

An intermediate form by which the medusoid passes into the fully developed Medusa is seen in *Pennaria*. Here the umbrella has four well-developed radial canals which open into a marginal circular canal, while its codonostome, though never attaining the widely open condition found in the planoblast, and carrying on its margin only the rudiments of tentacles, is sufficiently developed to admit of the free ingress and egress of the surrounding water. Notwithstanding, however, this relatively advanced stage of development, the gonophore remains permanently attached to the trophosome, and thus discharges its generative products without ever becoming free.¹

Development of the Gonophore.—In the development of the Medusa-bud, the first foundation of the Medusa, like that of every bud in the Hydroid colony, consists of an outbulging of some definite part of the Hydroid body. There is thus formed a sac-like projection whose walls consist of endoderm and ectoderm in direct continuation with the same layers in the colony, and whose cavity is also only an extension of that of the part from which the bud is given off.

The subsequent course of the development has recently been studied more especially by O. and R. Hertwig,² and by Weismann.³ When the hernia-like sac which forms the foundation of the gonophore has attained a certain height the ectoderm of its summit becomes thickened and forms an internal prominence, the "Glockenkern" or *endocodon* of Weismann. This, pressing on the part of the endoderm which lies beneath it, causes an inversion of the endoderm in the form of a cup whose walls, necessarily double as the result of the invagination, rise on all sides round the endocodon. In the meantime a central cavity has been formed in the solid ectodermal endocodon. This is to become the cavity of the umbrella, while by the partial adhesion to one another of the two endodermal layers by which it is surrounded, four (or more) longitudinal channels are produced. These are the radiating canals, while the intervening endoderm, whose lumen has become obliterated by the adhesion, forms the endoderm lamella or vascular lamella of the Hertwigs.

At the same time the bottom of the endodermal cup rises in the form of a hollow cone, pushing before it the ectodermal layer which forms the floor of the cavity of the endocodon. It thus becomes clothed by this layer, and forms the manubrium of the Medusa with its endodermal and ectodermal layer, while the circular canal which in the Medusa runs round the margins of the umbrella is formed by intercommunicating lateral tubular offsets from the distal extremities of the radial canals. Finally, the cavity of the umbrella, still represented by the hollow endocodon, opens externally

¹ Another intermediate form between hedrioblast and planoblast has been recently described by Clarke (*Mem. Boston Soc. Nat. Hist.*, vol. iii., 1872) in a Gymnoblasic Hydroid from the American coast. In this, which gives origin to medusoids with well-developed radial and circular canals, Clarke has seen some of the medusoids detach themselves before liberation of their generative products, while others discharge these without ever becoming free.

² O. und R. Hertwig, *Das Nervensystem und die Sinnesorgane der Medusen*, Leipzig, 1878.

³ A. Weismann, *Die Entstehung*, &c.