

fruits occasionally met in the Lower Greensand beds, and which, if they belong to either class, are more like Pandanaceous fruits than Liliaceous.

As I have found fragments of similar cavernous wood in the Greensand of Folkestone, it is probable many more specimens may be by diligence obtained; and my impression is, that a large tree I once saw split out like a picture on the surface of an enormous block of ragstone in Mr. Bensted's quarry was a nearly perfect specimen of the *Dracæna Benstedii*, or whatever other genus this specimen may be proved to belong to.

We have before drawn passing attention to some of the plants of the British cretaceous rocks, and we wish again to do so now. It is an unworked mine full of promise, and every labourer in it will meet reward.

ON THE RESTORATION OF PTERASPIS.

BY THE REV. HUGH MITCHELL, M.A.

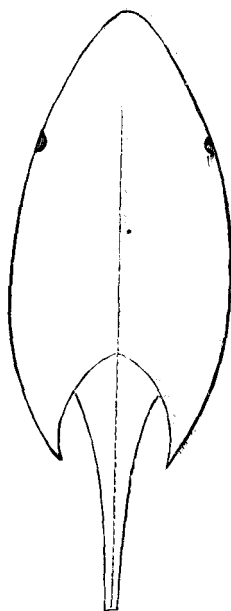


Fig. 1.

In the year 1860, when engaged in drawing up a list of the fossils known to occur in the Lower Old Red Sandstone of Scotland, we had occasion to remark that, with the exception of the Pteraspis, we had found in our northern rocks the various fossils of the equivalent beds in England, and many others besides, indicating an extensive piscine fauna in that epoch of geological history. We have now to remove that exception, for Pteraspis does occur with us. Some very fine specimens have recently been found in our Scottish rocks, and from their examination we are not only able to discern that fragments which have been many years in our possession, and which we could not refer to any known fossil, belong to that palæozoic fish, but we are also encouraged to attempt the restoration of the remarkable buckler, composed of solid bone, in which this ancient denizen of the deep was encased.

Figure 1. In the construction of this diagram three fossil specimens have been employed. These specimens are similar in their proportions and in the method of their pre-

servation, and their exact measurements have been followed in the figure. The first specimen, used for this diagram, exhibits very beautifully the form of the shield with the terminal horns, and the distinct eye-sockets. The eyes are placed on the margin of the shield, and their impression is also seen on a cast in the stone of this specimen. The second specimen is the prolonged central termination of the shield, which has been broken off at the ridge which terminates on either side in the horns. The third specimen shows the junction of this central prolongation with the shield. All the three specimens have a high central ridge, and still retain something of the graceful outline of the living form. As preserved in the stone these specimens show only the nacreous layer, the other component layers of the bone of the *Pteraspis* having perished in their case.

Figure 2. Two specimens have been employed for the construction of this diagram, the one a piece of solid bone, and the other a cast in the stone of the under surface of the dorsal shield. They are apparently the relics of individuals of the same species and even size; and we have again followed their exact measurements in the figure. The specimen of solid bone exhibits the external aspect and general

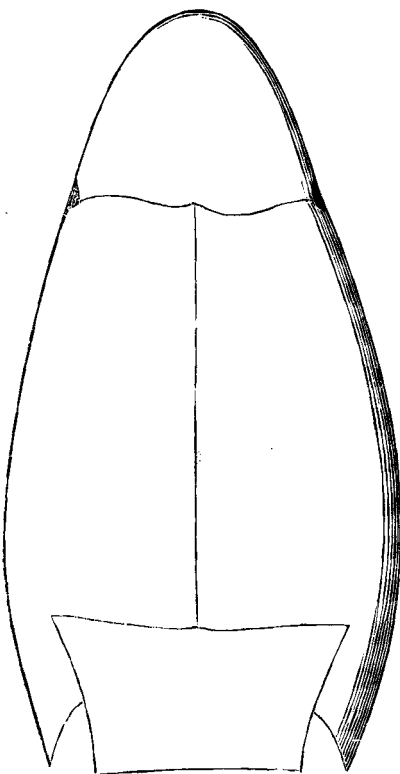


Fig. 2.

outline of the shield, and is especially valuable as showing the form and position of the horns of the shield. It will be observed that these are not the prolonged cusps of the *Cephalaspis*, or at least of the *Cephalaspis Lyellii*. The cast shows the marks of the eye-sockets, and exhibits traces of the central ridge of the shield. The ridge, however, is a low one in comparison of that in Figure 1; and we have hitherto failed to discover the central prolongation or termination of this larger or adult form.

Figure 3. This must be understood to be very conjectural; and although three of the plates are copied exactly as they occur in the stone, their arrangement and their function must be considered so far

a guess. We regard the whole as forming an abdominal plate, composed of different pieces, joined by sutures, and which covered the under side of the head and, it may be, part of the body of the Pteraspis. The pieces we possess are numbered in the diagram 1, 2, 3, and the

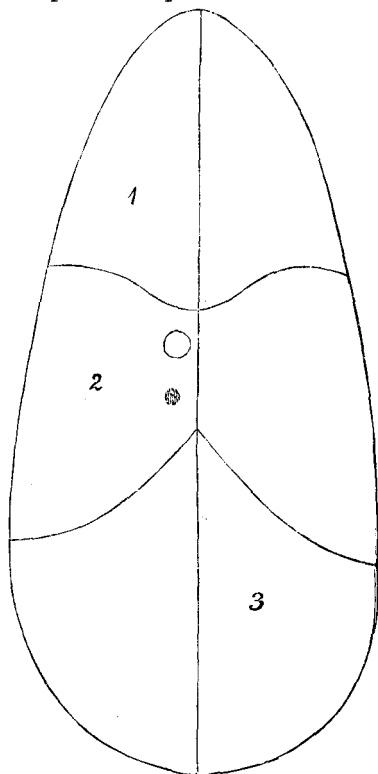


Fig. 3.

others have not occurred to us. In 1 we cannot discover any trace of the eye-socket, which, had this been the anterior portion of a dorsal plate, ought to have been displayed; but in 2 there is a round orifice, to which a sucking apparatus might have been well attached. If this interpretation be correct, and be confirmed by further evidence, then, at length, we have reached the method in which the Pteraspis and its kindred Cephalaspis sought and received their food in the waters. The separate plates seem to be bone, composed like that of the cephalic buckler, and were apparently joined together by deep sutures. The bone covering the upper surface of the head presented a solid mass to any opposing object; but that covering the under surface, as less exposed, was formed of different pieces, and thus flexible wherewithal. And we have observed that Plate 1 covers Plate 2 by a deep marginal socket; so that the plate to which a sucker might be attached could not be torn from its place without the resistance of the other.

CORRESPONDENCE.

Origin of Flint Veins in Chalk.

DEAR SIR,—A short time since a paper appeared in your publication reviewing the various theories concerning the origin of the chalk flints. No notice was then taken of a theory which, to my mind, explains the origin of flint better than any of those theories which have as yet been