Proceedings of the Iowa Academy of Science

Volume 41 | Annual Issue Article 108

1935

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H. W. Norris
Grinnell College

Jack Maxfield
Grinnell College

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H. W. Norris and Jack Maxfield

The terms *hypophysis* and *pituitary* are used loosely and interchangeably by many if not most writers on endocrine organs. By "pituitary" the writers of this paper understand an assemblage of two diverse elements: an epithelial *hypophysis* derived from the buccal ectoderm of the embryo and a *pars nervosa* originating from the infundibulum of the brain. The junction and fusion of these two parts form the pituitary proper. It is with such an interpretation that we shall use the terms hypophysis and pituitary.

There is a very extensive and increasing literature on the pituitary body, especially of mammals and amphibians. That pertaining to the elasmobranch hypophysis is somewhat incidental, although Baumgartner ('15), Gentes ('03-08), B. Haller ('98), Graf Haller ('24), Herring ('11-13), Stendell ('14), Sterzi ('09, '12) and Woerdeman ('14) have made notable contributions.

Admitting the possibility of the occurrence of a representative of the pars nervosa in elasmobranchs, nevertheless it must be regarded as quite insignificant. The hypophysis of elasmobranchs has a unique structure, three distinct parts: 1. anterior lobe, pars anterior, a hollow elongate tube or sac; 2. superior lobe, pars intermedia, sometimes paired, applied closely and attached to the saccus vasculosus of the brain; 3. inferior lobe, considered by some as homologous to the pars tuberalis, attached by a slender stalk to the anterior (usually) lobe. It is this inferior lobe which is the distinctive peculiarity of the elasmobranch hypophysis. Structurally, histologically and ontogenetically it is allied with, perhaps to be considered a part of the pars anterior.

Our interpretation of the structure of the elasmobranch hypophysis is that expressed by Sterzi and by Baumgartner, that in essentials it consists of a dorsal elongate sac lying beneath and in contact with the inferior lobes of the brain, and connected with a more ventrally (and commonly posteriorly) lying bi-lobed sac (inferior lobe of the hypophysis) by an interhypophysial stalk. Anteriorly the dorsal elongate sac has a thickened glandular ventral wall designated as the anterior or rostral lobe, and posteriorly a

thickened dorsal wall in intimate relation with the saccus vasculosus and known as the dorsal or superior lobe. The bilobed ventrally lying sac is called the posterior lobe by Baumgartner and the endocranial lobe by Sterzi. As it may be anterior, posterior or intermediate in position and is always ventral in relation to the other lobes, and does not always lie in a definite endocranium, we shall term it the inferior lobe. In the cylindrical or selachoid elasmobranchs the inferior lobe is usually situated in a sella turcica hollowed out of the cartilaginous floor of the cranium, and is imbedded in connective tissue commonly so dense that it is impossible to dissect the lobe free. Hence it has escaped the notice of many investigators and is quite generally ignored by writers on comparative anatomy and by makers of models of the elasmobranch brain. In the batoid forms there is little indication of a sella turcica and with some care the inferior lobe may be dissected free of the endocranium. The most satisfactory method of determining the structure and relations of the inferior lobe is by means of serial sections involving the brain, hypophysis and cranial wall in their natural positions in relation to each other. The inferior lobe has been supposed to be formed from the original hypophysial sac as a pair of lateral out-pocketings that gradually lose their separate connections with the sac and fusing together join the sac by means of a common interhypophysial canal which may or may not become a solid stalk later. But Graf Haller believes that the paired lateral lobes are not outpocketings but the persistence of the inner ends of a pair of clefts ("Kieferaugenspalte") situated between the eye and the jaw-arch of the embryo, and which become included within that part of the hypophysial sac formed anterior to the true Rathke's pouch.

The positions of the anterior and posterior lobes in reference to each other are fairly constant. As stated in a preceding paragraph the anterior lobe appears to be a thickening of the ventral wall of the hypophysial sac anteriorly and the superior lobe a dorsal and posterior thickening. In some instances the anterior lobe is telescoped into the superior lobe to some extent. The anterior lobe is characteristically composed of tubules chiefly, although in some forms (Centracion, and to some extent Squalus) vesicles are common. Usually the ventral wall of the anterior lobe is folded in on the middle line, and oblique infoldings of the wall are not uncommon, especially in the posterior part of the lobe. On the other hand the superior lobe is composed of solid cords almost exclusively, and foldings of the wall are uncommon. In the

selachoid forms there is usually a sharp distinction between the anterior and superior lobes, and in some instances they are not in direct contact, but in the batoid forms the junction between the two lobes is so intimate that they are distinguishable only by differences in staining reactions and slight differences in cell structure and arrangement. In some batoids (Urobatis, Pteroplatea) there are two distinct parts of the anterior lobe, distinguishable in staining, the anterior part of the lobe reacting much more intensely to hematoxylin stains. The superior lobe is more acidophile in its staining reactions than the anterior and inferior lobes.

The inferior lobe is in most of its characteristics more variable than the other lobes. Its typical position in reference to the other lobes is perhaps best shown in *Heptanchus*, in which it is seen to be situated in a sella turcica at the posterior end and ventrally of the anterior lobe and connected directly with the latter by the interhypophysial stalk. But from this position it may depart widely. In many forms its position is ventral to the posterior or middle part of the anterior lobe; in *Carcharias taurus* it is ventral to the anterior part of this lobe. In some forms, as *Narcacion* and *Myliobatis*, it may extend far anteriorly of the other parts of the hypophysis. In the genus *Raia* it is usually ventral to the anterior part of the anterior lobe, with exceptions in some species. As previously mentioned it is not situated in a sella turcica in the batoids. The shape of the inferior lobe is as variable as its position. In general it is a much flattened horizontal sac imbedded in the fibrous endocranium and connected with the anterior lobe by a hollow or solid interhypophysial stalk. The length of the latter is dependent largely upon the degree of migration of the lobe from the typical position. It may be a solid glandular plate, circular in outline (Isurus), or quadrangular (Alopias), flat branched (Narcacion, Myliobatis), a transverse bar (Raia, Carcharias), a semicircular bar and branched (Pteroplatea). In the batoids it is commonly composed of minute vesicles, in contrast with the tubular structure of the anterior lobe; in the selachoid forms, as in Centracion and Cephaloscyllium, the tubular structure may predominate. The blood supply of the inferior lobe is extremely variable, scanty when the lobe is partially or wholly rudimentary and functionless, abundant when the tubular structure is conspicuously developed. In the staining reactions of its cells the inferior lobe resembles the anterior lobe, but the coloring is not so intense.

On the whole we agree with Stendell that the hypophysis of the elasmobranchs is more primitive in its structure than that of other

vertebrates. As Graf Haller has pointed out, the hypophysis is not merely the differentiation of Rathke's pouch, but is a product of the general development of the head.

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DEPARTMENT OF ZOOLOGY,
GRINNELL COLLEGE,
GRINNELL, IOWA.