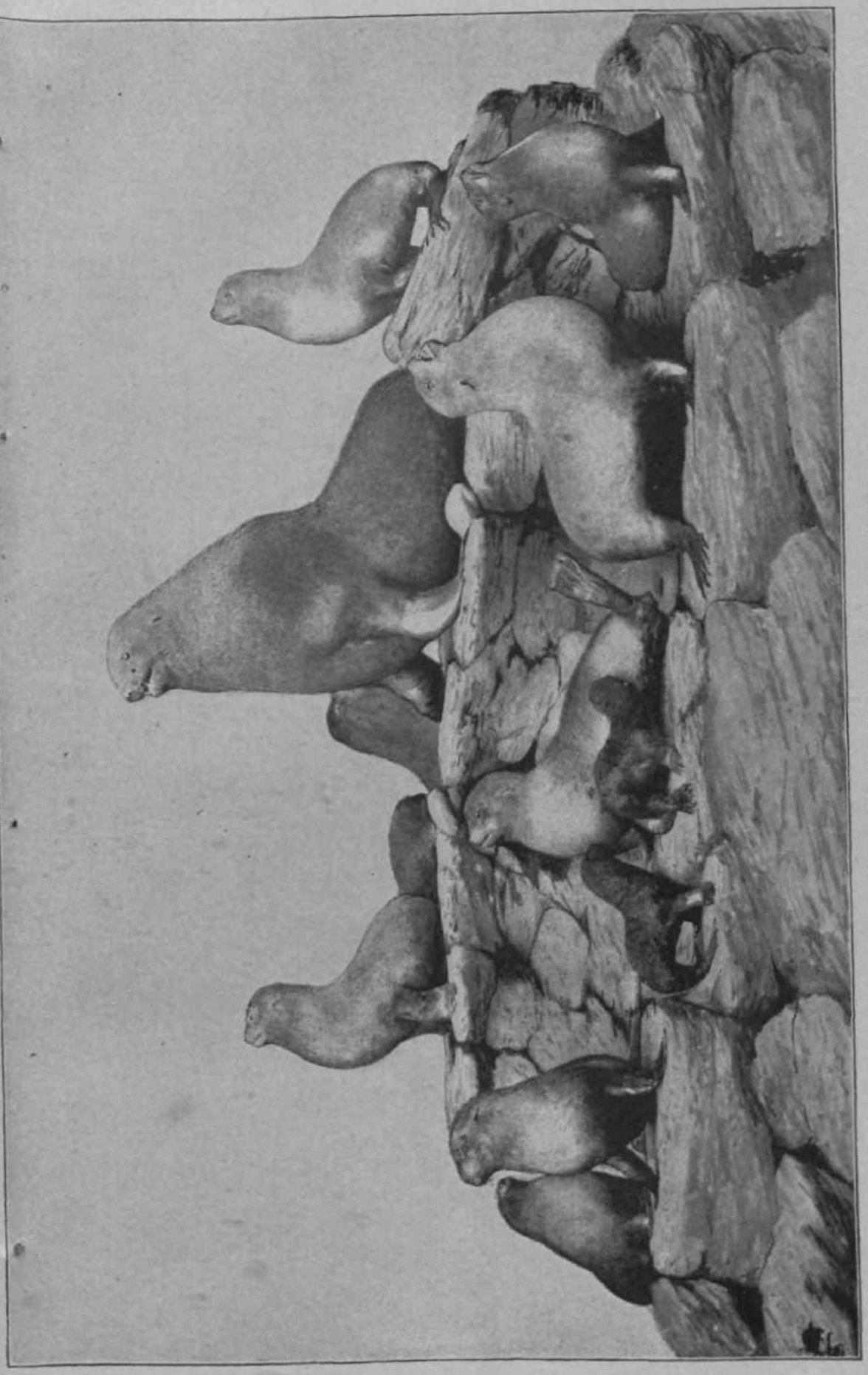
While the work from 1875 on was constantly advancing in Washington, and the antiquated and badly prepared specimens in the old collection were being replaced as fast as possible by others as good as could at that time be prepared, similar agencies were in activity in Rochester, and under the influence of Prof. Ward a number of enthusiastic young men were brought together and employed in the various branches of the work connected with the establishment. It was here that, through the stimulus of association and in connection with the immense work in preparing natural history specimens which was then in progress, mental forces of another kind came into being; and here, in 1879, and the years following, some very remarkable pieces of work were accomplished, which for originality and strength far surpassed anything hitherto attempted in America. Among these may be mentioned Hornaday's groups of orangs, one of which is now in the museum in New York, and another here in Washington. These, though lacking in the artistic repose which characterizes some of the later productions of himself and his pupils, were extremely spirited and had all the qualities of good workmanship and parinaiience which could be desired.

A series of animals of the Rocky Mountains, mounted by Mr. F. S. Webster to serve as models for the artist Bierstadt, and since destroyed by fire, should also be mentioned in this connection. Work of this kind demonstrated the triviality and false ideals of such ambitious figure groups as those of Verreaux, of which certain examples had reached this country and were up to that time greatly admired, and of the work of the European school of mammal taxidermists in general, well typified in the celebrated Wurtemburg collection and in many of the groups in the Liverpool Museum. It is not intended, however, to disparage the very excellent work of Verreaux upon single specimens*

* *X* lion which, since 1870, has been displayed in the American Museum in New York City, is perhaps the best in this country. The National Museum has a hyena mounted by him whirh, though not one of his greatest works, is full of spirit.



A GROUP OF SKELETONS INTRODUCTORY TO THE SERIES SHOWING THE HOMOLOGIES OF **THE BONES.**



GROUP OF FUR SEALS.—CALLORHINUS URSINUS.

Mounted by Julius Stoerzer in 1875 and exhibited at the Philadelphia Exhibition.

mounted in attitudes of repose for case installation, nor is it intended to ignore the wonderful work done under Paolo Savi for the University of Pisa—work quite in the modern spirit, which the test of nearly a century has shown to have all the qualities of good workmanship.* But for the fact that these are buried in the midst of a poorly installed collection in an inaccessible gallery in a small Italian city, possibly the spirit of modern artistic taxidermy would not have remained so long latent. The museum at Turin has also had excellent taxidermists in its employ.

At Leyden also much good work was done, and the animals were mounted in varied positions. The birds at Leyden afforded a striking contrast to those in the Natural History Museum at Bremen. These were mounted in fixed conventional attitudes, and since the museum possessed an immense collection of birds, they were crowded together side by side, heads toward the wall and tails projecting over the edges of the shelves toward the spectator, so that they looked like horses m a stable, viewed from the rear. This museum, as I saw it in 1880, was an eloquent teacher of methods to be avoided. It is to be hoped that, before now, most of these skins have been unmounted and placed in drawers in a study series, and a reasonable exhibition series substituted.

Mr. John HaucocK, of London, many years ago did excellent work, combining artistic feeling with scientific accuracy, and Mr. E. T. Booth somewhat later developed a marvelous collection of British birds in his "Dyke Road Museum" at Brighton. These were mounted in life-like attitudes in the midst of natural accessories, and were satisfactory alike to artists and to naturalists. Following in the same course the admirably mounted collection in the Town Museum at Leicester was developed by Mr. Montagu Brown, and that in the British Museum of Natural History under Dr. Giinther, beginning as early as 1880. On this side of the Atlantic, as early as 1870, most excellent work of this kind was done by Mr. Andrew Downes in his private cabinot in Halifax, Nova Scotia.

The Society of American Taxidermists was organized March LM, 1880, by Messrs. Hornuday, Lucas, Webster, Critchley, Jules Bailly (a pupil of Verreaux), Martens, and Fraine, all of Rochester, and a number of other taxidermists scattered through the country joined in the movement. This society was the direct outgrowth of the aspirations of the enthusiastic founders of the new American school, and had for its object not only the improvement of taxidermy from the technical standpoint, but the elevation and ennobling of the profession of taxidermy and the establishment of loftier ideals for the work.

The intention was to hold annual exhibitions, to secure the award of

* A group of starlings around the skull of a sheep rivals the best bird group since made, and a boar attacked by hounds show<* wonderful skill in mammal work.

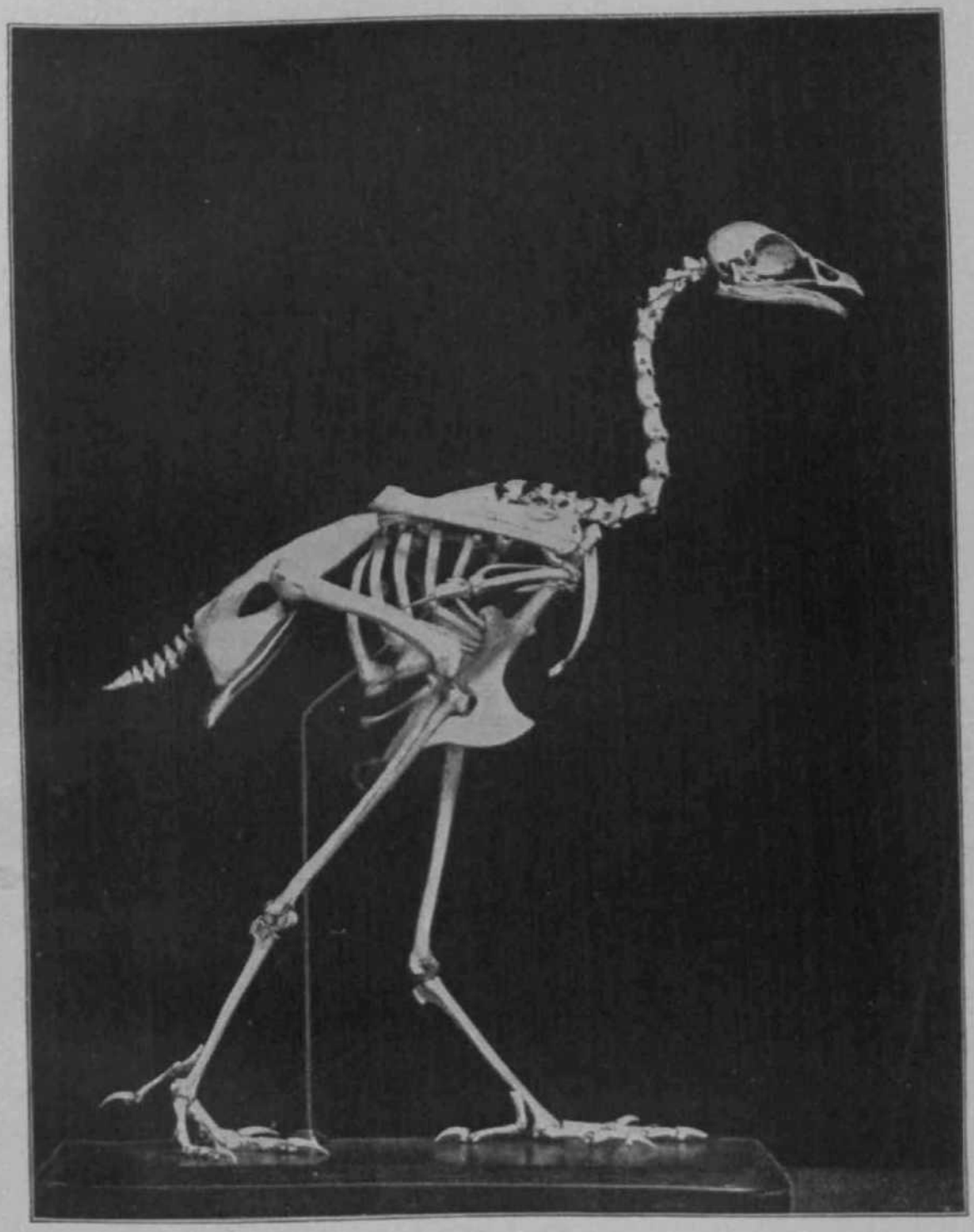
prizes for the most meritorious advances, and to publish an annual volume of Proceedings, devoted to the discussion of the principles and methods of the art.

The ideals of the organization before very long developed to such a degree that they could not be worked out to the best advantage in a commercial establishment, and several members of the new school, having found that their objects were thoroughly appreciated and their efforts meeting with hearty support from the authorities of the U. S. National Museum, began to look to Washington as a wider and more promising field for their activities. In the National Museum, in the meantime, constant progress had been made, especially in the work of preparing casts and models in plaster. Some of the work prepared for the International Fisheries Exhibitions in Berlin in 1880 and London in 1883, would be regarded as admirable if done at the present time.

