

names refer mostly to the appearances of the coralline remains. Corals still live; and they are beautiful now as then; but the age of coral prominence is passed.

In that stage of the earth's history which geologists call the Devonian age, many new and complicated forms of life appeared. The flora of that day consisted largely of land plants, and these were of gigantic proportions, though all belonged to the botanical divisions of cryptogams or flowerless plants. There were flags and rushes in abundance, and dense forests of beautiful ferns and immense mosses grew in profusion. The ringed structure of the Devonian plants indicate the recurrence of alternate seasons of rest and growth. In one tree trunk, a hundred and fifty rings have been counted, indicating most probably a very great age.

But the distinctive feature of Devonian formations is the occurrence of fishes, many of them of large and strange growth. Fishes, as we all know, belong to the vertebrate division of the animal kingdom; that is to say, they have well-formed back bones, while all the animals whose remains abound in the earlier rocks, are of the invertebrate, or non-back-boned kind. There are many fundamental differences between these two great classes of animals; and the seemingly sudden appearance of back-boned creatures on the earth is an unsolved problem to the evolutionists. On the other hand the special creationist believes that the God of earth called into existence these finny denizens of the deep, when suitable to His wise purposes so to do.

But let us glance at some of them. Devonian fishes were monsters in truth, most of them very different from the fishes of to-day. Yet they all belonged to the two classes of ganoids, such as the sturgeons and mud fishes of present times; and placoids, as the sharks and rays.



Fig. 8.

Here (Fig. 8) is a typical fish pictured on the slab of stone as found in the quarry, very unlike the fisherman's prey of to-day; is it not? It has been named *Cephalaspis*, or head shield, from the effective armor with which the fore part of its body was protected. The creature's mouth was beneath the body, so that it probably had to turn upon its back

when about to seize its prey, as do the sharks.

Another fish is here (Fig. 9) represented. It is the *Pterichthys*, or winged fish and the name, is well deserved. Notice the pair of stout appendages one on either side of the body.



Fig. 9.

These could with propriety be called fins, for by their aid the creature was able to move through the water, yet they were as hard as the rest of the body. The head of the fish was protected by a strong helmet, and its body was covered with a stout coat of armor-like plates.

Then there was the *cocosteus* or berry-bone fish, so named from the peculiar markings on the skin. It had a flexible tail, though the front part of the body was heavily mailed. One of the hugest of these fishes was the *Dinichthys*, the remains of which abound in the rocks of Ohio, where they have been investigated by Prof. Newberry. He declares to us that the body of this fish was from fifteen to eighteen feet long, and about a yard in thickness. The jaws alone were nearly two feet in length; and armed with double rows of teeth, and a pair of formidable tusks. All Devonian fishes thus far discovered had vertebrated or jointed tails.

The Carboniferous age, next in order of time to the Devonian, was specially distinguished by a profusion of vegetation. The story of the rocks tells us that the verdure of that day far exceeded, in rank luxuriance anything that has since been known. This vegetable tissue has undergone a wonderful metamorphosis by which it has been transformed into coal, and in that form been stored within the stony vault of the earth's crust till the time of the world's greatest needs. It is a strange conception to many that coal, which we dig from the earth as we mine for metals, and which bears so many resemblances to minerals, could be of vegetable origin. Yet the proof of such is practically beyond dispute. In the coal seams; abundant remains of plants, leaves, stems, branches, roots, and fruits are found; but a stronger proof still is afforded by the microscope, which reveals the peculiar woody structure in all varieties of coal.

In the picture (Fig. 10) is a greatly magnified representative of a bit of anthracite—the hardest and most stone-like of coals—as it appears under the microscope. The cellular struc-

ture, so characteristic of woody matter, is plainly apparent. Even



Fig. 10.

the ashes of coal if properly examined, will reveal the presence of vegetable cells, oftentimes showing the characteristic markings with sufficient distinctness to permit the identification of the class of plants from which the coal has come. As a farther proof of the origin of coal, it should be known that by hydraulic pressure, vegetable matter has been completely changed into a substance greatly resembling coal.

An interesting computation has been made by Le Conte, as to the amount of material needed to produce definite amounts of coal: A vigorous vegetation of today, such as a heavy field crop or a forest growth, yields annually about one ton of dried organic matter to the acre; or in the neighborhood of a hundred tons per century. This amount of vegetable matter, if compressed till it acquired the specific gravity of coal (1.4) and spread over an acre, would form a layer less than two-thirds of an inch in thickness. Bischof has pointed out that vegetable substance, in changing to coal, loses, on an average, four-fifths of its weight by the escape of carbon dioxide, marsh gas, and water. Therefore a vigorous vegetation of today could form a layer of coal only one-eighth of an inch in thickness per century; and to form a vein one foot thick would require ten thousand years, and a layer of a hundred feet in thickness, such as is found in some coal fields, would require the lapse of a million years. But we are not to suppose that the earth was always as it is today. It has passed through many preparatory stages, and among them was a coal-forming period, in the course of which an omniscient Creator caused the earth to yield luxuriant verdure, to furnish light and heat, centuries later, to His children.

The coal plants, however, were strange in comparison with the forest growths of this age. There were *Lepidodendrids*—scaly stemmed trees as the name implies—towering to the height of sixty feet, and measuring from three to four feet in diameter at the base. But little is known of their foliage, but it is supposed that the leaves were of a kind probably allied to pine needles. A distinct pith is found in the trunks, allying the tree to the exogens. The trunks were marked