

disappeared, and which are only now retained in the ontogenetic development"; then (p. 43) "for the Gasserian ganglion there is no indication of a connection with the epiderm"; and, lastly (p. 52), "it appears to be hardly any longer possible to look upon these nerve-ganglia (Nervenknotten) as simply homologous with spinal ganglia."

Baldwin Spencer¹ writes (*loc. cit.*, p. 129) concerning *Rana temporaria*:—"Along certain lines the cells of the nervous layer proliferate, and it is by this proliferation that the rudiments of the cranial nerves are laid down"; further (p. 130), "the development of the ganglia at the level of the lateral line, and the fact of their long connection with the epiblast at this point . . . is of great interest in connection with certain points in the development of the Elasmobranch nerves."

Concerning the developmental phenomena in the trunk-region at this period, the spinal nerves are stated to be not yet visible, "though the nervous sheath is clearly developed and in this the lateral line"

The author next mentions observations made by him on Dr. Beard's sections of Elasmobranch embryos, and goes on to say (*loc. cit.*, p. 131):—

"The Gasserian ganglion is, at all events in part, formed *directly from the epiblast* . . . the same development takes place in the case of the ganglion of the third and seventh nerve—in that of the ciliary ganglion the development is particularly clear— . . . *The ganglia arise along a level of the lateral line continued on the head.*"

He next says:—"The curious origin of the ganglia of the cranial nerves points strongly to the conclusion that . . . their present condition and nature must . . . be regarded as a secondary and certainly not primitive condition.

"In passing, I may just notice that on this supposition an explanation is offered as to the origin and meaning of the two curious branches which unite respectively the ganglia of the fifth and seventh and fifth and third cranial nerves; they may be regarded as persistent parts of the lateral nerve . . . in the head."

In the third place, extracts will be given from Beard's more extensive paper.² He writes (p. 97) as an introductory statement:—"At present we are acquainted with no Invertebrate nervous system which is built upon the same plan as that of Vertebrates"; and then passes to the results of his investigations chiefly carried out on embryos of *Torpedo* and a few other Elasmobranchs. I make the following selections (p. 101):—

"At the point of fusion" (of the cephalic nerve with the epiblast) "a local thickening of epiblast has previously taken place. After the fusion has taken place a proliferation of some of the cells composing the thickening ensues. The proliferated cells form a mass of actively-dividing elements still connected with the skin. . . . This mass of cells is the rudiment of the ganglion of the dorsal root."

On p. 110 he adds:—"Along with the separation of the (vagus) ganglion from the

¹ Early Development of *Rana temporaria*, *Quart. Journ. Micr. Sci.*, Suppl., 1885.

² Branchial Sense-Organs in Ichthyopsida, *Quart. Journ. Micr. Sci.*, November 1885, No. ci.