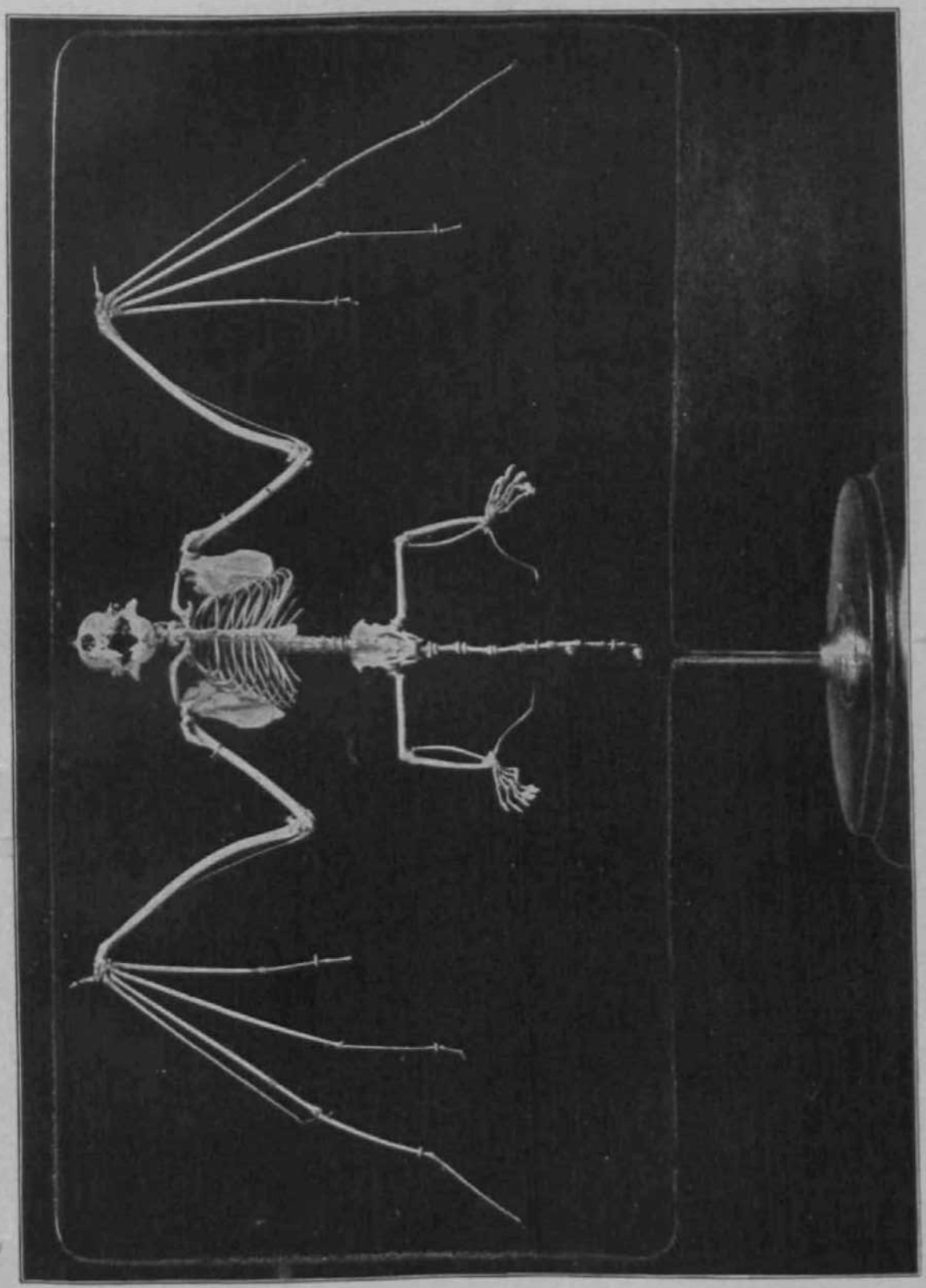
Soon after the reorganization of the National Museum in 1881 Mr. \V. T. Hornaday was appointed chief taxidermist, and he was soon followed to Washington by Mr. P. A. Lucas, who, though an accomplished taxidermist, had given especial attention to the mounting of skeletons and anatomical preparations. Somewhat later came Mr. F. S. Webster, and others of the Kochester group would also have been added to the Museum staff but for our feeling of unwillingness to interfere with the important establishment at liochester by taking away so many of its most competent men.

In the meantime the Society of American Taxidermists had been steadily at work. It held three annual exhibitions (in liochester, in Boston, and in New York), and in 1884 another exhibition was held in connection with the Cotton Centennial Exposition at New Orleans and under the auspices of the National Museum. Three numbers of the reports were published. Since 1884, however, the society has been dormant. Perhaps its work had been accomplished. At all events, its influence was strongly felt, not only among taxidermists but through the larger and smaller museums of the country, and during the five years of its existence a decided change in public opinion had been effected.

The necessity for the development of a great mouiuetl collection of mammals in the National Museum, and above all the execution of the plan for preparing monumental groups of the animals which are approaching extinction, mounted in natural attitudes and surrounded by proper accessories, has given a very wide field for work in higher taxidermy, and a number of young men from various parts of the country sought admission to the Museum workshops, where they received or completed their training. Among the most, prominent of these maybe mentioned the late Jeuness Richardson, wjio was for three years in the Museum, and went in 1380 to become the chief taxidermist of the Museum of Natural History in New York City, where he iucoui-



SKELETON OF MEOAPODE,—TALEOALLUS LATMAMI. SHOWING METHODS OF MOUNTING.



SKELETON OF BAT.-MOLOSSUS RUFUS, SHOWING METHODS OF MOUNTING

plished some very noteworthy pieces of work, especially in the mounting of birds.

Mr. L. L. Dyche, now professor in the University of Kansas, also passed several months here, and learned the methods which have resulted in his excellent work upon large mammals shown in the Kansas State building at the World's Fair of 1893.

Mr. William Palmer, now chief taxidermist of the Museum, also received his first training during these years, and began a career which has resulted in the production of such remarkable work as the groups of Caribou, prepared especially for Chicago, which, in the judgment of the writer, have not been surpassed anywhere, marking as they do the highest attainment in the imitation of nature, with that combination of life with perfect repose which is the supreme test of merit in taxidermy. Many other men have profited by work in our laboratories, and are now scattered through the country, either attached to museums or in private business as taxidermists.

The taxidermists previously attached to the Museum have produced work in its way equal to that of their associates. The casts of reptiles, fishes, and cetaceans made by Joseph Palmer are by universal admission unrivaled, and this perfection was reached under Prof. Baird's * encouragement before the Society of Taxidermists began its work and as early as 187(5.

The bird work of Henry Marshall, though for the most part limited to preparation of specimens for shelf installation, has not been surpassed. Mr. N. It. Wood, who came from Eochester in 1888, has produced noteworthy work in groups of birds, and is especially skillful in the mounting of the various breeds of domestic fowl, which he has done with such painstaking accuracy that they may well serve as fixed standards in the development of the races of poultry. His work in restoring hair to skins which have become bare, is worthy of the most painstaking Oriental.

In the mounting of skeletons and anatomical preparations the highest standard of excellence has been aimed at, and it is believed that there is no collection of mounted skeletons in the world which can show more perfect pieces of work or a higher average grade of excellence. Mr. Lucas, under whose direction this collection has grown up, and who with his own hands prepared many of the most remarkable specimens (Pis. 32 and 33), has become curator of the department of comparative anatomy, but has transmitted the technical merits of his methods to Mr. J. W. Scollick, whose work upon minute osteological preparations is little short of marvelous.

It might be said that these words of coinmeiidution would be in better taste coming from outside and written by one who has not been, in the matter of sympathy, so closely associated with the development of the ideals of the higher taxidermy and the furthering of their accomplishment. This was in my mind when, a year ago, I requested Dr. It. W.

Sbufelilt. I . >. Army, **who bad** recently published sonic **articles** on **taxidermy** in **'*The I Divide," and who** was **also a judge of awards** in tin- **department of taxidermy** at **the** Columbian **Exposition, to** prepare an **article apon the modern maaeam toridermy. Jt was the idea** that Dr. Sliufeldt, not **being** attached to any **museum,** would lie **able to examine critically** and discuss **the subject without prejudice, taking Into consideration** all that **has** been **done elsewhere** as **well as** in **Wash* Btgtcm,and this lie endeavored** to do. The **predominance of** illustrations taken **from specimens** in our **Museum,** us **finally published,** was not **intentional,** but **was due to the difficulty of obtaining satisfactory photographs from other establishments. An sffari** was **made to obtain** illustrations ironi **the** New York **Hnseuhi and from** the **British Museum.*** The illustrations **obtained from these sonrces by no means did** .justice **to** the **specimens** illustrated, **and** the efforts to **secure photographs** of the Savi groups in I'Na. and **of** the rhinoceros mounted for the **Medici** collection in Florence three **hundred yeaxs-ago, were nnsti**ccessf**al.**

Dr. Slmtcldt's **essay, which** was published in **the Museum report for L882, has attracted much attention, especially abroad,** and tin- American t:ixidennie work, **the excellences** of which are suggested rather than tally **depicted** in the **illustrations, baa received much praise from** those who are. not **familiar** with it, **and, if one** may predict, the **paper** will **be useful** in still **further raising** the **standard of museum taxidermy.**

A special illustrated **supplement bo Natural** -Science was published in **England on the occasion of the meeting of the British Association for the Advancement of Science.** This **disentitled "Taxidermy as a** Fine Art." **and** was **devoted** not **so much** to a review **of** the **Shnfeldi** article a- to critical **comments** upon **the** illustrations, **of** which **a selection of** nine were **reproduced,** in **cloning** tus remarks the **editor aaj**s:

In select ing the plates for this **article** we have **paid but** suinll **attention** to the many beautiful illustrations **of bixdt.** In r»-sj»en to bird group* oar homo muse a ins **do not** require much Tr**aching, thoagfe** even they have yet tn **[ears** tluit -' hirrt i:an be mounted in the most nniur;il niaimt-r on **an ordinary** miim-iim **p m t** or **rtaad.** It

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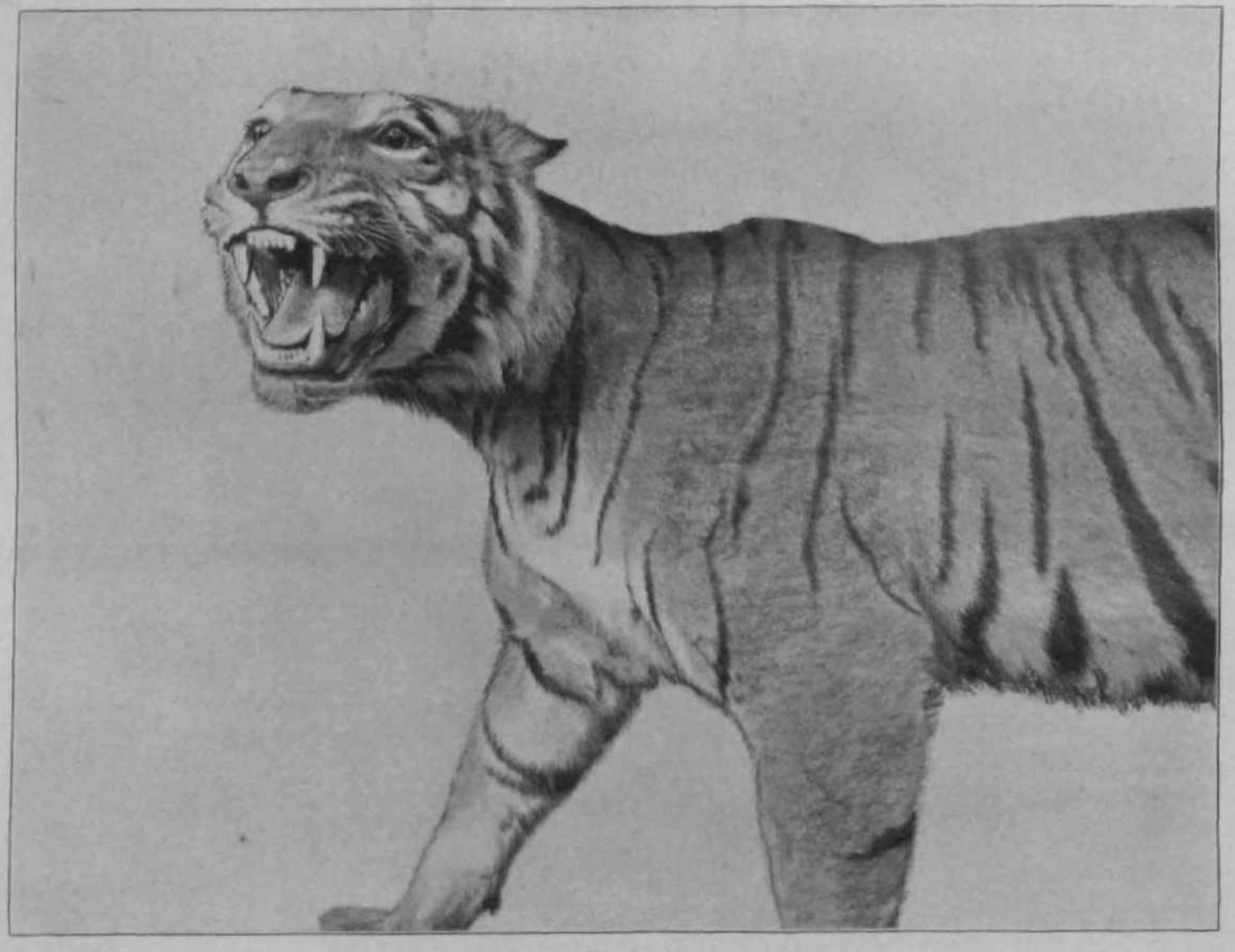
•Dr. 1(. Bowdk'r Sharp*'*]>n]K>r **on "Orttfth«t**gy at ! ***loath*** **Kouiogtofi," in the** "Kn^Jbh **Dlnatraled Uagazina," Deesabe**^ 1^7.]>p.]«6~175, gives an cxccHeut **idea** of the bTjli^b **Mnemi groups,** thou^li th« **Illactratiooa, not** Ijeiuy **pbotogtapbio,** <l« mil iifl'unl tlie op]>ortimitv for judging tJie degree to whkh the *cue**ssories simulate **ntitiirat** effects.

