named by him, I have little hesitation in stating my conviction that none of these are well founded. Sir Philip Egerton (Quart. Journ. Geol. Soc., Lond., vol. xvi.) considers two of them founded on imperfect data—*Cheirolepis curtus* being from an imperfect specimen of *Ch. Cummingia*; the seeming larger size of the head and obliquity of the mouth being occasioned by “dislocation of the cranial bones,” and the apparent shortness of the trunk and smaller tail being owing to the “concealment of the nape, by some of the dislocated members, and mutilation of the extremity of the upper lobe of the tail.” The only other distinctive characteristic given by McCoy, is the tuberculated scales. This, it seems to me, might probably have been occasioned by the nature of the matrix. *Cheirolepis macrocephalus*, founded on its proportionately larger head is shown by Sir Philip to be merely *Ch. Trailli*,—a squeeze having “thrown down one ramus of the lower jaw, and forced the pectoral arch from its normal position;” hence the seemingly larger head. *Cheirolepis velox* is, however, considered by Sir Philip sufficiently marked to constitute a new species. It is described as differing from the others in its smaller head, more slender body, and larger fins,—all three characteristics, as already stated, are very apt to vary from the state in which they may be preserved; and on comparing a well-marked specimen of *Ch. Cummingia*, in my possession, in which, however, the head is imperfect, with the figure of *Ch. velox*, given by McCoy in the “British Palæozoic Fossils,” they correspond so exactly in every respect, except that in my specimen the depth of the body is, perhaps, slightly greater, that I cannot but believe them identical. The position, size, and form of the fins, even to their minutest details, are exactly the same in both.

The species described by Agassiz are undoubtedly good, and well marked. I am not so well acquainted with the characteristics of *Cheirolepis Trailli*, as of the other two species, but in these latter, at all events, the scales are quite sufficient to distinguish them from one another.

In *Cheirolepis Cummingia* the scales are small, rhomboidal, and quite smooth, as in *Acanthodes Mitchelli* and *Ischnacanthus gracilis*.

In *Cheirolepis uragus* they are small and rhomboidal, with five or six delicate converging striæ on the anterior edge of the inner surface, somewhat like those of *Cheiroacanthus microlepidotus* and *Diplacanthus longispinus*, but smaller than those of the latter.

In *Cheirolepis Trailli* they are small, rhomboidal, and have each a very prominent, sharp, oval, lengthened tubercle in the middle, parallel, with the oblique posterior border.

RESWALLIE, FORBES.

IV.—ON *DIDYMASPIS*, A NEW GENUS OF CEPHALASPIDIAN FISHES.

By E. RAY LANKESTER, Esq.

(PLATE VIII., Figs. 4-8).

THE specimen which I intend briefly to notice was obtained by Dr. Grindrod, of Malvern, about two years since, from

the red, compact Sandstones, immediately resting on the grey 'Passage-beds' at Ledbury. Dr. Grindrod has kindly lent it to me for description.

The fossil is in two pieces, one showing the convex surface, the other the concave impression, of the cephalic shield of a fish, evidently closely allied to *Cephalaspis*. This shield is a little above an inch in length, and a little less in breadth. Anteriorly, it is transversely divided by a well marked line of junction into two portions; an anterior semi-circular piece, and a posterior, larger, and somewhat square, piece. The anterior portion exhibits two distinct oval orbits, placed close together at its centre. Radiating channels mark the inner surface of this portion of the scute, recalling the similar 'channelling' in *Cephalaspis*. The line of junction between the two plates describes a double curve, the two produced angles of the semi-circular plate embracing the posterior plate, but not diverging from it; whilst in the median line, the anterior piece is produced into the posterior to a small extent. In this way the double curvature of the margins is effected. Posteriorly, the posterior plate becomes contracted, and its margins tend towards describing a dome-like outline when it is abruptly truncated, and the truncated margin thickened and inflected. A thickened ridge passes anteriorly along the median line. No radiating channels mark its inner surface.

