

research among us, and in educating the present generation of naturalists.

It is not asking too much that these collections should now be exhibited to the public, and I can truly say that were all our treasures fairly laid out, so that the whole could be seen at a glance by intelligent visitors, our citizens when visiting similar institutions abroad, could with pride point out what Massachusetts has done for science, and confidently affirm that their Museum fears no comparisons. Indeed, the Museum of Comparative Zoölogy should no longer be looked upon as a State institution; so far as its intrinsic value is concerned it has acquired a national importance.

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*Report on the Fossil Plants, by LÉO LESQUEREUX.*

No report has as yet been made on the Fossil Plants of the Museum. It is therefore advisable to examine in some detail the different collections, or parts of collections, now in this department, in order to establish a reliable point of comparison for further communications on their increase and improvement.

The Museum possesses,—

1st. A splendid collection of tertiary fossil plants of Europe, the specimens of which, in a perfect state of preservation, have been furnished and named by Professor Heer, of Zurich. It includes representative and characteristic species of three stages of the Tertiary—Oeningen, Schrotzburg and Upper Rhone, and contains eight hundred specimens, representing more than one hundred and fifty species. This is by far the most valuable part of the collections of fossil plants, and has not its equivalent in any museum of America.

2d. A collection of tertiary plants from the basin of Paris, part of the cabinet of Mr. Duval, bought in 1859, contains splendid Fucoids, large dicotyledonous leaves on tufa, and a lot of less valuable specimens from various parts of Europe—in all one hundred and sixty-eight specimens.

3d. In Bronn's collection, besides sixty specimens of tertiary plants from various localities of Europe, there are seven specimens of Cretaceous species and fifteen of the Jurassic and Lias formations. It is but a poor representation of the two last

formations, which, as far at least as regards their vegetable remains, are as yet very imperfectly known.

4th. Of the Trias, Keuper and New Red Sandstone, there are in Bronn's collection fifty species, represented by one hundred specimens. These, from various parts of Europe, are generally good; their stations are carefully marked on the labels, but they are not yet satisfactorily identified.

5th. The vegetation of the Carboniferous epoch is already pretty well represented in the Museum. From Bronn's collection there are one hundred and fifty-two specimens, some of them very interesting, and gathered from different parts of Europe. From the Coal measures of England we have about the same number.

But it is from our own continent that the largest number of species and specimens have been procured. There are from Ohio one hundred and fifty specimens; from Pennsylvania, fifty; from mixed localities in Pennsylvania and Ohio, thirty; from the anthracite basin of Massachusetts, fifteen; from Maryland, nine; and from Illinois, twenty-two. As these specimens are generally fine and valuable, though they do not represent any very rare species, it is to be regretted that their number is not larger, especially as they are from regions of our coal basins, which have been rarely explored, and from which palæontologists have as yet received few materials. This last observation does not, however, apply to the coal fields of Illinois, especially not to that famous locality, Mazon Creek, from which the Illinois specimens of the Museum were obtained. It is, on the contrary, one of the most thoroughly investigated, and generally known for the beauty of the specimens which it has furnished to Palæontology. The remains are small, indeed, and generally occupy the centre of a pebble of carbonate of iron; but in this formation plants and animals appear to have escaped the effects of maceration, which has generally destroyed the soft parts of the plants; and even all the soft species whose remains were imbedded in the bituminous shales of the coal. And therefore, in these pebbles, not only have the vegetable remains with their tissue been fully preserved, with their outline and nervation well defined, but many species have been found there which have never been seen anywhere else in the coal basins of America. A proof that we know as yet only a

part of the vegetation of the Carboniferous age, and perhaps only a small part. In the same deposit, and in the same kind of pebbles, many small animals—Crustacea, Anelides, winged Insects, and even Saurians—have been found of late, all species unknown before in the Coal measure. The Museum has recently made arrangements for obtaining a larger number of specimens from that locality.

6th. Among the Coal plants of the Museum, a collection worth mentioning for the beauty and large size of its specimens, especially in the genera *Sigillaria* and *Lepidodendron*, is that of Mr. J. G. Anthony. It was obtained from Cuyahoga Falls, Ohio, and contains eighty-four specimens. It is the more valuable from the reason that the geological horizon of the bed of coal where the collection was made is fully ascertained, being the lowest bed of the coal measures above the conglomerate.

7th. Lately another collection of fossil plants of the Coal, presenting the same advantage as the former has been made in Pennsylvania for the Museum, from three different beds of anthracite, whose horizontal position is equally well marked. It contains one hundred and forty-six specimens, all carefully determined and labelled. The species are recorded in the catalogue, in a table, according to their geological horizon. In comparing their distribution in that way, it is seen that two species only belong to two different stations and none to the three. Such tables established with care would help to solve the problem of distribution of species at the different levels or horizons, where our coal beds are formed, and furnish at the same time reliable leading species for the identification of the coal strata.

8th. From the Coal measures of Nova Scotia, the Museum has a series of about one hundred broken, small, poor specimens, coming especially from the Joggins. This collection is not of great value.

