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THE GEOLOGICAL HALL OF THE AMERICAN MUSEUM OF NATURAL HISTORY.

L. P. GRATACAP.

The development in New York of two public museums devoted to art and science has been long watched with interest by all who appreciate the refining and civilizing influences such institutions exert. Yet these museums are insufficiently known to our public, and their educational importance is undervalued. In one of them, the American Museum of Natural History, varied and costly collections are exhibited in a series of halls, each of which illustrates some special department of science.

In the large hall, at the top of the building, the collections of fossils and geological specimens are placed, and so arranged that one can walk through the ages of the world by taking as many steps as would carry him twice the distance of a city block. The visitor starts with the lifeless areas of archæan time and rises through successive stages of animal life, reviewing as he steps from case to case the evolution of new forms, noting the disappearance of old ones, until, through forms more and more closely allied to those of our modern seas and lands, he emerges in the Quaternary upon the traces of man. The dullest imagination is stirred by this mental recreation of the stages of life's unfolding, and the least observant eye watches for the opening links of the zoological chain.

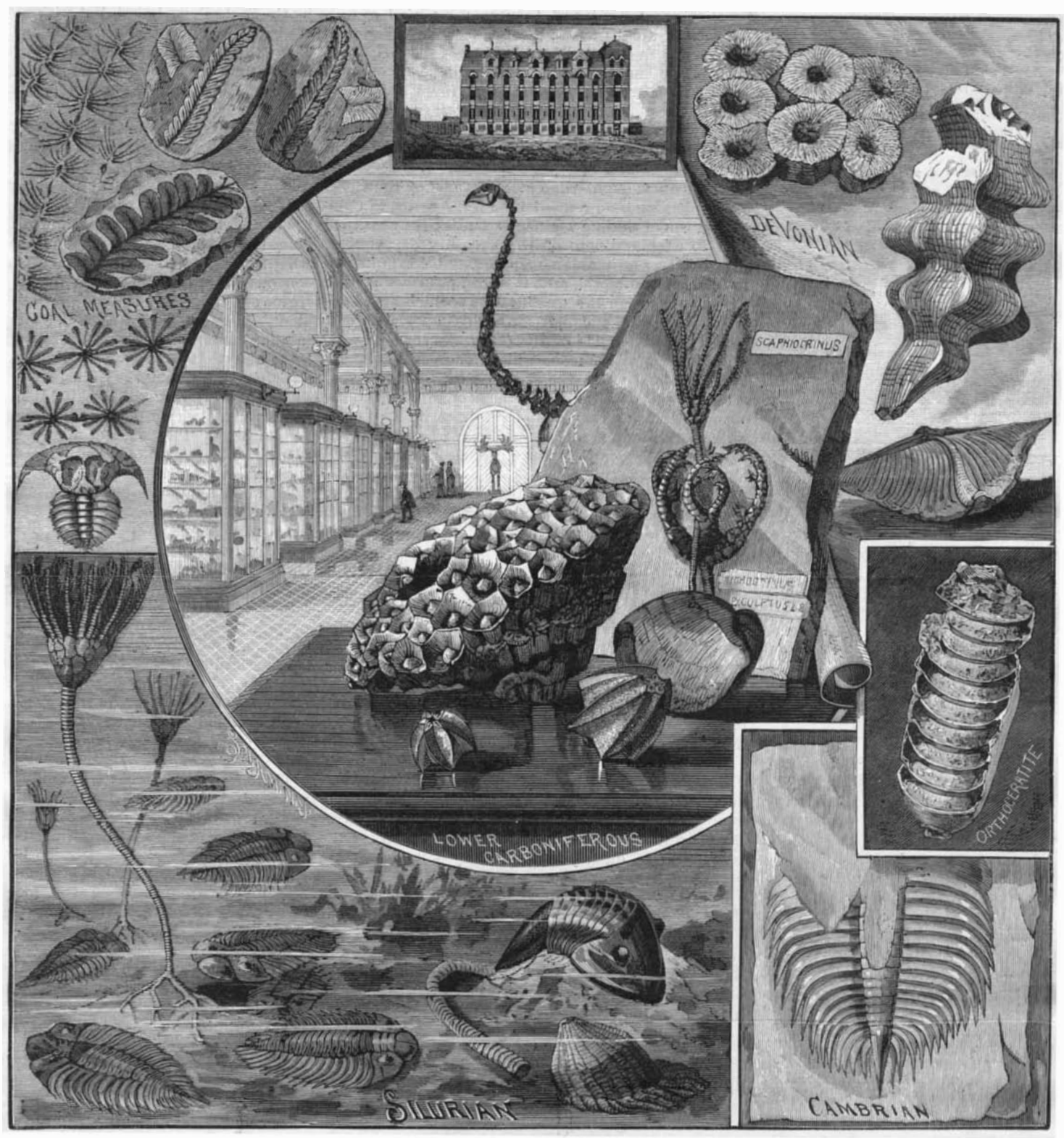
The general arrangement of this series of fossils in their chronological succession, as well as according to their zoological classification, and to some extent so exhibited as to show distinctions between the forms found in different parts of the country, is unrivaled. It has received the highest encomiums, and justly reflects honor upon its curator, Prof. R. P. Whitfield. As we enter the hall we encounter on the left specimens of the various rocks which come from areas of archæan strata, which represent the adamantine flooring upon which the sedimentary rocks of the succeeding ages were laid.