Flake-like fragments from the inner substance of the scute, soaked in Canada-balsam, and examined beneath the microscope, show large "bone-lacunæ" very densely packed, arranged at right angles in the different lamellæ of the bony-material, so as to produce the appearance of cross-hatching. (See Plate VIII., Fig. 7)

From these characters, it is sufficiently clear that this head-shield belongs to a member of the *Cephalaspidæ*, and of that section of the family in which the calcareous material presents true bone-lacunæ. It resembles most closely the *Auchenaspis* of Sir Philip Egerton, which has two species to represent it; it differs from this genus in the absence of diverging cornua from the anterior portion of the shield, in the relatively larger size of the orbits, and in the very different form, and far greater relative size, of the posterior or neck-plate. Hence I propose to call this form *Didymaspis* (δίδυμος twin, ἀσπίς shield), alluding to the two nearly equivalent portions into which the shield is divided. This species I wish to call *D. Grindrodi*, after the indefatigable investigator to whose collection it belongs. There appears to be a distinct homology between the anterior portion of the shield in *Auchenaspis* and *Didymaspis*, and the rostrum, orbital pieces, and cornua, of the genus *Pteraspis* (the most elaborate form of that section of Cephalaspidæ in which the shield presents a cancellous structure, with no bone-lacunæ), whilst the "neck" plate of *Auchenaspis*, and larger posterior plate of *Didymaspis*, correspond to the disc and spine of *Pteraspis*. In *Cephalaspis*, on the one hand, and *Scaphaspis*¹, on the other, these

¹ *Scaphaspis* is the genus allied to *Pteraspis*, which includes the species *Lloydi*, *truncatus*, etc., with a simple ovate shield.

pieces, or plates, are not differentiated—the shield in both is of a single piece; but it is obvious that in *Cephalaspis* the rostral, orbital, and cornual element predominate, whilst in *Scaphaspis* the discal region chiefly is represented.

EXPLANATION OF FIGURES.

- Fig. 4. Relievo } of *Didymaspis Grindrodi*, sp., nov., from the Lower Old Red,
5. Intaglio } Ledbury.
6. Outline of the shield of *Didymaspis*.
7. Bone-lacunæ from the posterior portion of the shield of the same.
8. Outline of *Auchenaspis*.

V.—NOTES ON THE GEOLOGY OF SOUTH BEDFORDSHIRE.

By J. SAUNDERS, Esq.

THE Geology of South Bedfordshire is now being exhibited more fully than hitherto, as the extension of the Midland Railway from Bedford to London is opening up a series of sections in the newer Secondary rocks which characterise this part of the county. The following notes were chiefly taken during a walk made last summer along the line, between the towns of Bedford and St. Alban's (Herts). For the first few miles the excavations are slight, and exhibit only the Drift sands and gravels of the rich valley of the Ouse, though these are well worthy of careful examination for flint implements and mammalian remains, which have been discovered on the north side of the river, at Biddenham, by J. Wyatt, Esq. About three miles from Bedford is an excavation in the Oxford clay; the upper portion is dark brown merging into dark blue beneath, and it abounds in fossil wood in various stages of carbonization, the colour of which ranges from brown to jet black; it is so abun-

DIAGRAM TO ILLUSTRATE THE GEOLOGY OF SOUTH BEDFORDSHIRE.

- a. Oxford clay. b. Greensand. c. Gault. d. Totternhoe stone. e. Supposed bed of clay under the Lower Chalk. f. Lower Chalk. g. Chalk with flints. The dip of the strata is a little greater than that of the surface of the country.

dant in places that some of the excavators fancied they were coming upon a coal-mine. Running through the mass of clay is a profuse abundance of roots and fibres in inextricable confusion. *Belemnites* are common in this bed, as is also *Ammonites Calloviensis* in the clearages, but the fossils are so hopelessly compressed and fragile as to defy all attempts at extrication, save in the smallest specimens. This formation extends to Ampthill, where it is more largely developed, and where a tunnel is carried through it immediately beneath the Park. The approaches to the tunnel exhibit a series of beds of clay, brown at top and merging into dark blue below, with intermediate bands of