

to undergo there a further development before being discharged into the acrocyt," an appendage of the gonophore in the form of an external marsupial chamber which exists in certain species, and receives the ova before their final escape as larvæ into the surrounding water. I described the function of the gonophore in this case as merely that of "a receptacle in which certain intermediate stages of development take place."<sup>1</sup>

The phenomenon, however, thus recorded in *Sertularia pumila*, I believed to be peculiar to this species, with possibly a few others, and I thus overlooked its real significance. The important researches of Edouard van Beneden have since shown that the sexual cells may originate in other parts of the colony at a distance from the gonophore,<sup>2</sup> and Kleinenberg has made it evident that egg-cells which originate in the ectoderm may pass through the mesosarc into the endoderm, and there, surrounded by conditions better suited to their nutrition, may increase in size and make further advance towards maturity;<sup>3</sup> but it was reserved for Weismann by his epoch-making researches into the origin of the sexual elements in the Hydroida,<sup>4</sup> to show that what I had thus regarded as an exception was really the rule, and that the sexual cells originate in most cases in parts of the colony removed from the gonophore, into which they subsequently wander in order to pass through certain later stages of their development.

These remarkable researches of Weismann have shown not only the parts of the colony in which the sexual cells originate, but the special layers—endoderm or ectoderm—which give birth to them, and the unexpected fact has been elicited, that there is no constancy either in the part of the colony or in the particular tissue in which the germ cells, which are to become developed into spermatozoa or into ova, first show themselves.

The observations of Weismann have been made on a very large number of species, and he concludes that the sexual cells arise now here, now there, without rule or connection, and that their origin has no definite relation to the germinal layers of the embryo, that on the contrary, it is now the endoderm, now the ectoderm, now both layers together which give rise to them. Then again it may be the ectoderm which gives origin to the male, the endoderm to the female sexual cells, as is the case in *Campanularia flexuosa*, while in other instances, as in *Eudendrium racemosum*, it is the reverse of this. And not only does the relation of the sexual cells to the two primary layers thus vary, but their relation to the various zooids of the colony is equally without any apparent law; for in some cases the place of origin of these cells may lie in the manubrium of the Medusa, in others in the cœnosarc of the stem or branches, and now again in the buds which are to form sedentary gonophores. It would seem that every

<sup>1</sup> Gymnoblasic Hydroids, p. 150, woodcut fig. 21, p. 50.

<sup>2</sup> E. van Beneden, Sur la distinction originelle du testicule et de l'ovaire, *Bull. de l'Acad. Roy. de Belgique*, sér. 2, t. xxxvii.

<sup>3</sup> Kleinenberg, Die Entstehung der Eier bei Eudendrium, *Zeitschr. f. wiss. Zool.*, Bd. xxxv., 1881.

<sup>4</sup> August Weismann, Die Entstehung der Sexualzellen bei den Hydromedusen, Jena, 1883.