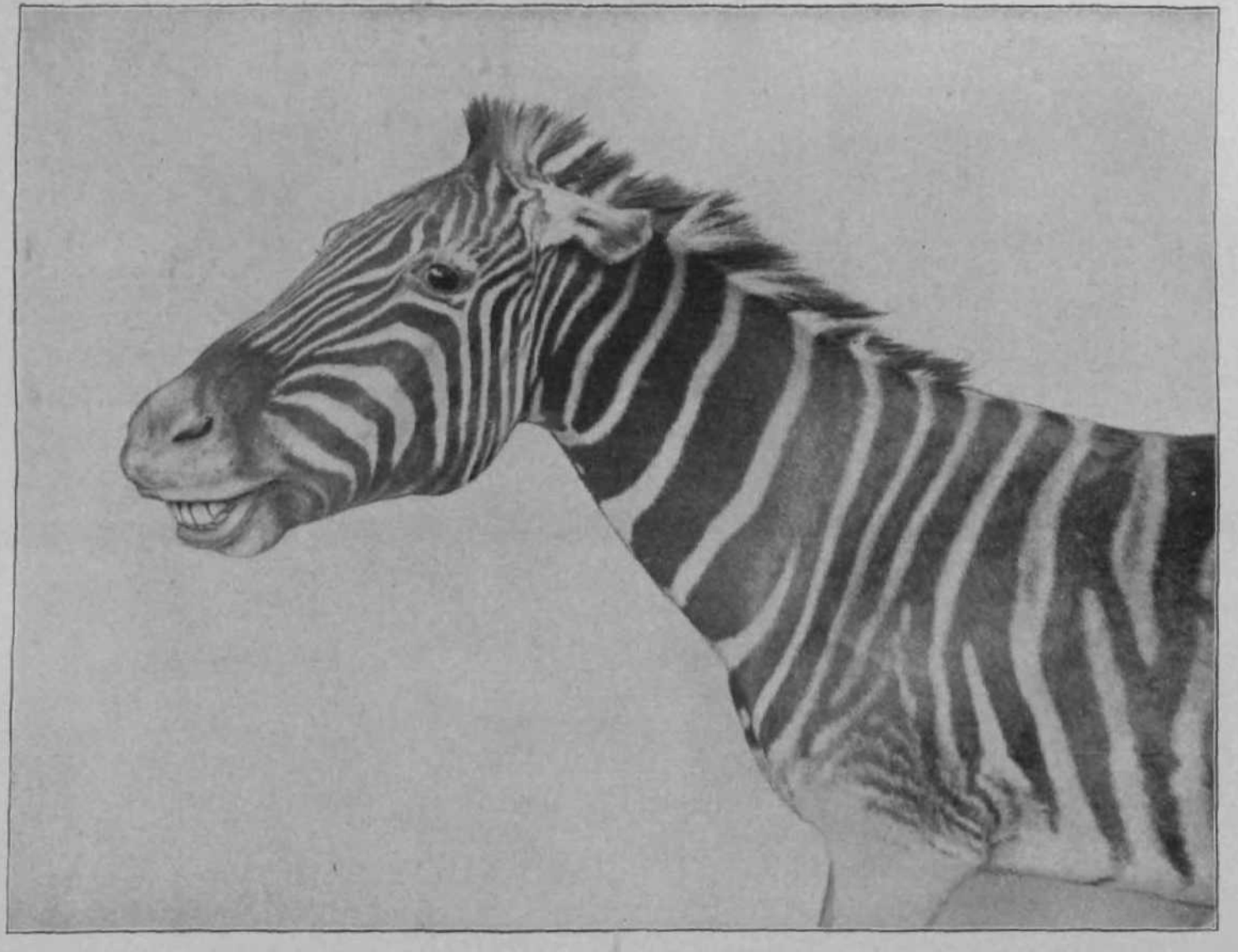
W« ! ran k I y admit that in **the** titati«r tu .inin.uuniir.il >;II>IIJ.-. **of birds, Groat Britain** still **m i y m a i** thf I'uii.d State s. So far as **taxidermy** is **ooaoemed,** An:,eriuin wnrkrapii **eaa** ln>lrl their owu, lmt the art ***ot*** iiuiking and **grosr.ng aceuaorJM** we have yet in acquire. The only succes»fnl acce*«ory w«rk done in this country is thiit 1>»' the Mogridgen, ^^° wer« Trained at SoutlI **Kenatsgimi,** iiml **who an** represented extfJL^L^t•l^• ia tb(? Hsu ^<»rk Museum ami |>y one piece in **WaaUagtOtt.**

Many uf the gTonps of this kiutl, even w!,«n made *h*\ ih<- **Ifogii**lges, err in making the aci-fhsiu-ic**s more** p>nmtiiii-ut **than** tlic hirda and tilling tin cases with artifiri;i] tiowcro ami leaves to such it **d«grM** that ilu- **bird*an *a**tirely**knbordin**ite. An excellent iIIlistm;ion of effective **and legitimata** use of accessort«s is to be seen in the admirably group <i knii:-!:iil> m the V-w T« k Museu in.



MEAD OF TIGEH, —FELIS TIGRIS.

Mount"! ⊳t W T HuniHdav. illiiturntiup **moddlHg** in **dw** under the akin. Ears with metallic autetftufcea **for** cartilages, and tongue skinned and built up wit bin vrith *clay.*



BURCHELL'S ZEBRA," EQUUS BURCHELLI.

Mounted by W. T. Swnaday. Showing method of modeUng of lips ami eyes.

is in preparing the other classes of Vertebrata aiul the In vertebral a that American taxidermists take the lead, and it is their excel leu ce in this direction that we have endeavored to set forth as an example.

But for the general approval of the American work, as shown in the comments upon this paper, I should perhaps not venture to express so frankly my own opinion as to what the American taxidermists have done, and, as it is, this is done chiefly for the purpose of explaining the causes which have led to its development.

The editor of Natural Science is quite right in questioning Dr. Shufeldtfs statement* that the development of taxidermy in the United States is due to the stimulating influence of the World's Columbian Exposition. As a matter of fact, the taxidermy at. the Columbian Exposition, with the exception of that in the Government building and that of Prof. Dyche in the Kansas building, was decidedly poor. Certain mammal heads mounted by Mr. Stainsky were of high merit. Beside these, there was scarcely a specimen of remarkable merit in the general taxidermic display; and many of the groups, so-called, illustrating the fauna of special States, belonged to the grotesque and unworkmanlike period of twenty years ago.

Very important advances had been made before the Chicago Exposition was organized, and there was scarely a group among those shown by the National Museum which had not been planned and partially executed before preparation for the Exposition began. The Caribou groups already referred to are possibly exceptions, but these were simply advances along established lines.

To emphasize the fact that work of the very highest type was done in the Museum as early as 1884, representations are given here of a tiger (PI. 34) and a zebra (PI. 35) mounted by Mr. Hornaday and his assistants at that time. These have all been engraved before, but so unsatisfactorily that for the purpose of making a record in this place new plates have been prepared.

The true explanation of our advance in taxidermy lies in the happy relationship which was established in 1882 between the authorities of the Museum and the representatives of the Society of Taxidermists. These were based upon a recognition of the dignity of personal labor, and a recognition of the fact that work of this kind could not be done by men who counted their pay as the only remuneration for their exertions. The taxidermist was recognized either as an artist or as an expert artisan, as his individual capacities might merit, and he was encouraged to do every part of the work with his own hands, trusting nothing to laborers or ordinary mechanics. He was furthermore told that one specimen well mounted would be more highly appreciated than twenty "stuffed in the old way,* and that no expenditure of thought,

• Dr. Shufeldt Assures me that his statement has been misapprehended, and that he quite agrees with the critic in his views as to the cause of the development of the higher taxidermy.—G. B. G.

time, or material, was too great, if needful to secure the very best possible results which his abilities would enable him to produce. When he had accomplished a really creditable and conscientious piece of work, his name was placed upon the label as its maker. In this way a good piece of taxidermy is placed in the same standing, in its way, as a book printed by Mr. William Morris or one bound by Mr. Cobden-Sanderson.

One of the former members of the Museum staff of taxidermists, now engaged in other pursuits, writes:

The fact that the National Museum gives the author of a really good group credit for it ou the label has had a great influence for good. The American Museum is the only other that I have ever known to do this; but if the museum officers generally could only know the tremendous stimulus this is to even the humblest taxidermist all would take advantage of it. And it costs nothing. If your plan in this respect were universally adopted it would be a constant and powerful stimulus to the production of the finest kind of work.[1]*

No taxidermist or modeler was placed in a responsible position who was not himself a naturalist and whose own instincts did not lead him to study a living model or the best attainable pictures or sculptures of similar subjects belore beginning his work, and whose painstaking habits of research did not have an influence upon his method of work to such an extent that he would work out every muscle and bone with reference to casts or skeletons before him in his workshop.