They are crystalline and ore-bearing rocks, devoid of fossils, and typify to us a wonderful period, when the solidifying crust of the young globe was strained, contorted, and wrinkled under the tremendous lateral pressure of the contracting sphere, when the elastic, semi-rigid strata were thrown into flexures, and under the liquefying action of pressure and heat their elements were redistributed, mineral crystallizations formed, and crevices and faults evoked. Although it seems possible that fucoids or sea weeds may have spread themselves in thick sheets along the marine margins of the lands, the evidence of any other kind of life is shadowy and equivocal.

From microscopic study and recent geological surveys, we have learned that over wide areas volcanic forces played their disturbing part in the formation of this primal world. Dikes of intrusive lavas are found widely distributed through the Huronian beds about Lake Superior, in Wisconsin and Canada, while Prof. Hitchcock has insisted that many of the White Mountain peaks in that distant day were active craters, down whose sides poured the extended and liquid materials which have become crystallized and hardened into the granites and greywackes of to-day. It was a period of preparation before the hosts of living forms which filled the later seas were ushered in, and the mysterious processes of life began their course.

With one turn from the side of an alcove to the other we have passed over centuries of time, and find ourselves inspecting the multitudinous remains of trilobites, which in the Cambrian age suddenly and in great numbers made their appearance in the primordial ocean. The trilobite, so named from the division of its body into three sections—the frontal parts or *glabella*, the middle or *thoracic segments*, and the tail or *pygidium*—was distantly related to our modern king-crab, whose cast-off shells are to-day seen strewn along the beaches of Staten and Long Islands.

(*Continued on page* 245.)



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The next cases display to us the varied and prolific life of the different Silurian groups. Here are brought to view the lavish multiplication of species, and the new re-enforcements of animal life extend its domain in all the orders of the invertebrate kingdom. So luxurious and manifold was the development of certain shell-incased organisms known as brachiopods, that the Silurian age has been comprehensively designated as the age of brachiopods. These animals possessed the seas and littoral borders of the continents of those days; since then their decline has reduced them to a few species.

Brachiopods were creatures grouped under the mollusca, along with oysters, mussels, and cockles, which secreted a calcareous shell around themselves made up of two valves joining along a hinge line, in some cases interlocked or articulated, in others freely moving over each other with the hinge line reduced or absent, and holding within their fleshy bodies two spiral processes, which were more or less extensible, and which were once thought to be feet, whence the descriptive name of brachiopod, from *βραχιων*, an arm, and *πους*, a foot, or arm-footed animals. These delicately constructed and finely fimbriated parts served as breathing organs, and were connected with the processes of feeding. The abundance of these animals in the Silurian age exceeds all imagination. Look at these slabs of rock packed closely with the embedded shells, while in the numerous trays the clean, beautifully ornamented species of *Spirifer*, *Strophomena*, *Rhynchonella*, etc., are exhibited, reproducing that ancient fauna with startling distinctness. But associated with these multitudinous remains of brachiopods are many other forms even more interesting, and only less important from their restricted development.

Here are nests of quaint trilobites grouped together in numbers as they were buried upon the old sea bottom, some, as it were, arrested in their flexuous motion over the inequalities of the beach, and others preserved as they wrapped themselves, in some spasmodic movement of death, head and tail together, in cylindrical bundles. Here are corals torn by the hammer from stony bosses which were once the reefs of palæozoic seas, while long "straight horns"—the shelly incasements of extinct devil fish—plants, sponges, and exquisite stone lilies fill other shelves. Here are slabs of sandstone from an ancient seashore pitted with small shells from which lines and tiny ridges sweep, as though just drawn by a retreating wave, photographs in quartz of the gentle action of the primal tides, teaching the lesson of the uniformity of nature, when to-day we see the same surfaces on any ocean-washed shore.

