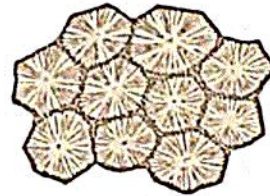


What, then, let us inquire, is the real history of the cerebral development of the vertebrata, as recorded in the rocks of the earlier geologic periods?

Though the vertebrata existed in the ichthyic form throughout the vastly extended Silurian period, we find in that system no remains of the cranium: the Silurian fishes *seem*, as has been already said, (page 53,) to have been exclusively Placoid, and the purely cartilaginous box formed by nature for the protection of the brain in this order has in no case been preserved. Teeth, and, in at least one or two instances, the minute jaws over which they were planted have been found, but no portion of the skull. We know, however, that in the fishes of the same order which now exist, the cranium consists of one undivided piece of a cartilaginous substance, set thickly over its outer surface with minute polygonal points of bone, (fig. 7,) composed internally of star-like rays, that radiate from the centre of ossification, and that present, in consequence, seen through a microscope, the appearance of the polygonal cells of a coral of the genus *Astrea*. The pattern induced is that of stars set within polygons. Along the sides or top of this unbroken cranial box, that exhibits no mark of suture, we find the perforations through which the nerves of smell, sight, taste, and hearing passed from the brain outwards, and see that they have failed to originate distinct vertebral envelopes for themselves;—they all lodge in one undivided mansion-house, and have merely separate doors. We find, further, that the

Fig. 7.



*Osseous points of placoid cranium.\**

(Mag. twelve diameters.)

\* From the head of *Raja clavata*.