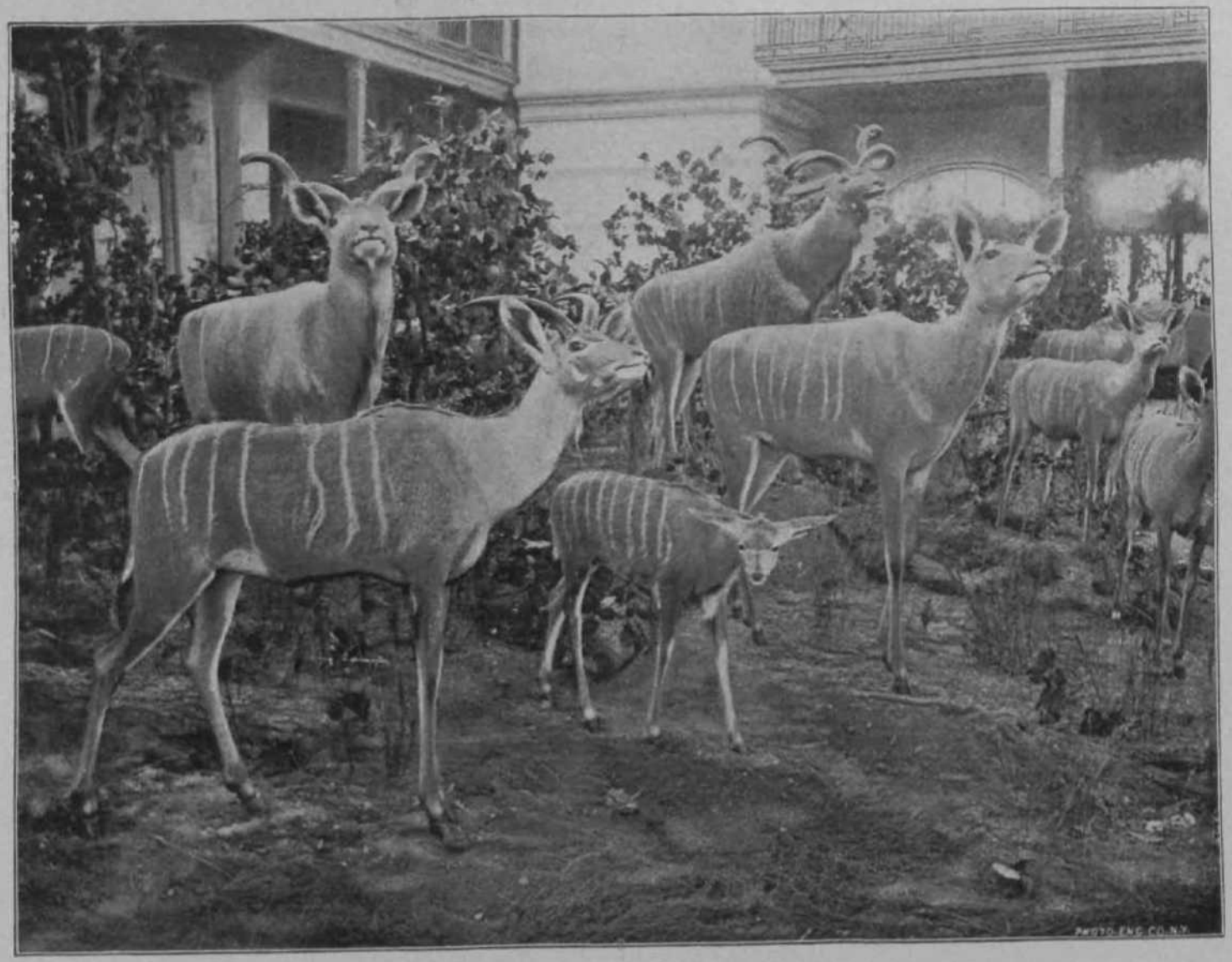
The workshops soon became filled with photographs and casts; and among these would be seen models and sometimes originals from the hand of Barye and other sculptors, whose art the taxidermist attempted to adopt as far as possible into his own. Tliese men were members of the scientific societies, and some ot them have since become specialists in science, although they have never lost their relationships to their previous work. Prof. W. B. Scott, of Princeton University, and Prof. F. H. Knowlton, of Columbian University, did excellent work in taxidermy before leaving it for research-work, and Mr. L. L. Dyche, although professor of zoology in the State University of Kansas, mounted with his own hands most of the specimens in the great groups shown in the Kansas State building at Chicago.

Incidentally it may be mentioned that many American naturalists are amateur taxidermists, and that some of the most successful groups of mammals and birds in the Museum have been done by workmen not possessed of artistic skill though excellent in technique, whose work has been designed and directed by the curators of the several departments.

In connection with these discussions of American work it seems desirable to refer to the extensive collection of South African mammals and birds, exhibited at the Dr. Emil Holub's South Africau Exposition in Prague in 1891.+ The mammals were mounted in groups in

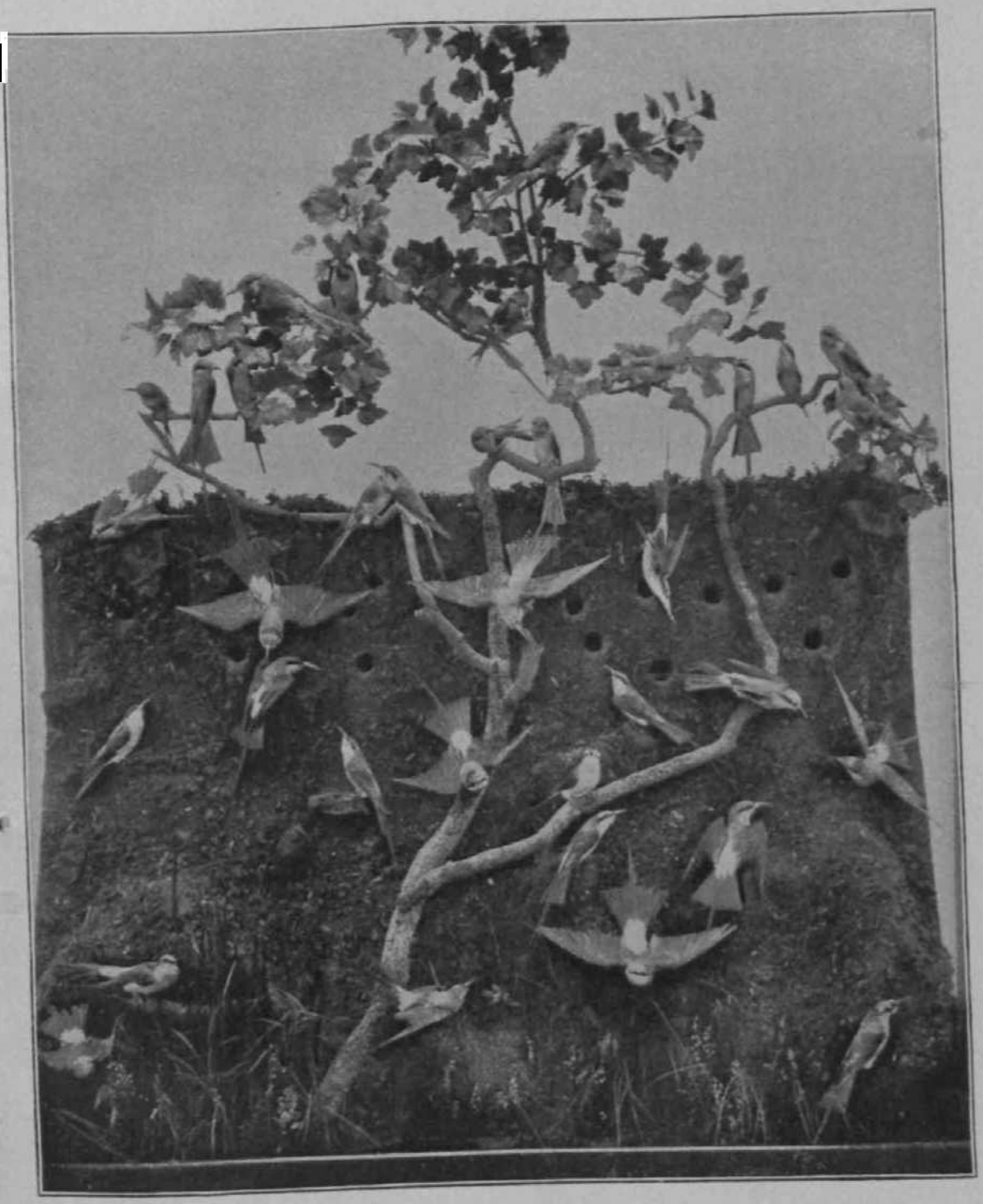
* A **label of** the **kind here referred to** is illustrated in one **of** the plates.

t Dr. Holub's South African Exposition was held in the building erected for the National Jubilee in Bohemia in 1891. Here were exhibited the material **results** of



GROUP OF TWO SPECIES OF AFRICAN KUDUS, STHEPSLCEROS CAPENSIS AND S. ZAMBESIENSIS.

Collected *by* J»r Kuiil **Holuband mounted *antar* htedlreotkw for the South** African Exhibition. Prak-u-*, 1893.



A " NESTING COLONY " OF MEROPS RUBICOIDES, ON THE LOWER BANK OF THE TSHOBEL RIVER, .NESTING COLO^ ^ J(JNCT|0N W|TH THE ZAMBESI. (Mo-RUTSE KINGDOM..

Mountad under tbe dtoeotkffl of Dr. fcdl Htitat. for th« South African ExhfWtton. Pngue, 1892.

GROUP OF *OCTOPUS* —OCTOPUS VULGARJS.

Mounted in a i;iass case to produce (hu effeet ef 1MB under water.

varied attitudes, and some of these groups were admirable. One of them is here illustrated, as well as *one* group of birds (Pis. 36,37).

Environmental groups of marine animals.—It has long been a favorite idea of the writer that the appearance and habits of tishes and other aquatic animals might be best shown by mounting some of our colored casts among natural surroundings in a case resembling an aquarium tank, and admitting most of the light from above through glass so tinted that the appearance of being under water would be given. All attempts in this direction failed, however, and it has remained for Mr. Lucas, in his group of Octopus (PI. 38), to show that it is possible. It is intended to carry this still further, and especially to attempt to show the life of the coral reefs.

Some groups of reptiles, colored casts in the midst of natural surroundings, have also been completed, and these, though not realizing our highest ideals, show that there are good possibilities iu this direction. The stuffing of skins of fishes has been carried to high perfection in Europe, owing to the desire of anglers to preserve trophies of their successful excursions in their own homes. Simple accessories, such as suffice to represent the shores of a stream or lake, are used with them with a very good degree of effect. A wonderful display of these angling trophies was shown at the International Fisheries Exhibition in London in 1883. It is our experience, however, that it is scarcely advisable to stuff a scaly fish or reptile. Sharks may be stuffed, but fishes are neither satisfactory nor lasting. If casts can not be had, it is best to be content with preparations in spirits.

The mounting of the Pacific tcalrus.—hi the discussion of the recent taxidermic work in the Museum which has appeared from time to time during the past year in the scientific journals, the Pacific walrus, which was exhibited at the World's Fair, has been severely criticised, and it has been said that it is inartistic and false to nature.

The preservation of a worthy memorial to the North Pacific walrus is especially desirable, since this is one of the species threatened with extinction. Numbered by tens of thousands and flocking together in immense droves when the American whaling fleet first entered the Arctic in 1854, they have now been reduced to a mere handful in American waters, and the old males are now entirely extinct iu the Western Pacific, and it is doubtful whether this particular phase of the species is to be found anywhere. The specimen shown at the World's Fair (PL 39) is an admirable example of the old male, and since it was

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Dr. Holub's second exploring trip to South and Central Africa in 1883-1887, which were first exhibited iu 1891 in Vienna. The exposition at Prague was the most complete, 13,000 objects being exhibited in addition to the groups of mammals which were mounted in accordance with measurements made by Dr. Holub in Africa. There were a numbrr of groups of natives exhibited in connection with their actual dwellings and the implements of their arts and industries. A large album of views of this exposition and of the groups was presented to the Institution by Dr. Holub.

acquired only after long and **continued** effort it **seems** IMU **propel** that its t•nth **to nature,** as now hmmtteil, should **be vindicated.**

The skin in iiucstion was moniUed by a most skillful ami **constien**tinus **member of the** stair, rite **ohlef taxidermist, Mr.** William **Palmer, who spent some months** on **the** IMbilof **Islands making** preliminary **studies** in order to lit **himself fox** tliis particular **undertaking,**

