

albuminous fluid, which is totally different in appearance from the blood, containing blood corpuscles, which is usually described as indicative of the earliest circulation.<sup>1</sup> This fluid is set in motion by the impulsive contractions of the heart; as may very easily be seen by the help of a low magnifying power. This clear, dark area, which we now know to be the vascular area, is considerably increased in size beyond the space it occupied when first noticed, (see Pl. 14, fig. 12,) so as to have a diameter of about double the length of the embryo, and equal to one sixth of the circumference of the egg.

At the next step, we find the embryo still more bent upon itself, especially at the anterior part, (Pl. 12, fig. 6,) where the head curves downwards and backwards so as to approximate the cardiac region (*h*). A greater definiteness obtains in the outlines of the eyes (Pl. 12, fig. 6, *h*; Pl. 21, fig. 28) and ears (Pl. 12, fig. 6, *l*; Pl. 21, fig. 27). The spinal tube is still more closed over (Pl. 12, fig. 13, *e*). The dorsal vertebræ are more marked posteriorly (fig. 12, and 13, *f*). The subsidiary layer is still further contracted at its mouth, by the increased constriction of the abdominal parietes (fig. 13, *o*). The heart, (Pl. 12, fig. 6, *h*), in addition to the sigmoid flexure of the last phase, has become swollen and curved downward towards the ventral surface of the body, carrying with it the superposed musculo-cutaneous layer.<sup>2</sup> At this advanced stage of growth, the embryo is so transparent that the whole internal organization may very easily be recognized without the help of dissection. This transparency, however, does not amount to that glassy clearness which it obtains among the embryos of Fishes. The further progress in the evolution of the nervous system, the dorsal vertebræ, the chorda dorsalis, the eyes, the ears, and the branchial fissures, will be described when treating of the special development of each of these organs; it being sufficient here to have traced their origin and mode of growth up to that period when the nature of each and all of them could be easily recognized. Hereafter we shall merely mention the degree of development of these organs at each phase, without adding any special details respecting the process through which they have passed to arrive at any particular stage, and at the same time describe

<sup>1</sup> This early circulation of an albuminous fluid with minute granules probably precedes the formation of the blood in all Vertebrates. I have observed it in Fishes and Birds.

<sup>2</sup> If the embryo is cut out of the egg in connection with the vascular area and immersed in sugar syrup, it will live, and its heart beat vigorously, for at least twelve hours. In some instances, when the whole egg was sunk in syrup, after the shell had been

taken off, the embryo lived not less than thirty-six hours. We have several embryos of different ages which have been preserved in strong syrup for more than two years, and the blood has just as clear and brilliant a red color as when it flowed through the vessels of the living animal. Caution, however, is necessary in transferring the embryo to the densest syrup in which it is eventually to be preserved, else the animal may shrink and become distorted.