

THE OSTEOLOGICAL CHARACTERISTICS OF THE FAMILY SYNAPHOBRANCHIDÆ.

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The family *Synaphobranchidæ* was indicated in 1862 by Mr. James Yates Johnson in "Descriptions of New Genera and Species of Fishes obtained at Madeira." It was, however, based on superficial characters, and little idea could be derived from the characters visible externally as to the real affinities of the type. Mr. Johnson's diagnosis was as follows:

This genus [*Synaphobranchus*] forms the type of a new family of malacopterygian apodals, which differs from all previously established families, except the *Synbranchidæ*, in having the gill-openings close together on the ventral aspect; and from the *Synbranchidæ* it is distinguished by the presence of fins. Moreover, from the *Muraenidæ* it is separated by the possession of pectoral fins, and from the *Congridæ* by the possession of scales and by the vent being before the commencement of the dorsal fin.*

Nothing has been since added to our knowledge of the essential characters of the group, although a number of additional species have been made known. The following description will therefore prove to be useful, it is thought.

SYNAPHOBRANCHIDÆ.

Synonyms as family names.

- = *Synaphobranchidæ*, Johnson, Proc. Zool. Soc. London 1862, p. 169.
- = *Synaphobranchoidæ*, Bleeker, Atlas Ich. Indo-Neerland., v. 4, p. 13, 1864.
- = *Synaphobranchidæ*, Gill, Arrangement Fam. Fishes, p. 20, 1872; Gill, Standard Nat. Hist., v. 3, p. 103, 1885.
- = *Synaphobranchidæ*, Jordan & Gilbert, Syn. Fishes N. Am., p. 364, 1882.

Synonym as group name.

- = *Synaphobranchina*, Günther, Cat. Fishes B. M., v. 8, pp. 19, 22, 1870.

DIAGNOSIS.

Enchelycephalous Apodals with conic pointed head, moderate opercular apparatus, lateral maxillines, cardiform teeth, distinct tongue, inferior branchial apertures discharging by a common aperture, continu-

*Proc. Zool. Soc. London, 1862, p. 169.

ous vertical fins, pectorals well developed, scaly skin, and nearly perfect branchial skeleton.*

Description.

Body slender anguilliform, moderately compressed anteriorly, much compressed toward end of tail, and with the anus in the anterior third of the total length.

Scales small, linear or elongate elliptical, arranged in small groups obliquely at right angles to those of the neighboring groups.

Lateral line distinct, more or less high up and on each side of the back in front, but gradually declining, and near the middle behind.

Head moderate, compressed, oblong, conic laterally, with all the bones invested in the skin.

Eyes within the anterior half of the head, directed sideways, of moderate or large size, covered by thin skin.

Nostrils lateral, the posterior considerably in advance of the lower half of the eye, the anterior near the tip of the snout and subtubular.

Mouth with the cleft slightly oblique, extending considerably beyond the eyes.

Jaws well developed; maxillines approximated close to the front of the vomer, with the clamping processes selliform and appressed closely to the sides of the vomer behind its head, with ledge-like extensions within along the anterior half, and expanding vertically backwards; mandible slender, the dentary with the coronoid process obsolete, the surface of the bone having a corneous appearance behind, ensheathing the articular, which extends well forward in front of the condyle and scarcely at all backwards.

Teeth conic, in a narrow band in the jaws and vomer.

Lips obsolete.

Tongue little developed.

Periorbital bones almost membranous.

Opercular apparatus feebly developed; operculum lamelliform and claviform, inserted very low on the hyomandibular; suboperculum expanding downwards and with an anterior process continued in front of the operculum; interoperculum lamelliform, intervening between the suboperculum and preoperculum; preoperculum almost reduced to a muciferous canal.

Branchial apertures inferior and confluent in a single external longitudinal slit.

Branchiostegal rays in moderate number (about fifteen), attached to the sides of the compressed ceratohyal and epihyal, slender, abbreviated, and moderately bowed, not being curved up above the operculum.

