is observed to extend along the posterior half of the bone, disappearing in the anterior half.

On comparing this form of dentition with that from the Lower Oolites named *Pycnodus didymus*, Ag.—which is most probably the lower jaw of *Mesodon Bucklandi*—it will be seen that the Portland fossil is distinguished (i.) by having the inner series of teeth relatively larger, (ii.) by exhibiting part of a supplementary inner row, and (iii.) by displaying the outer small teeth in three series, with half of a fourth series, all very irregularly arranged. Such differences may certainly be regarded as of specific value; and these characters also appear to separate the present fossil from all other jaws of *Mesodon* hitherto described. The most nearly related form is *Mesodon Nicoleti* (Ag.), from the Portlandian of Soleure, Switzerland. This species, however, is not satisfactorily defined, being apparently founded on an imperfect mandibular ramus with abnormally developed outer teeth; and if certain specimens in the British Museum, obtained from Soleure and probably referable to *M. Nicoleti*, are correctly so determined, the specific distinctness of the Swiss form from the English fossil is shown (i.) by the relatively smaller size of its inner teeth, (ii.) by the absence in it of a partial supplementary series inside and of a fourth series outside, and (iii.) by the greater regularity in the arrangement of its three rows of outer teeth.

Under the circumstances, the *Mesodon* of the English Portlandian may appropriately receive the name of *M. Damoni*, in memory of one of the most successful explorers of that formation, who first made known the fossil jaw by publishing a good figure.

IV.—ON *Cœlacanthus Phillipsii*, AGASSIZ.

By JAMES W. DAVIS, F.G.S., F.L.S.

THE late Prof. Louis Agassiz, whilst on a visit to Halifax with Prof. John Phillips, during the years in which he was preparing his “Recherches sur les Poissons fossiles,” identified the caudal extremity of a large species of *Cœlacanth* fish to which he appended the name of *Cœlacanthus Phillipsii* in honour of his friend. The specimen is from a large “baum-pot,” as the calcareous nodules are locally termed, obtained from the Lower Coal-measures. This specimen was found at the Swan Bank Pit at Halifax, and, so far as I know, is the only one which has been discovered. The surface exposed by splitting the nodule is 0.295 m. diameter, and the part of the fish preserved extends across it; it consists of the caudal portion of a large individual, which, had it been perfectly preserved, would have been between four and five feet in length. The vertebral axis extended in a straight line across the surface: its constituent parts are not preserved, but the distance between the neural and hæmal spines indicates a vertebral column of considerable size and power. Attached to the vertebral column are about thirty rays above, and a similar number below, which will probably indicate the same number of vertebral segments. The first caudal fin is

supported by neural and hæmal spines, interspinous bones, and fin-rays. The spines at a distance of 0.160 m. from the extremity of the anterior fin have a length of 0.050 m.; further back they decrease in length, and extend at a more acute angle with the axis of the body. The proximal end of each spine is bifurcated and broadly expanded for attachment to the cartilaginous column; the distal extremity is clavate with a flattened extremity. The proximal extremities of the interspinous bones are similarly clavate, and the flattened ends of each were joined together by a cartilaginous envelope. The interspinous bones apparently thin out to a point in the opposite direction, and the method of their attachment to the rays is not very clear. The rays do not afford any evidence of the bifurcated extremity embracing the interspinous bones, described by Agassiz as pertaining to *C. granulosus*, but appear rather to form a sort of splice with it. The fin-rays are articulated, and repeatedly bifurcate; their distal extremities are fine and slender. The posterior part of the tail, as represented in this specimen, somewhat disturbed and imperfect, indicates a breadth of 0.160 m. The second expansion of the caudal fin is not represented. A number of neural and hæmal rays occupy the space between the origin of those supporting the tail and the margin of the baum-pot; they are long and slender and deeply bifurcated for attachment to the vertebral axis; and the rays are hollow, but to a less extent than those of *Cœlacanthus Tingleyensis*, Davis,¹ which, however, are thicker in comparison to their length than are these. Agassiz remarks that the caudal fin is rounder than in *Cœlacanthus granulosus*, Agass.;² but it is more than probable that the round appearance of this specimen is due to its imperfect preservation.

