

attention has chiefly been devoted to those points which are less fully illustrated in Rathke's monograph. The minuteness with which he has described the muscular development of a number of young Testudinata belonging to several distinct families¹ has induced us to enter into fewer details upon this point, especially since the muscles of the adults are fully described in a preceding part of this work.² On that account, we have taken more particularly into consideration the Histology of this system, for which we refer to the next section. (See also p. 592, Pl. 19, fig. 25.)

The Heart. The heart, and in fact the whole circulatory system, is a development of the dorsal surface of the intestino-subsidiary layer into a vast network of anastomosing channels, through which the blood runs in certain determined directions. It is within the boundaries of the central propeller of the circulation that the blood first makes its appearance, surging backward and forward. At first, circulation is a mere tossing of elementary cells and albuminous fluid from one side to the other of the simple saccular heart (p. 547; Pl. 12, fig. 7, *h*). After the vertebral layer (Pl. 9e, fig. 4, *f*¹, fig. 4a, *f*¹, *f*⁶, fig. 4b, *f*¹) has divided off from the subsidiary layer, (fig. 4, *o*¹, *n*, fig. 4a, *o*¹, *n*, fig. 4b, *o*¹,) the latter becomes separated from the former to a considerable extent, so as to leave a cavity (Pl. 9d, fig. 1, *h*, *j*²; Pl. 9e, fig. 5, *j*²) of variable depth between the two. This cavity is deepest along the median line of the body, and grows shallow on each side till its upper and lower walls meet along the sides of the embryo. At the anterior part of the body, the largest and deepest portion (Pl. 9d, fig. 1, *h*) of the cavity is nearly altogether shut off from the rest; this is the heart. As yet there is no circulation in it, there being no walls proper; in the beginning it merely marks its position, just in the same way that the primitive furrow indicates the site of the spinal marrow. However, in order to avoid confusion, we will at once designate it as the heart, and speak of it as such during its formation, as well as afterwards. In the beginning, the heart lies at the inner angle of the curve of the head, so that it is partly in the dorsal and partly in the ventral region, and is essentially more anterior than the brain (fig. 1, *e*¹, *e*⁶). This latter feature would be more readily perceived if the embryo were represented in a straightened position.

On account of the absence of a circulating fluid of any consistency, the heart is not perceptible in a general view of the whole animal. It requires a longitudinal section (Pl. 9d, fig. 1) of the embryo, in order to lay it open to view. On this account it is not seen in several of our figures representing external views of some older stages, (Pl. 12, fig. 3, 3a, 4,) where the anterior bend (fig. 3, *a*⁶, fig. 3a, *a*⁶) of the body has receded toward the abdominal

¹ Rathke, *Entwicklung der Schildkröten*, p. 154.

² *Comp. Part II., Chap. 1, Sect. 7, p. 270.*