We rapidly pass by some splendid examples of petrified casts of seaweeds, we take a few hasty glances at the beautiful chain corals, the delicate embroidery of bryozoan remains, animals belonging to the "sea mosses" of present seas, of which our common *flustra*, so frequently mistaken for a seaweed, is a good example, and then pass into the Devonian age, or the age of fishes. In it we encounter the fossils of those great extinct inhabitants of the ocean which have long formed some of the most interesting relics of ancient life. The fishes of those days were incased in bony plates whose articulating edges united them in an armor of durability and strength, and we can fancy their dark forms shooting through the marine depths like pelagic monitors. In the Devonian age an enlargement of the coral life occurred and the cup-shaped corals abounded. These are long or short cornucopiæ formed shells, generally single stems, but frequently grouped in colonies, and displaying upon their upper surface intricate networks of vertical, concentric, and transverse partitions.

The next cases introduce us to the Lower Carboniferous, or the age preparatory to the deposits of our coal beds. The most notable specimens of this period are found among the crinoids, whose sculptured calyces resemble toy boxes from which extend arms tressed with fringes of fimbriæ like a tassel. On our plate two are shown of different species, entrapped together, as they became interlocked and were buried at the bottom of seas rolling over the present site of Crawfordsville, Ind. These crinoids, briefly described, were inverted star fishes provided with a long, flexible stem made up of separate plates, rooting in the mud bottom and swinging to and fro, gathering their nutriment by means of the moving ciliæ along their arms. In this period these singular creatures flourished in enormous numbers, but have since declined, and are now represented by barely more than fifty species. Here also we meet corals, and brachiopods now waning in the dawn of new conditions.

We next enter the domain of the coal measures. Here the vegetable kingdom in its lavish expansion of forms overshadows everything else. Mighty tree ferns, gigantic club mosses, forests of tall sigillaria, and calamites shaded the warm estuarine borders and interiors of the continent. Their embedded fragments and parts have made our coal seams, while the land, through continuous oscillations, now rose and now sank below the sea level, and successive sedimentations sealed in the plant beds, whose slow change into coal has yielded our age the source of its mechanical and industrial progress.

We now pass through the Mesozoic and Tertiary cycles, encountering more and more familiar shapes in the shell remains and the increasing indications of mammalian life, until in the Quaternary we find the implements of those early men who crowned the works of creation by ushering in that period which some writers have designated as the psychic age, or age of mind.

The survey of this geological and paleontological cabinet has been very brief. It would be possible to linger many hours over the mineral cabinet, or exhaust our admiration over the cases of sea shells. The collection of fossils is unique. It was the famous Hall collection, accumulated during the survey of the State, of which Agassiz said, "Whoever gets Hall's collections gets the geological museum of America;" and it has been placed under the charge of one who is more familiar with it than its original owner, and through whose hands every specimen in it has passed. New additions have been made to it, and as it grows the student and the casual visitor will find new material for examination and pleasurable inspection.

Reclaiming Lands in Florida.

The Disston Land and Improvement Company is doing some marvelous work in Florida, in redeeming thousands of acres of land which are now under water. Already immense tracts have been thus made available, and it has been demonstrated that there is no better land in the State than that thus reclaimed. The company operates under a law of the State which allows it one-half of the land rendered available, and expects to reap a rich harvest before it finishes the improvements contemplated. The South Florida Railroad, from Sanford to Tampa, crosses the State on a dividing ridge, and from this ridge, looking south, there is a continual, but gradual, depression in the land to the southern extremity of the State. The land to the south of this ridge is different from that on its north, in that it is not at all undulating, but spreads out in a vast plain, gradually inclined toward the north. The Disston Company is utilizing this work of nature. Lake Kissimmee is in the midst of a series of lakes, and its northern point just touches the South Florida Railroad at Kissimmee City. This lake is a very long and narrow one, reaching toward Lake Okeechobee, with which it has been connected by canaling the intervening series of lakes. The lakes around Kissimmee have been connected to it by canals, giving a continual outlet to Okeechobee. Thus the areas of these lakes are lessened by the immense flow which finds its way to Okeechobee and from thence to the Gulf on one side, and to the Atlantic on the other, canals reaching from the immense lake to these two great bodies of water on each side. By this canaling process the level of Lake Kissimmee has been lowered six feet and that of the lakes surrounding it proportionately. In this manner the Disston Company proposes to reclaim thousands of acres of land, one-half of which will go to the State, and the other half to the company. The land which is thus made useful is not only that immediately surrounding these lakes, but extends in many places over miles of swampy bottoms. Since these lakes have been connected, it is now an easy matter to start by boat in Lake Kissimmee, in the center of lower Florida, and proceed by water through Lake Okeechobee to either the Atlantic or the Gulf. It is said that Georgia's great swamp, the Okefinokee, can be easily reclaimed. This immense morass, forming a distinct basin much lower than the surrounding country, is, at its lowest point, within but a few miles of the St. Mary's River, the level of which is below that of the swamp. These two connected by canal, the great Okefinokee is drained, and a magnificent area of land is ready for the plow. It is only a question of time.—*Atlanta (Ga.) Constitution.*

Legal Fog.