Dorsal, anal, and caudal confluent in an uninterrupted fin, with the

* If we look to the essential characters, however, rather than to those which will enable the group to be recognized in comparison with the other families as readily as possible, the family can be defined as enchelycephalous apodals with abbreviated branchiostegal rays and single ventral branchial aperture.

rays readily perceptible through the skin; dorsal variable, commencing behind or in front of the anus and mostly low; anal deeper and commencing close behind the anus; caudal prominent.

Pectorals well developed, near the breast, with the rays distinct.

Branchial arches nearly complete, with slender glossohyal and urohyal, and with the first, second, and third basibranchials ossified, first and second hypobranchials ossified, third cartilaginous, ceratobranchials and epibranchials of four pairs ossified; pharyngobranchials of second pair rod-like, of third pair developed as dentigerous epipharyngeals; hypopharyngeals oblong, closely apposed to and superincumbent on the rudimentary fifth arch. Interbranchial fissures extended.

The osteological characters supporting those enumerated are many and important. It need only be added here, however, that the ectopterygoid is developed as a slender rod bordering the membranous palatal roof, and that the hyomandibular is very large and directly obliquely backwards, and, inasmuch as the facet for articulation of the operculum is near the distal extremity, the opercular apparatus is thereby thrown far away from the cranium. The corneous appearance of the dentary is striking, but of more importance is the extension forward of the articular bone. Perhaps the most obvious character is the abbreviation of the branchiostegal rays entailing a striking contrast to the other eels of the families *Simenchelyidae*, *Congridae*, *Anguillidae*, *Ophisuridae*, and *Muraenidae*, in which they are much elongated and sweep around the opercular apparatus, often intervening between it and the cranium.

There are two external features which are interesting on account of their bearings on the relationship of the family. They are (1) the character of the scales and (2) the position and approximation of the branchial apertures.

The form and mode of distribution of the scales (elongated and elliptical, distant, and arranged in patches at right angles to neighboring ones) are so marked that it might well be thought at first that they must indicate genetic relationship among the fishes so distinguished. If the eels alone were to be considered, it might be argued, with considerable plausibility, that the forms so characterized were descended from common ancestors so distinguished. It would even be difficult to present cogent arguments against such a postulate. But the structural differences between the several types so distinguished (*Anguillidae*, *Synaphobranchidae*, and *Simenchelyidae*) are very great, and that the same mode of squamation may originate independently is evidenced by the fact that among the ophidiids a like form and arrangement of the scales is to be found, although among others of the same family the usual form and imbrication of the scales occurs.

The approximation of the branchial apertures beneath the throat and their cincture by a common border recall the symbranchiate fishes, and on account of this character the present family has been compared

with, and might even be approximated to, those fishes." In this case, however, it will be evident, on comparing the structural characteristics of the several forms, that the resemblance is entirely illusive. As will be manifest on perusal of the description of the Synaphobranchoid characteristics, the family is typically apodal, and closely related to the *Congridæ*, *Anguillidæ*, and kindred families. On the other hand, the Synbranchiate fishes have little in common with the true apodal fishes, except the eel-like form. Their structural features are entirely different. They are, in fact, more nearly related to the ordinary physostomous fishes than to the apodal, agreeing with the former, and differing from the latter in the constitution of the circumoral bones (jaws, etc.), the palato-pterygoid arches, and even the cranium, especially in the possession of the exoccipital condyles.

Two genera are known of the *Synaphobranchidæ*, and they are closely related, although differing markedly in the extent of the development of the dorsal fin forwards.

I. SYNAPHOBRANCHUS.

Synonymy.

= Synaphobranchus *Johnson*, Proc. Zool. Soc., London, 1862, p.
 < Synaphobranchus *Günther*.

II. HISTIOBRANCHUS.

Synonymy.

= Histiobranchus *Gill*, Proc. U. S. Nat. Mus., v. 6, p. 255, 1883.
 < Synaphobranchus sp. *Günther*.