

duced by a mere enlargement and overgrowing of the vertebræ and the ribs, that is to say, by the peculiar development of certain bones of the true skeleton.

The bony shield of *Sphargis* exhibits, moreover, some peculiarities which we do not find in other Turtles. There is a most elegant pavement of small plates, extending over the whole shield, seemingly jointed to each other by the finest sutures, which, however, are in fact nothing but nutritive canals starting from those seeming sutures, themselves larger canals, and ramifying through the plates as a fine network of a yellow color, owing to the fat fluid which the canals contain. As I possess no young specimens of this Turtle, I have had no chance to observe the corium before it is ossified, so that this remains to be studied. The character of the ossification is, however, really the same as in the dermal ossification of *Trionyx*, mentioned above, except that the canals seem to be more regular in *Sphargis*. With reference to the extension of these ossifications, I have already made some remarks above, when speaking of the bony shield generally.¹ I have now only to condense all the observations related above, in a few words.

The ossifications of the corium in Turtles take place only in the dorsal and ventral walls of the body. Their development is greatest in land Turtles,² and least in the *Trionychidæ* and *Sphargididæ*; in which latter, though they are relatively more extensive than in the *Trionychidæ*, they yet nowhere reach the true skeleton. The deposition of lime in these ossifications is mostly so extensive, that they are just as hard as true bone, and in proportion to this deposition of lime, their structure approaches also more and more that of true bone, the holes of the elastic membrane appearing then as haversian canals, and around them the fine bone-holes, but it shows still everywhere its character as dermal bone by the irregularity of its structure. In order to ascertain what is true skeleton bone, and what dermal bone, I have availed myself not only of the difference in their structure, but resorted also to the investigation of the cartilaginous skeleton in the embryo, or in the young soon after hatching. Such young Turtles furnish, indeed, the most beautiful microscopical objects for the study of cartilage and its ossifications. Now wherever we find regular cartilage in the young, we take it for granted that such parts are to be considered as belonging to the true animal skeleton. Thus we have ascertained

of the so-called skeleton of the Testudinata is formed by the skin. This has been further illustrated by W. Peters (*Observationes ad Anatomiam Cheloniorum*, Berolini, 1838) and by Owen (*Observations on the Development of the Carapace and Plastron of the Chelonians*, *Philos. Trans.*, 1849, and *Fossil Reptilia*, *Palæontographical Society*, 1849). The most striking evidence of the independence of the dermal and

the true skeleton is afforded by the solid frame of *Trionyx*, in which the growth of the dermal and of the true skeleton takes place by an alternate extension of their respective peripheric parts, as we shall see fully when considering this family more in detail.

¹ See, above, Sect. 4, p. 255-257.

² It is in this sense that the statement on page 236, line 22, is to be understood.