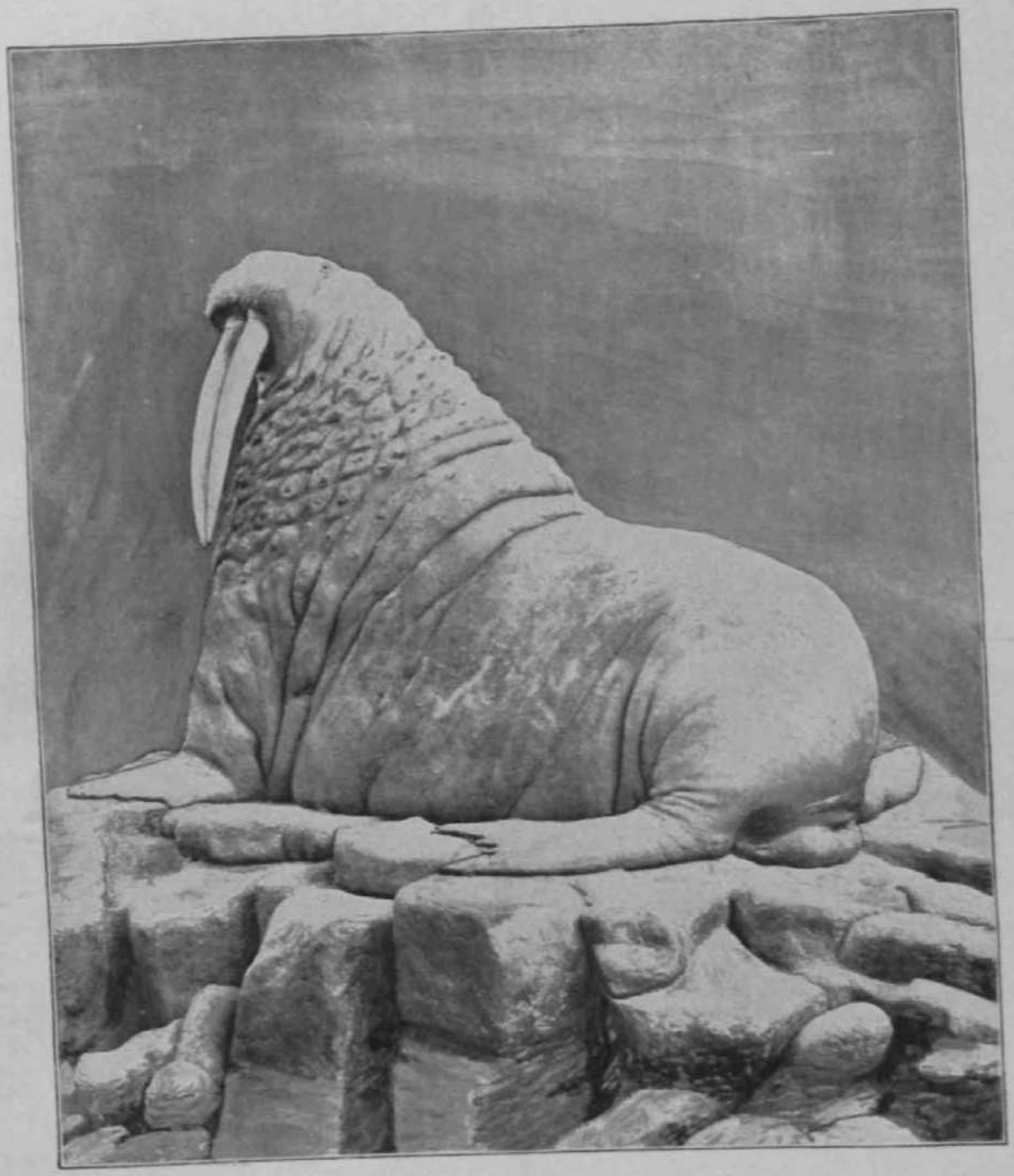
Cap*, K. P. Retendeen, formerly of the **U.** S. Coast Survey, **who was** familiur with **the Aictk < toean** for **fifteen pears,** and who has **geen te**ns **of thonaandB of walruses** in **the times when they w«w abondant,** in **1854** and in subsoqiu'n: years. and who lias **seeu thousands of** tliem at **one time** upon **the shore** at **Bandy** Point, **Bays of the specimen** in the Museum:

1 am satisfied that **the** iinumt«*d walrus is* true to **rtttnre and** in **every respi**ect an **admirable** piece of work. The **only eritieuwa which** 1 would **nuke** *n*\<on it is t Hat as auiuinl in the attitude nf t'\trt'in*' atirutimi and activity in **which** this is re**presented** would W, #)ightly smaller about the **neck.** The imu gement of **the wrtnklei** in the skin and thr **tobercnJaied appearance of ttssarfaceen** perfect,**and the** attitude of the limits can not **be** criticised.

The following **statement of the material** upon **which the treatmo**t of the skin was **founded** is supplied **by Mr. Palmer:**

(1) Fertoiial observation.*— Un AiigiiBt 7 **we landed** Mom **the** *V.* S. reveii ue-cutter *Ru*•A on Walrns Island, **having previously** »een **the mniiaut of a walnuhi**rd, consisting of eighi indiv:duals, oii tin• ishiml. We laudwl on the southfiu t-nd of the iiiland **aitd** made our way nver the rocky interior toward the **walraa,** but **mfor**tuuiitt-ly the vessel remaine'1 within **aigbtof** the animals, tun I the sailors from the **Wat** in which we **bad** landed instead of keepisg on the **QUM** side of the i**daad** persisted in (;etiiii|Lf int" view **of** the **walma, with the Ifesalf thai** before we got vlitliiu sbtxiting **distance** they ntade **prepayatjona to** leave the **rocks.** *I*-efore us \ras **tvUei**revicé i:.itherinkrt **foil of i**rater, so iU.it it **was** unpossible to get over it, and there not being tiine to gel aroniiti the head of it befon the w i**l**rus took tn **the** wate•r, I sat down on **abfl meka** at tl e edge of the crevice and examined the animals at leisirre. Before they had reached the water I had succee**dad** in tixiug in *my* mind the mo**itimportam** features of their pi:ysiogiuomy. **The walrus nearest** to me iras tin[1] nil'- that I I'XiuuiiH'd most thorunglily, aad I convinced **myself** of ibf **fa«-t** i hat thu general **poeitiana *ot*** the **walrus, M** delfoeated in Mr. Elli ott's pic ures, was true, ami in mounting tl is speci**aea 1 feUowvd as** cltmely as jKwsibte the **pletore which** remained in my miml <f this particular **walrns.** 1 **bad** a i ne view of **the** annual, vrLicit was **illltailt** *uot* mor« ti an 20 KKU and within easy gu nshot. No attempt was **made** to kill the animal, **ho**wever, ***ttbem* it** was so near **the w»&**r that if it tiad Lit-*n struck it **would** i ave faliiu **and** been **teat Then,** to<», 1 **hoped** tliat **there** might l*e another **opportonh** y of cap tunng a **speeiSM**n.

(2) *MmtMremtmt front the fresh specir„*r«.—Th»- akiit which was me**nates]** was obtaine.1 by **the** /.M*^ tin **d**ays afterward*. ThU waa after I lel't tlio island, **,ow**ever, and I wan **imiMe** t> Httnly ihf animal in t:.e flesh. *Dr.* **White, the** siir^etm of **the i**utter, however, made carefnl **meaamaaarni**s in accordance with specifications **which 1 left** in his *h*ands, a>*i* I am •atisfied that **th<**se measurements are accurate. Th.y met all the necessities of taxidermy, and are practically those which I would hav,» taken had I been present. The only thing lacking which I could have supplied **wonldl**ave bee uensts .nd photu^raph-. of certain portDM I had. how ever, the advantage of the head already **in i**he Muse itn, **wfcieb «**as received from Alaska in pickle and practically in the flesh, and was **mounttd** ii> thut condition after careful study by **Mr**. Hornaday. **I *l»o** hud • photograph of the great head of an Atlantic walrus.



PACIFIC WALHUS.-ODOBOENUS OBESUS.

Mounted under **tta** direction of William **Mmer lor** it:e U. S. Natiot »l Miwum.

MOUNTING THE PACFIC WALRUS.

(3) Pictures,—1 hud devoted some years to making a collection of tracings of all the illustrations of the walrus in books of travel and natural history, and think I had assembled some twenty of these, and am satisfied that I had, if not all, at least all of the most important of those which made any claim to have been made by observers. These were all quite unlike Mr. Elliott's drawings, but, as I have said, personal observation satisfied me that these drawings were true to nature and the others not. I showed Mr. Elliott's pictures to many of the natives and others on the islands, who all expressed themselves as perfectly satisfied with them.

(4) Anatomical indications.—In mounting the specimen the large wrinkled folds on the skin around the limbs and body were followed as closely as possible, and these, as every anatomist knows, indicate in no uncertain way the customary attitudes of thick-skinned animals such as the walrus, the rhinoceros, the elephant, and the armadillo. The shape and position of the warts on the neck, which look so grotesque and unnatural in the .Elliott pictures, were clearly shown in the skin and could not possibly have been very different from those which Mr. Elliott delineated. Even the inflamed surface as shown in the drawings, giving such a ghastly and disagreeable appearance to the animal, were manifestly true to nature, which is also supported by the testimony of people on the island and bjf Capt. Hcrendeen.

The deep wrinkles at the base of the flipper have been criticised us unnatural, but my own observations on many specimens of fur seal, sea lions, and walruses, and which are confirmed by many competent observers whom I have consulted (in fact, they can be readily found on any pickled skin), satisfied me that I was correct.

The thinness and smoothness of the skin in the center of these wrinkles, their position and general direction, even as illustrated in the palm of one's own hand, will couvince anyone who sees them that there must necessarily be wrinkles at those points when by the position of the animal the skin and blubber is entirely released *of* all tension and even crowded on itself; indeed, the most conspicuous feature of the surface of an animal of this division of the pinnipeds as he moves about, is the rapid change in the position and form of these wrinkles on many parts of the body.

The accompanying illustration (PI. 40) shows the manner in which the folds appeared in the fresh skin, the process of making them permanent, and the manner of preserving them as the mounting progresses.

Criticisms have been made also upon the shape of the nostrils. In regard to this I can only say that my guide was the appearance of the nostrils in the skin before it was fleshed, and when it was comparatively fresh. This I considered myself justified in doing, since I am not aware that anybody has made careful observations upon the appearance of the nostrils close at hand, except Mr. Elliott, whose drawings correspond with my interpretation, and Capt. Herendeen says that the walrus never opens its nostrils wine, and that it is only when breathing or excited that they are open to any considerable degree.

It has been also said that the neck is possibly a little too large, but the dimensions of the specimen as mounted are smaller in this part than is indicated by the measurements made by Dr. White. In mounting it I took into consideration the probability that the animal in life, standing with head erect and muscles rigid, would measure somewhat less.

It should be clearly stated that the preparation under discussion was intended to show the appearance in life of th« animal to which this skin belonged, namely, an old mule such as are rarely seen, and that none but old males assume the grotesque attitudes of which this is one. A young male would never present the same appearance even in the same attitude, because they are comparatively smooth, with thinner skins, more hair, and fewer tubercular growths upon the surface.

It should be said also that this represents the animal upon laud and in action, juntas it would appear after being aroused from sleep and just before making its way to the water. The customary attitude in which walruses are mounted, with

the flippers stretched out behind as in the hsiir seals, is not itself untrue to nature, but is only assumed by them when in repose or asleep, while with the hair seal it is constant.

It has been questioned whether it would be wise to mount a young Pacific walrus in the same attitude as that of the old male under discussion, but Capt. Herendeen states, from his experience, that all walruses, young and old, assume these positions when in action.

REPRESENTATIONS OF THE HUMAN FIGUBE.

For fifteen years the Museum has been constructing models of the human figure for use in the exhibition series, and has been striving by various means to secure the best results in this direction.

These figures are required for three purposes: (1) To show the characteristics of the different races, (2) to display costumes, and (3) to illustrate the methods of use of weapons, instruments, and processes of various arts and handicrafts.

For the first purpose it is manifest that the greatest accuracy and fidelity to nature is necessary, or the result will be useless. For the others the same degree of accuracy is, perhaps, not essential, if the labels clearly indicate that the faces are not portraits, but so far as possible the figures intended chiefly to show costume and action should attain the highest possible anatomical perfection.

The use of well-constructed figures in scientific museums is of quite recent origin, though manikins of conventional type have long been employed in collections of costumes and armor; and many very creditable efforts in this direction have been made in connection with expositions.

Before beginning our experiments we were familiar with the altogether admirable gallery of historical figures in Gastan's "Panopticum" in Berlin, and with those of Madam Tussaud in London, not so very good in execution, but nevertheless of high interest to the masses. We knew the representation of races of mankind at Sydenham and the Swedish peasant figures which had been so popular at the Philadelphia Centennial. We have since become familiar with the separate groups showing the history of primitive man, made for the Paris Exposition in 1888-'89, and the figures of race types in the Trocadero Museum in Paris. Indeed, we owe to the courtesy of Dr. Hamy the privilege of having had made copies of several of the latter, one of which is here illustrated (PI. 41), and at the same time obtaining a replica of the Roman warrior in armor, modeled for the Museum of Artillery in Paris, by the sculptor Bartholdi.

It is scarcely worth while to mention the ghastly wax figures of Kane, the arctic explorer, and his companions, iu costumes of fur, which were displayed in the old Smithsonian Museum as early as 1870. These, and the equally crude manikins of Eskimo Joe and his wife Hannah, made in 1873, have long since been discarded tind have no place in the history of recent efforts.

FIGURE OF MASAI WARRIOR, UPPEH KONGO.

From specimen in tiw i U.S. N itkawJ Mowoffl^a replica •-f Dn- Sgtuv In tK- Mm>> >iti 'i rocadéro, Paris.

JAPANESE MAN AND WOMAN OF THE LABORING CLASS.

Manikins constructed In Jap» f^tlu- U. s. Nattonal Kuwran.