It was of a case in the United States District Court at Albany, many years ago. A patent right suit was brought on before Judge Nelson. William H. Seward was counsel on one side. In summing up he occupied a whole day. Peter Cagger came in while he was talking, and after listening an hour turned to a learned lawyer and inquired: "What is 'Bill' Seward talking about?" The counsel on the other side made a long speech, and the judge charged the jury. After the jury had been out about two hours, they came in court and the foreman said: "Your Honor, the jury would like to ask a question." "You can proceed." "Well, your Honor, we would like to know what this suit is about?"—*N. J. Law Journal.*

FOR a cheap preparation to dip wrought iron articles in to prevent rusting (after being milled), use hot soda water to clean from oil, then hot lime water, and dry.

Correspondence.

A Cow with Five Legs.

To the Editor of the Scientific American:

This creature was about two years old, and not higher than three feet. Her fifth leg was on her left shoulder, about a foot long, and looked like the other legs, except that it was cloven into three toes instead of two. The hoofs of this fifth foot were very long, as the animal could not use the leg. The other parts of the cow were perfect, and she seemed to enjoy good health.

The owner was an Armenian peasant near this town, who has brought it here, thinking that he would be able to get some money by exhibiting the animal.

A. G. SEKLEMIAN.

Ezroom, Armenia, Turkey, February 23, 1886.

How Far Light Penetrates Deep Sea Depths.

To the Editor of the Scientific American:

This subject, referred to by one of your correspondents in your issue of March 20, has been carefully investigated by Messrs. Fol and Sarosin, of the Society of Physics and Natural History of Geneva, Switzerland. Without giving all the details, it was found that light penetrated fresh water (Lake Geneva) sufficiently to affect very sensitive photographic plates at depths of 170 meters (558 feet), and at that depth "the light, at mid-day, was about as strong as that of a clear moonless night." Similar experiments carried on in the Mediterranean led to the following conclusions: "In the month of March, in the middle of the day and in bright sunlight, the last glimmer of light comes at 400 meters (1,300 feet) below the surface." A full report of these investigations appeared in the *Photographic Times* of July 10 and October 9, 1885.

G. C. HODGES.

Utica, N. Y., March 22, 1886.

Collision at Sea.

To the Editor of the Scientific American:

The late sinking of the magnificent ocean steamship Oregon, and the ill-fated vessel that collided with her, again brings to public notice that dreadful disaster, collision at sea. In most cases, the difficulty has been that neither navigator knew exactly what course the other intended taking.

Now, one will notice, the large majority of collisions occur between steamers and sailing vessels at night, and in most cases the sailing vessel is in the wrong. The latter has the "right of way," and if it kept on its course, all would be well. But at night, on the water, positions and distances are very deceptive. The navigator of the sailing vessel sees the red, white, and green lights of a steamer; they become rapidly brighter, and he makes out the great, dark monster coming directly down upon him. He knows he has the right of way, but thinks if he keep son a collision will be inevitable, so suddenly changes his course; perhaps at the same moment the wheelsman of the steamer is changing his, and the next instant that which both aimed to avert is brought about, and usually with dire results. If either had known just what the other intended doing, the vessel would have kept on her course, and the steamer have gotten out of her way. Now, what is needed is some rapid way of communicating between two approaching vessels, what course one, at least, intends to take, and not have to wait for a vessel going at the rate of twenty miles an hour to "hide one of her lights" before the other vessel can know she intends changing her course.

There is plenty of inventive genius in this country to invent a way to transmit such knowledge, if our inventors would turn their attention in this much needed and worthy direction. As the pilots on steamers can judge what direction a sailing vessel is coming better than the navigator of the latter can the steamer's intended course, I would suggest that all steamers carry an additional white headlight on their bow, furnished with movable red and green screens, that can be quickly drawn in front of the light (thereby changing the white to a red or green light) by wires running from the light to the pilot house.

The wheelsman of a steamer, seeing a sailing vessel near, can decide on which side he should pass; if to "starboard," he can quickly draw the green screen in front of the light, thereby notifying the sailing vessel that she is to pass to the "starboard" side; or if the wheelsman considers the "port" the proper side to pass, he could draw the red screen, then the navigator on the sailing vessel could quickly know on which side the steamer intended to pass.

Of course, this idea is but a suggestion; but if it causes thinking men to take hold of such an important subject as lessening one of the greatest perils of the deep, it will have done its work; and I know no better way of reaching such thinking minds than through the interesting and highly prized SCIENTIFIC AMERICAN.

E. REYNOLDS.

Upper Falls, Md., March 29, 1886.