VISIT TO THE BRITISH MUSEUM.

(THE FOSSIL FISH COLLECTION.)*

MARCH 24TH, 1877.

Directors—HENRY WOODWARD, Esq., F.R.S., and WILLIAM DAVIES, Esq., F.G.S.

The party having assembled in front of the Cases containing the fine collection of Fossil Fishes, Mr. Woodward called attention to the oldest fishes known, the CEPHALASPIDÆ, represented by the genera *Scaphaspis*, *Cyathaspis*, *Pteraspis*, and *Cephalaspis*, and by *Pterichthys* and *Coccosteus* made famous by the writings of Hugh Miller. These early fishes are remarkable from the fact that although they possess well ossified head-shields, and in the case of *Pterichthys* and *Coccosteus* the tail has even the neural processes ossified, yet the notochord remains persistent as in the Lancelet (*Amphioxus*) and in the embryo of all modern fishes. In other words, the centra of the vertebræ are never consolidated. But although to a great degree destitute of a complete endo-skeleton, they were well defended by an exo-skeleton, consisting of hard dermal plates of bony enamel and by powerful spines. In some recent fishes, as the Sturgeon and Sharks, the bones are only partially calcified, and they are consequently termed cartilaginous fishes. In *Chelone*, too, amongst the Reptilia, the ribs and spinous processes are united to and help to form the carapace which serves as an exo-skeleton, and in the Crocodilia stout osseous dermal plates protect both the head and body. In the Sharks and Rays the shagreen is covered with compact or scattered ossified tubercles. After pointing out the fine series of Old Red Sandstone fishes, Mr. Woodward introduced to the Members his colleague Mr. William Davies, F.G.S., who has charge of the Fossil Fishes in the Museum.

Mr. Davies commenced his observations by drawing attention to the remains of the large Sauroid fishes, *Rhizodus* and *Megalichthys*, from the Carboniferous of Burdie House, as represented by their partially ossified bones and scales. These powerful preda-

* See Catalogue of Type Specimens of Fossil Fishes in the British Museum, by W. Davies, F.G.S., "Geological Magazine," Vol. viii. p. 208 and p. 334.

ceous fishes possessed teeth of two kinds—an outer row of closely set, short, conical fish teeth, and an inner series of widely separated, long, laniary, and highly enamelled teeth, which, in *Rhizodus*, range from three to six inches in length, and are so truly Saurian in character, that it was originally referred to the class Reptilia. The spinal column in *Rhizodus* was unossified, but the body was covered with circular bony scales, often of four or five inches in diameter. In *Megalichthys* the vertebræ are partially ossified, the centre remaining cartilaginous, thus forming a series of rings; the scales are rhomboidal and thickly coated with enamel, as are also the bony plates of the head. In *Saurichthys* the teeth, as in some Lizards, are implanted in a continuous groove, and the crown of the tooth is separated by a constriction from the fang.

The Dipnoi (double-breathers) are closely allied to the Ganoids, and are represented by *Dipterus* from the Old Red Sandstone, *Ctenodus* from the Carboniferous, and *Ceratodus* from Triassic and Oolitic deposits, their teeth being broad corrugated plates. Although the *Ceratodus* has living representatives in the rivers of Australia, no remains of the genus have been found in strata of later age than Oolitic.

The fishes of the Palæozoic rocks are all Heterocercal, the first Homocercal-tailed species being found in the Trias. From amongst the Oolitic species, Mr. Davies pointed out the fishes from the Solenhofen Limestone, which were the most perfectly preserved of all vertebrate remains, the complete outline, the bones, the fins, and the teeth, being all beautifully shown. The Lepidoids range from the Trias to the Chalk. The scales of this group are bony, covered by enamel, and are fitted to each other by a notch and a process which renders them mutually supporting. In this group also there is merely an unossified notochord. Their maximum development was in the Solenhofen Limestone and Wealden deposits. The teeth are conical or rounded, and, covering the roof of the mouth, were used for crushing. These fishes are found in the Lias of Whitby sometimes uncompressed.

Æchmodus and *Dapedius* are short, deep, laterally compressed fishes, peculiar to the Lias; the teeth in *Æchmodus* are pointed, in *Dapedius* they are bifurcated. The Pycnodonts have the mouth paved with flat, rounded or elongated teeth. In *Pycnodus* and *Gyrodus* the vomer supports five rows of teeth, the centre row in

Pycnodus being the largest, and the outer series the smallest ; in *Gyrodon* the central and the two outer series are large, whilst the teeth of the intermediate rows are the smallest. Many of the species of this group are only known by their jaws.

Passing on to species from Cretaceous rocks, Mr. Davies reminded his hearers that Ctenoids and Cycloids begin in the Chalk, and that at the same horizon nearly all the genera and all the species of the older formations disappear. The Ctenoids have the free margins of the scales serrated, of which the perch is a good living representative, the fin-ray is not divided. The fine series of Chalk Fishes was then pointed out, and next those from Monte Bolca. Of Palæozoic forms, the Cestracionts have one representative now living, the *Cestracion Phillipi*, or Port Jackson shark of Australia. The *Psammodus* and *Cochliodon* (which latter had several teeth joined together) of the Carboniferous Limestone had the largest teeth, though no evidence of the form of the jaw has been left. Attention was then drawn to the teeth of *Acrodus*, from the Lias, to those of *Strophodus*, which, while assuming various forms, were all from one species, as the teeth of each row in the same mouth are dissimilar in form from those of any other row ; and to the teeth of *Ptychodus*, which usually occur in groups of 50 or 60, while, except a few fin-rays, no part of the skeleton has been found.

A hearty vote of thanks to Mr. Davies, for his very instructive lecture, terminated the proceedings.

EXCURSION TO THE CRAG DISTRICT OF SUFFOLK.

APRIL 2ND AND 3RD, 1877.

Directors—WILLIAM WHITAKER, Esq., B.A., F.G.S., H.M. Geological Survey ; J. ELLOR TAYLOR, Esq., Ph.D., F.G.S., F.L.S., Curator of the Ipswich Museum ; and EDWARD CHARLES-WORTH, Esq., F.G.S.

(Report by DR. J. ELLOR TAYLOR.)

A number of members of the Ipswich Scientific Society and of the Colchester Natural History Society having joined the party from London at Harwich, the entire body proceeded in small boats to cross the estuary to near the new pier at Felixstowe. Thence