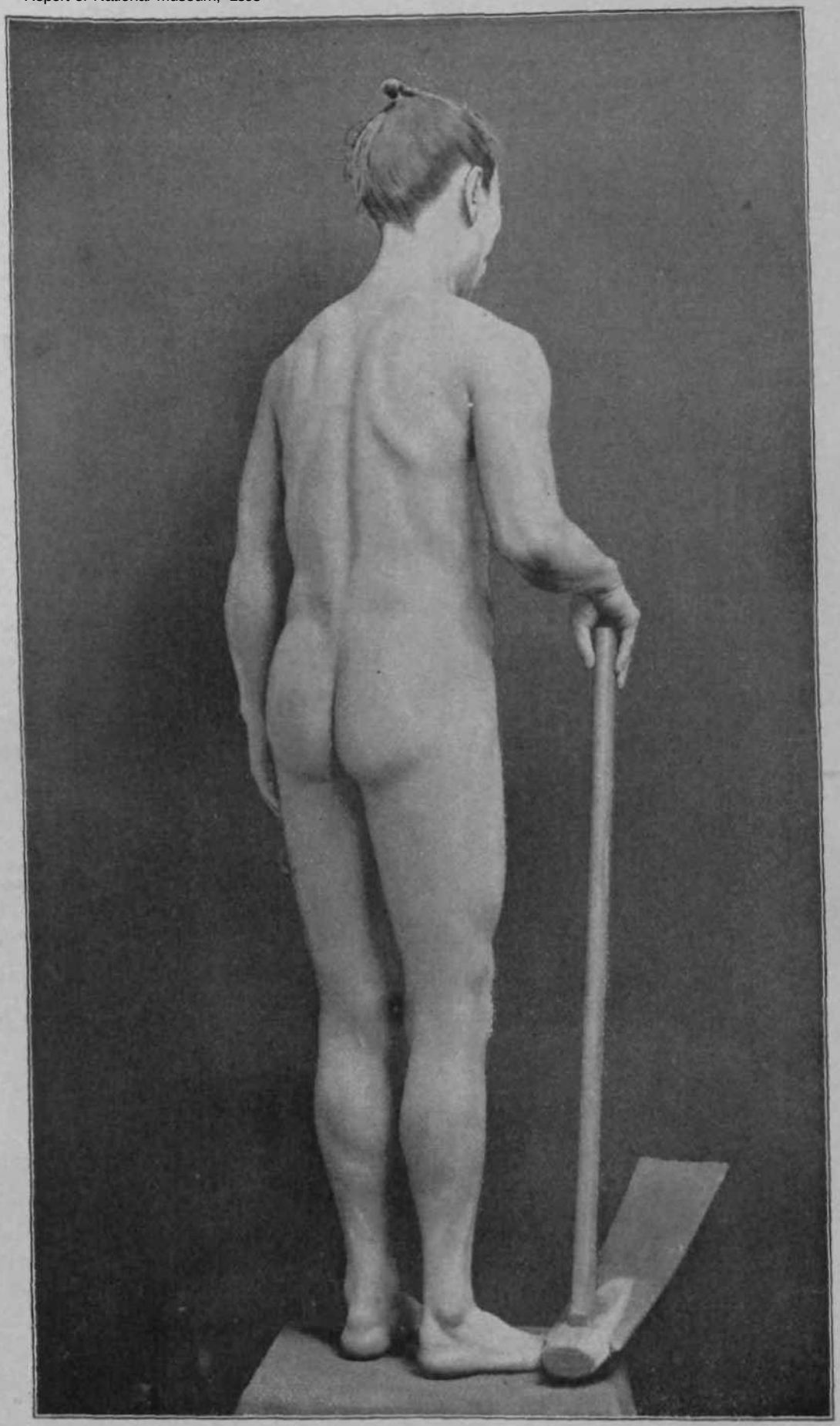


FIGURE OF JAPANESE MAN OF THE LABORING CLASS, UNDRAPED.

port of National Museum. 1893

KAN-KU-WASH-TE-WIN (THE GOOD ROAD WOMAN*, YANKTON SIOUX.

Plaster cast, with hair. eyes, **uu) ooetonu In plwter. Hedged fortto U. a. Kaekmal Muwun bj M Acblte (JoUn, mi>l painted by A. Zeno snmaier.**

CHE-TA-WAU-KOU-VA-MA-NI (THE HAWK THAT HUNTS WALKING), MEDAWA*KATON S.OUX

Plaster cast, with hair, eyes, and costume in plaster. Modeled for the U. S. National Museum by M. Achile Colin, and painted by A. Zeno Shindler.

(Cat. No. 76838, U. S. N. M.)

CHOCTAW SQUAW (ROSA WHITE THUNDER).

With artificial hair; sculptor's eye by J. Master; and MUSEUM costume, modeled by D. J. Brenner for the U. S. National Museum.

The first advance-wore made in 1875, when Fourcostamed figures were imported from Japan. These were exceedingly spirited and effective, and when examined in detail Showed Bach conscientious wuifcnuinsuip and sndi thorough fidelity to nature that they have served as an inspiration and a model for our workmen up to this day. Two of these figures,representing an actor and aa actress in the costume of .Japanese nobility, were carved in wood, ami Been to show tin; i extreme limits of this man-rial in the construction of (lie human model. The other two, a Laborer and his wife (PL 42), arc in pfipier-mache' ami are satisfactory in the highest degree. Tin- material is brought to an extreme of hardness, strength,aad delicacy of line which no American workman has been able to rival. Indeed, we have *noi* yet progressed beyond the use of the inncli heavier and clumsier plaster of Paris. *The* modeling is almosf perfect, as may be judged from the fact that the figures, with or without clothing, stand poised upon their feet without any attachment to the bottom of MM* case. The hair is attached directly to the figures and has none of the wi^like appearance which is almost universal in figures of rhis kind. The eyes, though glass is used for the outer Mm. are not. ^lass eyes. Even the aailt! willingly fashioned of horn and inserted j and the coloring, of which more will be said her. et the despair of our workmen. The figures :ts a whole exhibit such conscientious and painstaking accuracy, and such fidelity to nature iii the smallest details, that too mueh ean not be said in their praise. (See PI. 43.)

In L881 Rome figurt were mad*- for us by M. Achille Colin, a French sculptor living in Washington, on a new plan. These were executed in accordance with the rules of sculpture, the hair and the clothing to be of tin- same material as the head and body, and the sculptor'a eye [n be used instead of the customary one of glass. They were then painted by a portrait painter whose life had been spent in delineating Indians. The result was thoroughly satisfactory, and nothing better has since i»<en done. (Pis. 44 and 46.) It is probable that this method will be used more and more in the future, since many of fteraces whose lineaments and costumes ir is mosi desirable to perpetuate »an only he shown in this way. Their costumes BO longer exis;, and must: be supplied by the modeler and painter from such portraits as those of which we have a large number in t;:m gallery. When actual garments are not \\M'<\. there is no reason for the unsightly wig or the staring glass eye.

A modifli cation of i^lll< *SAm r to*tth°&* Wlls employed by Mr. l\ s. J. Dunbar, a Washington Bonlptor, in modeling the bee of a 8ionx girl, Rosi i White Tliuuder, for a full-length figure to be clad in a modern Sioux costume of blue cloth ornamented with elk ivory, obtained from the original, at that time a pupil in the tod boo! at Carlisle. In this ftgure, although the sculpturei l eye i a used, the hair is represented by a wig. The result is only partly satisfactory, but the experiment is an Interesting one, PL 43.)

More recently other methods have been employed. Mr. J. W. Heudley, a man of great ingenuity and mechanical skill employed in making models of fruit, produced a cast from life of a negro boy, which in its way is something entirely unique. Although no portion of the figure was touched by the modeler or sculptor, it has the merit of absolute accuracy, and yet is surprisingly spirited and life-like—a Samoan youth (PL 47), modeled from photographs under the direction of Lieut. W. E. Safford, U. S. Navy, who is very familiar with these people; a Dyak warrior (Pt 48), produced in the same way under the supervision of Mr. Hornaday, and an Indian in feather costume (PL 49), from a painting by an Indian artist of Chile, are thoroughly satisfactory, as is also a Bantu negro boy, modeled by Mr. Theodore Mills from life, by the aid of casts. (PL 50.)

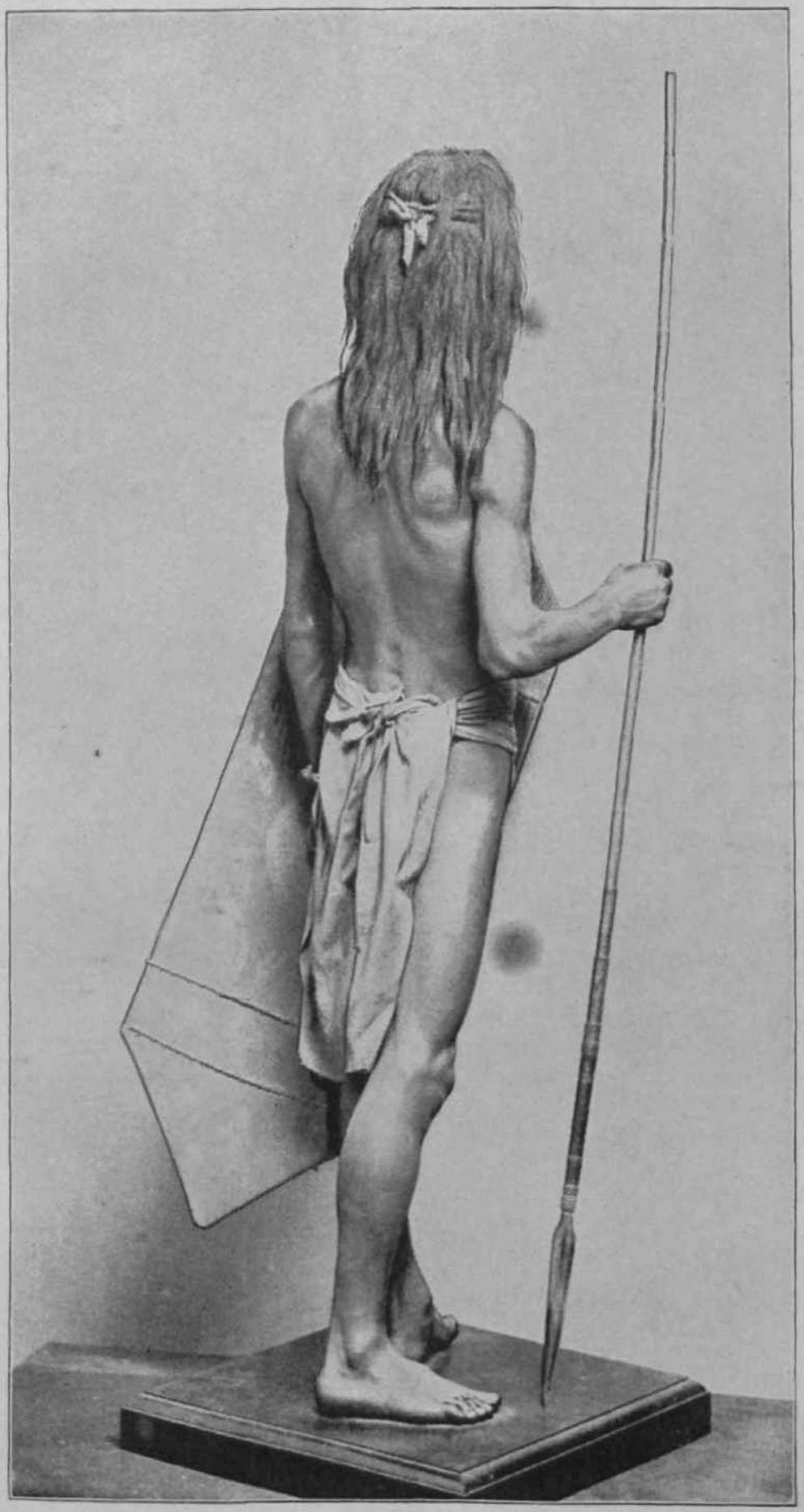
A number of figures of the same general character were prepared for the World's Fair. None of these were so carefully made as those already described, owing to the confusion and haste which always attend the preparation for a great exhibition. A new feature of the greatest interest was, however, introduced among the figures prepared for this occasion, and a set of groups, unique and full of interest, was the result. These, as shown in the cases, surrounded by proper environmental accessories and engaged in the occupations peculiar to the tribes which they represented, were no longer pieces of sculpture but pictures from life. The success of these groups is due to the supervision exercised by Prof. W. H. Holmes, artist as well as ethnologist, who gave life and pictorial expression to the figures already accurately modeled and costumed by the Museum preparators, who himself designed a spirited group of Powhatan Indians quarrying material for the manufacture of stone implements, which was modeled by Mr. U. S. J. Dunbar. *to* Mr. Frank Hamilton Gushing, whose long residence among the Indians of the southwest has given him perfect familiarity with their customs, and in whom mechanical skill supplements an artistic temperament, is due the perfection of other groups showing the life of these people. These are:

1. The Zufii ritual of creation.
2. The Zufii bread-makers and millers. (PL 51.)
3. The Zuñi potter.
4. The Zuñi basket-maker.
5. The Zufii belt-maker.
6. Navajo women, spinning and weaving.
7. Indian women of the plains dressing hides. (PL 52.)