9th. The formations older than the Carboniferous, are scantily represented in the Museum, by thirty-nine specimens of the Devonian of New Brunswick and Maine. Though these specimens are named by Professor Dawson, they are so badly broken, small and obscure, that little advantage can be derived from them for comparison and identification of species.

10th. The only representatives of the Silurian are six large, beautiful specimens, from the State of New York.

11th. The specimens mentioned above, mostly determined and labelled, are placed in cases and exposed to view for examination and comparison. But there is still in the magazine of the Museum a number of boxes, containing about four hundred specimens, which cannot be disposed in cases from want of place. They are mostly from the recent formations of Europe, and from the coal measures of America. Most of the specimens are good and valuable.

12th. Besides the fossil species, the department of botanical Palæontology received important additions and an element of success of great value in the collection of palms, fern trees and other equatorial species, immense trunks of which have been brought from Brazil, by Professor Agassiz. These will offer an invaluable advantage for the comparison of the fossil plants, especially in studying their internal structure. I do not think that any other Museum in the world contains such admirable materials for a scientific comparison of fossil plants with those now in existence.

In summing up this examination, it is found that the Museum has already about two thousand five hundred specimens of fossil plants, and that they represent more than five hundred species. It is by far the greatest number of vegetable remains found in any of the Museums of America. And it is easy to see that in its composition this collection contains the essential elements for the building of a great and solid scientific monument, where the vegetation of every formation may find its place, and be satisfactorily represented.

Much, however, remains to be done in order to reach this end. It is especially to the gathering and study of the fossil plants of our American formations that the first efforts should be directed; for of all our formations, except that of the Coal, there are no representatives whatever in the Museum. Nevertheless, questions of great importance, occupying now the scientific world can be definitively solved only by good collections of fossil plants, even of our most recent formations. The few vegetable remains, for example, obtained from the Tertiary of Tennessee and of Mississippi and from the Cretacean of

Nebraska and California, have demonstrated facts, which science was scarcely prepared to admit :

First. That the floras of our ancient formations already had peculiar types, which separated them from each other in the different continents. This is even evident in the vegetation of the Coal measure. Therefore, the supposition of a continental union of Europe with America by Atlantides or other intermediate lands, is proved to be untenable.

Second. That the essential types of the old floras, of the cretaceous and tertiary formations have passed into our present vegetation, or are preserved to our time. The Cretaceous of America, for example, has already the Magnolias, which we find still more abundant in our Tertiary. This last formation has furnished a number of species of the genus *Magnolia*, nearly identical with that now existing in the United States, while the genus is totally absent in the corresponding floras of Europe. More than this: we find in our Tertiary the same predominating types marked on both sides of the Rocky Mountains. On the Atlantic slope, leaves of magnolias, of oaks, of elms, of maples and poplars, and not a trace of coniferous trees; while in California and Vancouver Island, the red woods or *Sequoia*, abound in the Cretaceous and Tertiary, as now they still form the predominant vegetation of the country. These few facts are mentioned only to show the importance of collections of fossil plants from every formation of our American continent, the only part of the world where questions of general significance concerning palæontological distribution can be studied with some chances of satisfactory conclusions.

From our Coal measures, also, other problems of general interest are still awaiting a solution. The vexed question of the distribution of the vegetation at the various horizons where beds of coal have been formed is one of the most important. Some geologists assert that the differences in the vegetation of the coal are merely due to geographical or climatic influences; while others, on the contrary, find different and essential characters in the flora of each bed of coal. Nothing can solve problems of this kind but collections of fossil plants carefully made, not only in view of the determination of species and an acquaintance with the vegetation of a certain epoch, but especially in view of ascertaining local and general distribution

For this reason the plan proposed by the Director of the Museum, for the arrangement of specimens of animal Palæontology, should be followed with the same care for the fossil plants. It demands a collection for the study of species and another for the exemplification of geological stations by a number of characteristic species.

We have an abundance of fossil plants in the whole thickness of the Silurian. We can follow the development of vegetation in our Devonian, which also abounds in terrestrial and marine vegetable remains. Ascending through the Coal epoch to our recent formations, we may gather from all a number of fossil plants, and by and by have in the Museum the links of that admirable manifestation of life, under atmospheric influence, which animal Palæontology fails to show us, and which constitute an essential chapter in the history of our globe.

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*Report on the Collection of Mollusks, by J. G. ANTHONY.*

The year just closed has been one of considerable activity in the Department of Conchology. During the earlier portion of the year my attention was mainly devoted to exchanges, by which our collection has received large accessions of valuable species; while during the later portion of four or five months I have been almost exclusively occupied in preparing and mounting the specimens on the glass tablets, preliminary to their due exhibition to the public, and also as one very important step in the direction of making out a general catalogue of our Conchological collection.

By the exchanges above referred to, we have received during the year just closed, from twenty-five persons, thirty packages, containing 2,305 species and 39,319 specimens, being by far the largest number of species received from this source during any one year since the foundation of the Museum. The character of the species has also been gradually improving, and few are now received which are not directly available in adding novelties to our already large collection.

While the exchanges have thus largely increased, there has been a considerable falling off in the number received by donation, 156 species and 3,558 specimens being all that has been added from that source, as follows:—