A large number of scales are preserved; those on the anterior part are 0.100 m. in diameter, more or less circular behind, and ornamented with raised lines of enamel where the external surface is exposed. Most of the scales, however, are seen from the under side, as the result of the manner in which the nodule has split, and these exhibit a series of concentric lines parallel with their posterior border. Amongst the scales are two or three dissociated plates 0.30 m. across, which are exposed on the under side, and covered with concentric lines similarly to the smaller scales. The extension of the vertebral axis posteriorly between and beyond the lobes of the caudal fin is enveloped in smaller scales similar to those further forward, but only about half the size. There is no trace of other fins than the caudal.

Otto M. Reis, in a recently published memoir on "Die Cœlacanthinen,"³ has separated from the genus *Cœlacanthus* all those species with striated scales which occur in the Coal-measures; retaining those from the Permian formations, with *Cœlacanthus granulosus* (non *granulatus*), Agass., and *C. Hassiæ*, Münt., as types, and with them *C. caudalis*, Eg., and *C. elongatus*, Huxley. The species excluded, viz. *C. lepturus*, Ag., *C. elegans*, Newb., *C. ornatus*, Newb.,

¹ Trans. Linn. Soc. vol. ii. p. 427.

² Poiss. foss. vol. ii. p. 172, pl. xlii.

³ Palæontographica, vol. xxxv. 1888.

C. robustus, Newb., *C. Phillipsii*, Ag., *C. Huxleyii*, Traq., and *C. Tingleyensis*, Davis, are transferred to a new genus, *Rhabdoderma*. After a careful comparison of the species now described with the typical *C. granulatus* figured by Agassiz, there does not appear any generic difference in them to warrant such a separation.

The Halifax Hard-bed Coal rests on the Ganister rock and Seat earth used for making fire-bricks; it is an impure Coal containing iron in the form of pyrites, and not unfrequently nodules of the same substance. Rounded concretions containing carbonate of lime are also found in the Coal. Both contain vegetable remains in a beautiful state of preservation; when cut for microscopical examination, minute details of structure are exhibited with marvellous fidelity. Immediately above the Hard-bed Coal is a stratum of laminated shale, which is in some localities almost entirely composed of the fossil shells of marine genera, including a large proportion of *Aviculopecten*. The bed is about four inches in thickness; above, it is succeeded by a bed of shale four to six feet thick, containing a considerable number of nodular concretions, composed of carbonate of lime, with an outer covering of iron pyrites. These when broken are found to contain great numbers of remains of mollusca of the marine genera *Goniates*, *Nautilus*, *Bellerophon*, *Orthoceras*, *Nucula*, *Aviculopecten*, and others less common. Fossil fish remains are also found associated, and it is in one of these balls that the example of *Cœlacanthus Phillipsii* was found. Scattered over the surface of the nodule are shells of *Goniates*. From its association with these marine mollusca there appears to be no doubt that *Cœlacanthus* existed in salt-water during the formation of the Lowest Coal-measures. This is interesting for comparison with *C. Tingleyensis*, Davis, found in the Cannel Coal at Tingley, which is in the Middle Coal-measures. The Cannel Coal was deposited in a series of lake-like lagoons, the bottom of which were filled with fresh-water bivalves of the genus *Anthracosia*. The remains of *Cœlacanthus* occur in great abundance, and it lived at this time in fresh-water. The specimen of *C. granulatus*, Agass., was obtained from the Magnesian Limestone of East Thickley, in Durham, which is of marine origin.

V.—ON THE SCHISTS OF THE LIZARD DISTRICT.

By ALEXANDER SOMERVAIL, Esq.

Introduction.

THIS paper is intended as preliminary to one shortly to follow on the nature and origin of the banded structure in these rocks.

I have deemed it necessary to treat of the present subject as introductory to the other, giving my own views as to what I believe to be the true origin and relations of these rocks to each other, as these seemed to me to have a very direct and important bearing on the question of their banded structures.

Under the term schists used in the title I include all the rocks composing the "granulitic," "hornblendic" and "talco-micaceous"