The first group of the new style made was the group of *Kiowa children at play, equally good in its way, designed some years ago by Mr. James Mooney, of the Bureau of Ethnology, who also planned the group of Navajo silversmiths. Dr. W. J. Hoffman's "The Primitive Scribe,"[7] a Chippewa shaman in his lodge writing an incantation on prepared birchbark, and another of a Crow Indian painting a blanket, are worthy of notice.

SAMOAN YOUTH.

Model used for illustration V. P. National Museum by Theodore Mills.

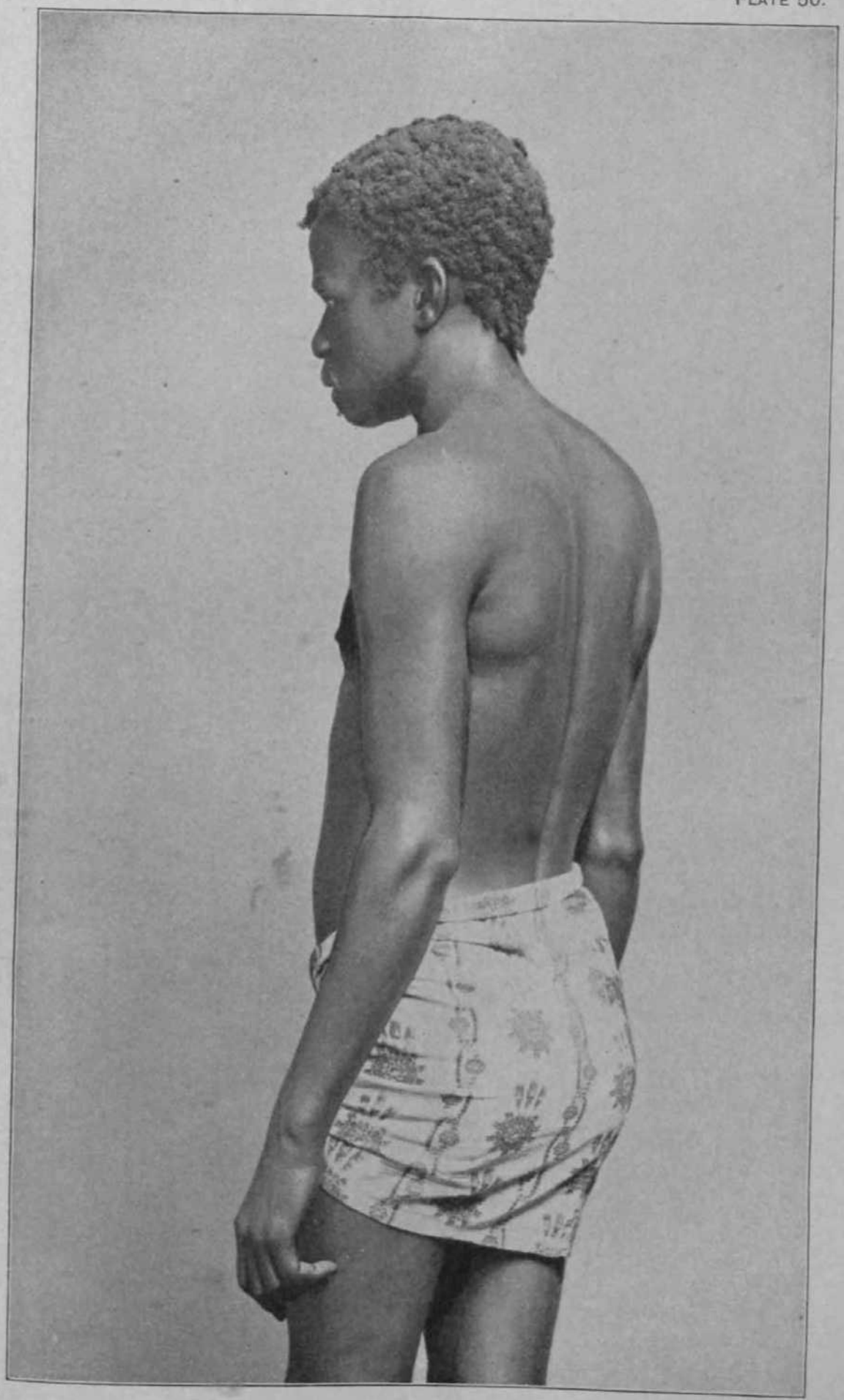


DYAK WARRIOR,

Modeled for the I'. 8. National Unseam by **Tbeodon** KUla.

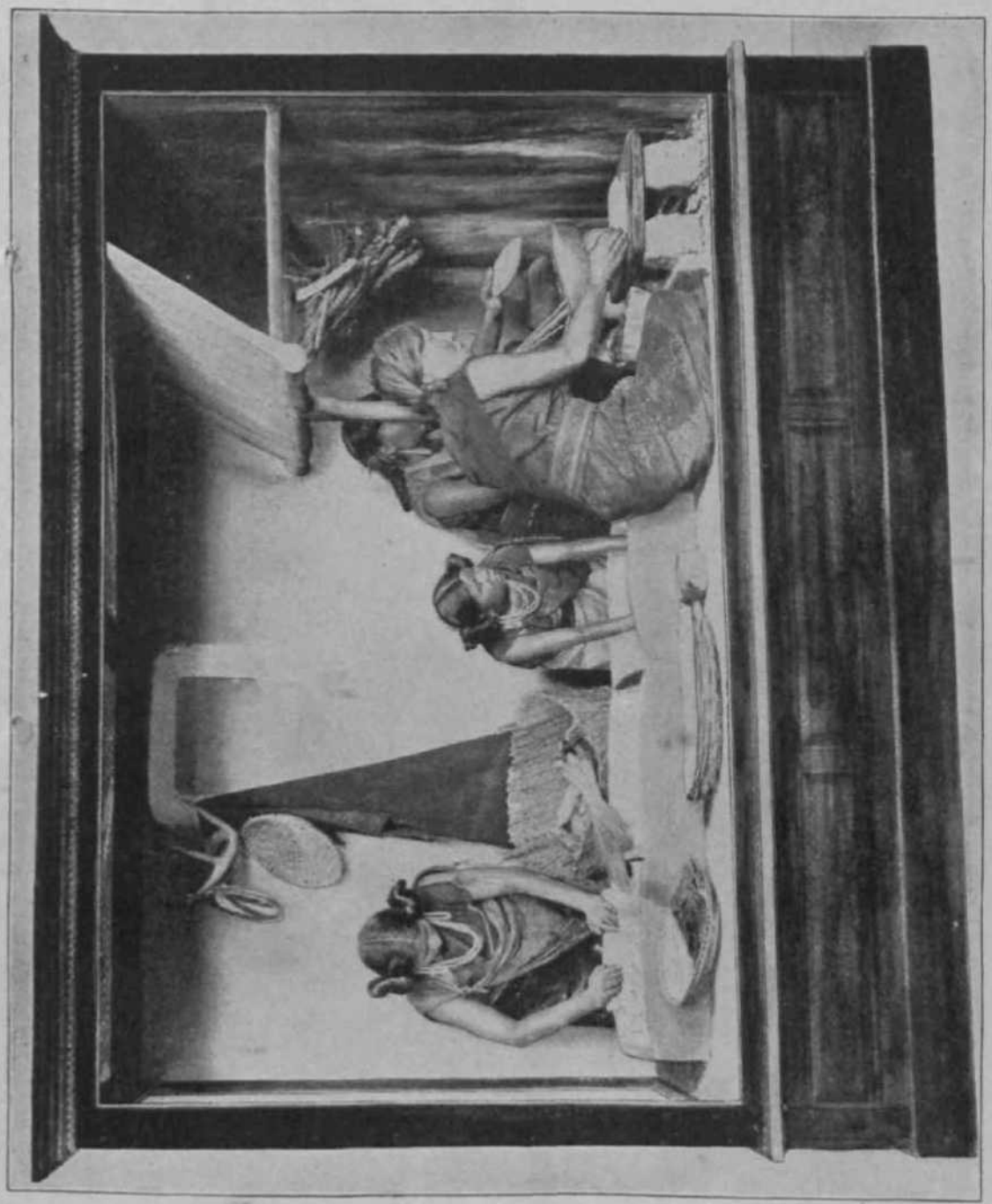
X1VAR0 İNDIAN IN FEATHER COSTUME.

Modeled for the U. S. National Ifnsetun by Theodore Hills.



BANTU NEGRO BOY.

Moileted for tbe U. S. National **Unseam** by Theodore Mills.



ZUÑI BREAD-MAKERS.

Prepared under the direction of Mr. Frank H. Cushing.

PLATE 52.

INDIAN WOMEN DRESSING HIDES.
Prepared under the direction of Mr. William H. Holmes.

The groups of Loucheux and Ilupa Indians, arranged by Prof. Holmes, were also effective artistically, though lacking the advantages which a personal acquaintance with the tribe would have given the designs.

The relative values of costumes and implements displayed upon manikins, and those shelved in cases with tickets explaining their uses, need no discussion. A caution should be written to museum men, however, which is that it is very dangerous to try to make such groups except under the eye of an ethnologist who has been among the people to be represented. The object of a reference to these groups is simply to call attention to the fact that something has been done which was never before attempted for the American Indian, and that the result seems to more than justify the effort.

Experiments are still in progress, and it is believed that figures still more truthful and life-like than any that have yet been produced will be the result. The most serious difficulty to be overcome is in the treatment of the surface of the figures and their coloring. We use only plaster of Paris. Wax, which has been so often employed for faces and hands, has been discarded as being too delicate, and not so well suited for life-like effects as plaster. Papier-maché, as has been stated, our workmen can not manipulate so as to produce sufficient hardness of surface and delicacy of line. The gelatine which has been used for natural history preparations offers no absolute permanence. Plaster of Paris has only one objection, which is the roughness of its surface. It is now believed that the smoothness and texture of the flesh can be produced by the use of some of the mineral waxes.

The question of coloring is a more difficult one. Our Japanese figures, on close examination, do not present a uniform hue, but have a solid body color, enlivened by innumerable dots of a much darker tone. These are produced by some spatter-work process, either by spraying from a stiff brush, or by blowing the pigment in a fine spray from the mouth. When viewed at a short distance, the effect is precisely that of living flesh. Experiments are now being made with the air brush, which will doubtless produce the same effect.

The representation of human hair, especially of the beard, also presents great difficulties; but it is believed that in time the use of plaster and paint will supplant the products of the wig factory.

It will be observed that the steps of progress in modeling man have been very similar to those in the mounting of the lower animals, and the influence of the skilful American taxidermist has been felt everywhere in this work also.

Allusion has already been made to the taxidermy at the Holub exhibition in Prague. The mounting of anthropological groups was even more ambitious and successful, and is illustrated here by three plates, showing a group in action, a group in repose, and a single figure to show details of modeling. [Plates, 53, 54, 55.] In the anthropological as well as the zoological groups, the generous space of the exposition

afforded opportunities which are not often available in museums. Indeed the permanence of museum work seems to demand not only greater comx>actness, but more reserve, repose, and dignity than is necessary in installation for a temporary exhibition.

ENVIRONMENTAL GROUPS.

It is not expected that in the ethnographical museum of the future the lay figure will supplant the show case as a means for displaying ethnographic collections; but just as naturalists may feel it legitimate to use a considerable number of cases of animals mounted in the midst of natural surroundings to illustrate their habits or to make impressive memorials of species which are rarely seen or likely to become extinct, so will the anthropologist employ figures, not only for the education of the public, but as a more sure means of preserving certain of the most precious memorials of the primitive races of mankind.

It will soon be time to consider the question to what extent museums arejustified in the use of environmental groups. It is evident that this may be carried too far and be made tiresome instead of agreeable to visitors, while at the same time producing an effect quite opposite to that of dignified and systematic order, which should be characteristic of every museum. Furthermore, specimens thus mounted, unless the workmanship is of the very best and the cases practically perfect and impervious to air, are certain to deteriorate, since it is very difficult to get at them in order to cleause them and protect them from vermin. The writer has seen neglected cases of this kind in some of the largest government museums of the Old World, which were serious warnings against departure from the practice of individual mounts in cases free from the incmnbrance of accessories.

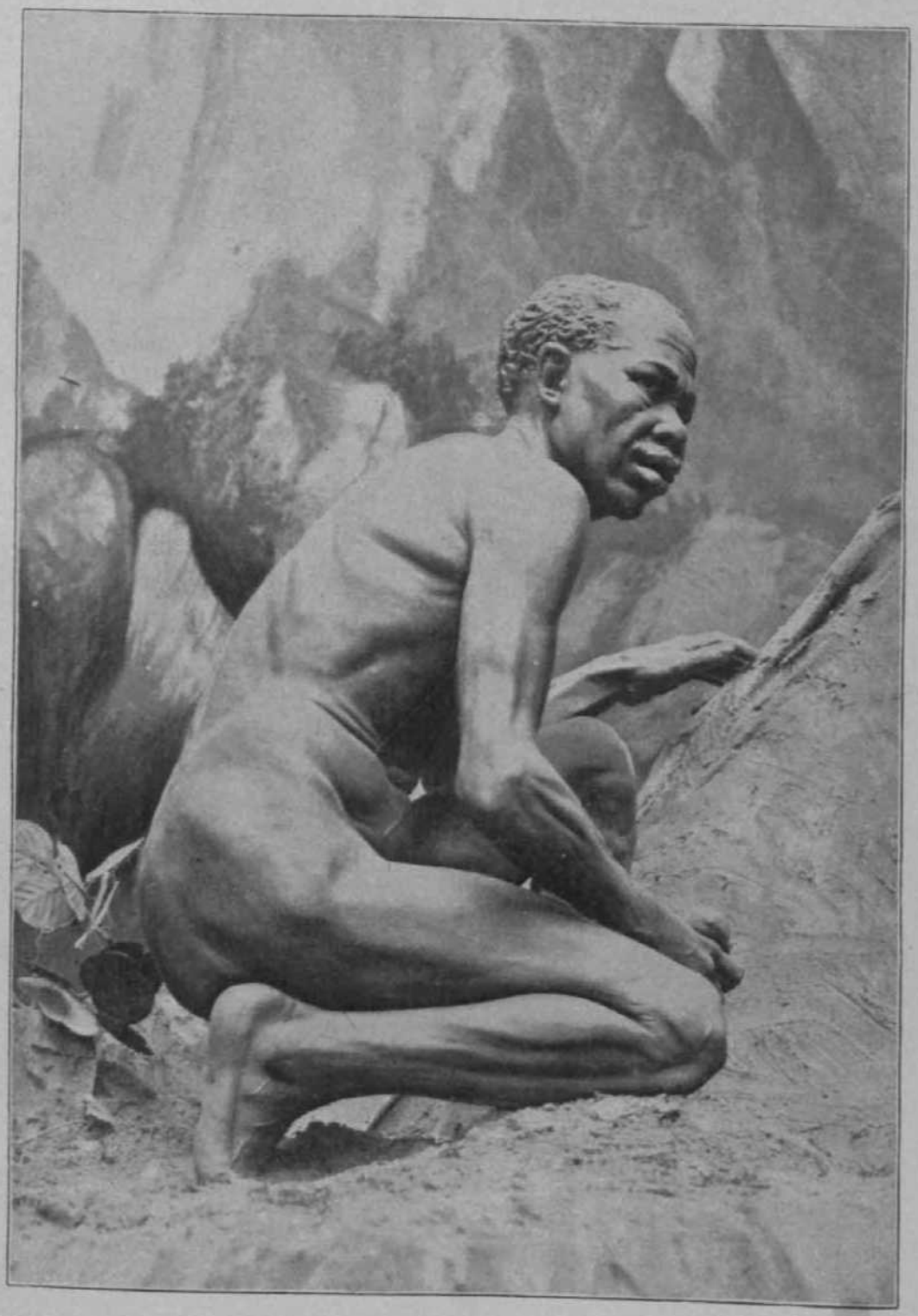
In the National Museum a definite limit has been fixed. Environmental groups will only be made in the case of the larger mammals and birds which are rarely seen and are on the verge of extinction, or for the purpose of illustrating some very remarkable habit.

It has been found in the installation of our department of birds that the series of Audubon's plates, showing the habits of birds, framed and hung near the exhibition cases, are almost as effective as the groups mounted to illustrate the same phases in their habits.

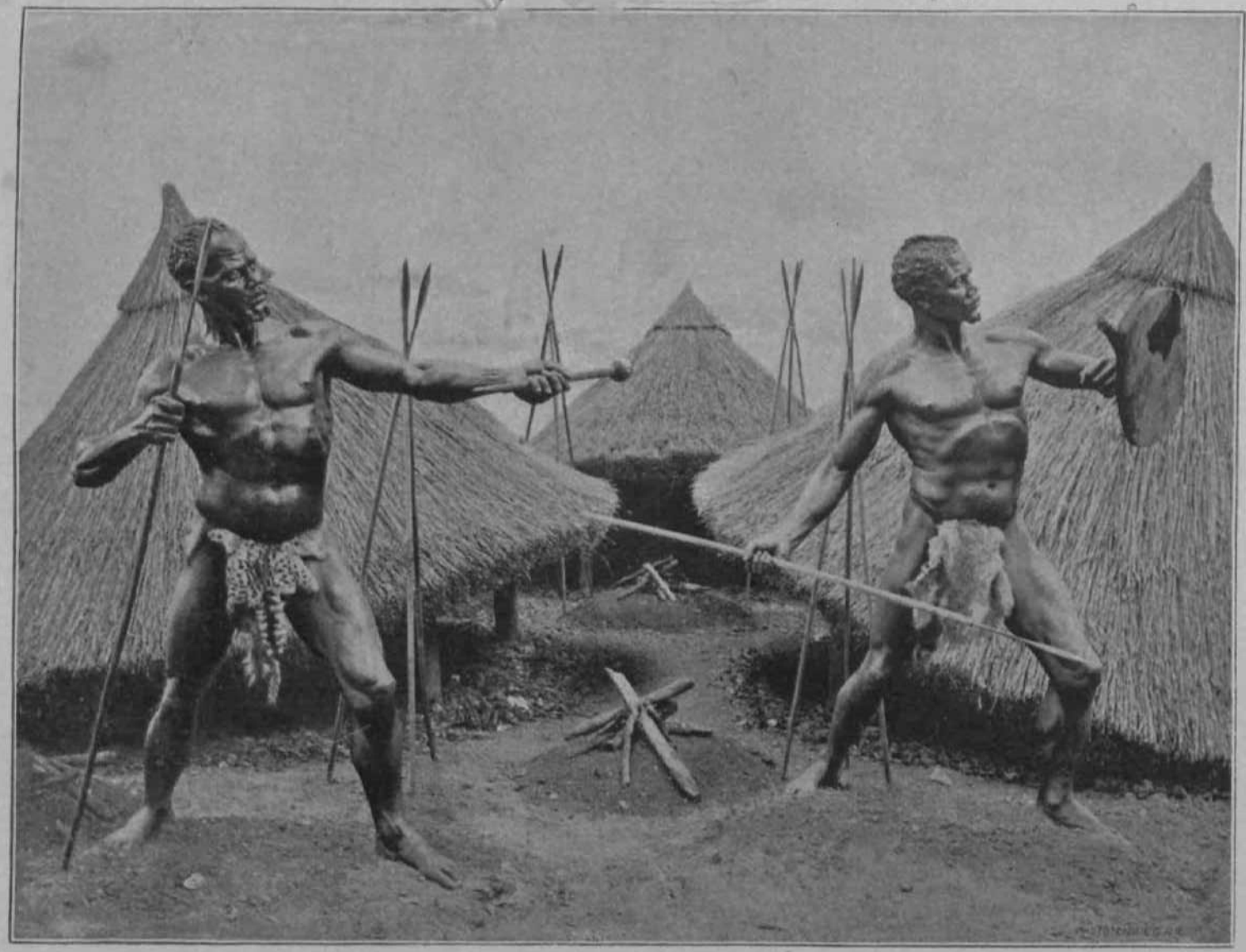
CONCERNING COLLECTIONS AND SPECIMENS.

The following principles in regard to collections and specimens represent in a general way the ideas which underlie all our recent work:

Collections in general.—Any object which has a name may be used in museum work. It does not follow, however, that any one museum should attempt to include all such objects, nor that there are not many which, in the present stage of museum practice, might not be entirely neglected.



A BUSHMAN IN THE ACT OF ENGRAV.NG FIGURES W$_{IT}$H A STONE HAMMER ON A OIO$_{R1}$TE ROCK
Mounted under **the** dmwu.....r Dr. Erail Hotab for **the** Sooth African **XAftttb., Prague,** S*



MATABELE WARRIORS IN THEIR ENCAMPMENT; THE LATTER BUILT UP FROM THE ROOFS OF HUTS OF A MO-TOKO TOWN. SOUTH ZAMBESI TRIBE; ZULU NATION.

Mounted under the direction of Dr. Emil Holub for the South African Exhibition, Prague, 1892.

ZULUS OF NEW SHESHEKE, ON THE CENTRAL ZAMBEZI, AT SUPPER.

[Thefoodfc tasted by the attend ants before the pa**wfcok seated** in **tto** center of the picture i M..vmt.'.t <in.|.;- the direction of Dr. **Enifl Holllb** for the Soittlt Africau E-v1iibiiioii$_{T}$ Pragm*, It[92].

Specimens in a museum are like the types in a printing office. They may be sorted in the cases in conventional order so as to be accessible when needed, or they may be used to make intelligible almost any train of thought or series of ideas, each being available in hundreds of different relationships.

Single or unrelated specimens, though valuable or interesting, are in themselves of little moment in comparison with series of much less precious objects which unite to teach some lesson to student or visitor.

Cumbersome and superfluous materials in collections.—One of the greatest perils to a museum is the possession of vast collections.

Collections which are encumbered with conditions as to manner of disposition and installation are usually causes of serious embarrassment.

Not the least important duty of the curator is to prevent the accession of undesirable material.

Material not germane to the plan of a museum should be exchanged or given to other museums which have use for it. What is expensive and unprofitable to one may be of the greatest use to auother.

Advances in any museum are effected not only by accession and enlargement, but by the constant substitution of better specimens, by advance in methods of display, labeling, and handbooks.

T)\e principal uses of specimens.—A museum is rarely justified in exhibiting all its materials. An exhibition series, when properly installed, is more effective when limited than when extensive.

Specimens not needed in the exhibition series are much more useful when placed in a reserve or study series, either to be used by students; to be exchanged or given to other museums, or to be employed when occasion may offer iu foimiug new exhibition series.

The exhibition series.—The effectiveness of a museum for popular cul ture depends chiefly upon:

(1) A careful selection and effective arrangement of the specimens exhibited (which implies the exclusion of many objects in themselves attractive and interesting).

(2) A thorough system of labels in simple language, supplemented bv pictures, diagrams, maps, and books of reference.

C\\ Specimens for exhibition should be selected solely with reference to the lesson they can teach, singly or in combination.

a To complete a series, any specimen is better than none.

(5) A copy? model, ui iuubu vr c g model or picture of a good thing is often more useful thL an actual spe^imey a poor one.

(6) A picture or model may often be shown to advantage in place of aiL teor unintelligible object.

(7) Books, manuscripts, pictures, maps, etc., become specimens when treated in the museum method.

The study series

(1) Specimens in the study series should be acquired in series sum-

ciently large to meet tbe needs of students who are known to exist. While nothing of value should be lost, it is questionable whether material should besought in large quantity, when there is no induction that it will soon be needed.

(2) Study specimens should be stored as compactly and economically as is consistent with their safety and convenient use, and should be accessible to every student.

(3) The study series is the storehouse from which the exhibition series may be replaced or extended and from which the needs of other museums may be supplied.

Records.—The most important fact concerning any object is the locality where it was found; next most important, the person from whom it was received. Every specimen should have its catalogue number indelibly engraved or marked upon it, and, when possible, the locality and source. Specimens can be named at any time, but the locality once lost, the object becomes comparatively valueless. The record of donors should be accurate and complete, so that the specimens from any given source can be traced at once to their location.