

MUSCLES OF MOLLUSCS.—There are frequently described in molluscs striated muscles, sometimes of a peculiar type. Müller and Keferstein have described them in the heart of Cephalopods and in the pharynx of the Cephalophora; Blanchard, in the adductors of *Pecten*, and Paneth, in the fins of Pteropods and Heteropoda. Schwalbe has described in the adductors of the lamellibranchs and elsewhere muscles with a double oblique striation, while, before him, Mettenheimer, Wagener and Margo had referred to the same appearance as spiral striation. Lately, Fol (*Comptes Rendus*, Jan. 23, 1888) has investigated the same subject, and concludes that true striated muscles do not exist in any mollusc. All cases reported as such, in reality, consist of smooth fibres, around which fine fibrils are rolled in a spiral manner, this being the case in all the special instances noted above. The method employed by Paneth (glycerine and nitric acid) produced such contraction that the spiral fibrillæ really appeared transverse. All of the molluscan muscles are of the smooth type; but these are to be grouped in two sub-divisions—that already mentioned, and that in which the fibrillæ are straight. The latter are the more abundant. Judging from their distribution, the spiral type are of value where a rapid contraction is needed.

THE PRIMARY GROUPS OF MAIL-CHEEKED FISHES.—A recent study of the structural characteristics of the mail-cheeked fishes has led to some interesting and unexpected results. The genus *Dactylopterus*, which has been almost universally closely associated in the same family with *Trigla* or *Peristedion*, and especially with the latter, was found to differ very widely. The relative proportions of the spinous and soft parts of the dorsal fin, to which so much value has been attributed by Dr. Günther, proves to be of comparatively slight importance. All the families recognized by Dr. Günther, except that of the Heterolepidotidæ, are very unnatural combinations of dissimilar groups; most of those recognized by myself are amply justified by anatomical evidence, but several others must be added to the list.

The genius of Cuvier, manifested in the perception of the relations of forms differing so much in superficial characteristics as do the mail-cheeked fishes, is justified by a detailed study of the various constituents of that group. The course of Günther and his followers in disintegrating it, widely divorcing its constituents, and associating its fragments with dissimilar forms, was a decidedly retrograde step. Nevertheless, although the group is one whose members are genetically connected, the diversities of structure are too great to allow of their retention in one family or even superfamily. They must be distributed into four (and ultimately more) superfamilies; those now determined are the Scorpenoidea, the Cottoidea, the Trigloidea, and the Dactylopteroidea. Several forms

that have not yet been anatomically investigated represent families—Caracanthidæ, Platycephalidæ, Agonidæ, and Rhamphocottidæ—exhibiting very peculiar characters, which must be reflected in their skeleton, and their exact relations remain to be ascertained; probably none belong to any of the superfamilies now established.¹

The families hereinafter enumerated appear to be all well entitled to the rank, and are characterized by various anatomical peculiarities. The most closely allied pair, and which perhaps need future confirmation, are the Hexagrammidæ and Anoplopomidæ. All the families will be diagnosed and, in part, fully described in several memoirs prepared for publication in the Proceedings of the United States National Museum, and the anatomical characteristics of the crania will therein be illustrated. The comparative characteristics of the major groups, or superfamilies, are made known in the following analytical exhibit:

A. Scapular arch normal, the post-temporal and postero-temporal forming part, and the latter intervening between the post-temporal and the proscapula. Infraorbital chain with all bones entering into the orbital margin and functional, only partially extended over the cheek; with the third bone hypertrophied and developed as a stay impinging on the anterior wall of the preoperculum; post-temporal normally articulated with the epiotic and pterotic; intermaxillines with well-developed ascending pedicles gliding over the front of the prosethmoid.

1. Dentigerous epipharyngeals 3.3; actinosts moderate and inserted on posterior edges of hypercoracoid and hypocoracoid; ribs backwards borne on enlarged parapophyses.—*Scorpenoidea*.

2. Dentigerous epipharyngeals 1-1; actinosts large and partly intervening between the hypercoracoid and hypocoracoid; ribs sessile on the vertebræ.—*Cottoidea*.

B. Scapular arch abnormal, the post-temporal forming an integral part of the cranium and the postero-temporal crowded out of place by the side of the proscapula above or at the edge of the post-temporal.

1. Myodome (muscular tube) developed and cranial cavity open in front; prosethmoid and anteor normally connected by suture. Infraorbital chain with its anterior bones excluded from the orbit and functional as rostralateral, the series covering the cheeks, the third a large buccal bone articulating with the anterior wall

¹ An examination of the *Platycephalidæ*, *Agonidæ* and *Rhamphocottidæ*, since the preparation of this note, has confirmed my suspicion that they are severally types of distinct superfamilies, *Platycephaloidea* (with families *Platycephalidæ* and *Hoplichthyidæ*), *Agonoidea*, and *Rhamphocottoidea*. I have been unable to secure specimens of *Caracanthidæ*, and know nothing of their anatomy.

of the preoperculum; post-temporal suturally connected with the epiotic and pterotic by inferior processes, and with the upper surface forming an integral part of the roof of the cranium; intermaxillines with the ascending pedicles atrophied and connected with the knob of the anteal (vomer) by ligament.—*Trigloidea*.

2. Myodome undeveloped, the cranial cavity being closed in front by expansions from the subtectals suturally connected with corresponding expansions of the prootics and the parasphenoid; proethmoid and anteal entirely disconnected, leaving a capacious rostral chamber opening backwards mesially into the interorbital region. Infraorbital chain, with its second and third bones crowded out of the orbital margin by junction of the first and fourth, and leaving a wide interval between the suborbitals and the preoperculum; the first very long and extending backwards, the second under the fourth and the third developed as a small special bone (pontinal) bridging the interval between the second suborbital and the antero-inferior angle of the preoperculum; post-temporal suturally connected with the posterior bones of the cranium, and with the upper surface forming a large part of the roof of the cranium; intermaxillines with well-developed ascending pedicles gliding into the cavity between the anteal (vomer) and proethmoid.—*Dactylopteroidea*.

The superfamily SCORPÆNOIDEA includes the families Scorpænidæ, Synanceidæ, Hexagrammidæ, (or Chiridæ), and Anoploporidæ. The Caracanthidæ are generally associated with the Scorpænidæ and may belong to the superfamily, but this is doubtful.

The superfamily COTTOIDEA embraces the families Hemitriptidæ and Cottidæ.

The superfamily TRIGLOIDEA includes the families Triglidæ and Peristediidaæ.

The superfamily DACTYLOPTEROIDEA is represented only by the family Dactylopteridæ.

It is probable that the Trigloidea and Dactylopteroidea will be hereafter segregated as representative of a peculiar suborder.—*Theo. Gill*.

THE COCOON OF PROTOPTERUS.—Professor Wiedersheim (*Anat. Anzeiger*) has collected together the various notices that have been written by J. E. Gray, A. D. Bartlett, Krauss, A. Günther, and others concerning the structure of the case or "cocoon" of the curious fish Protopterus, and describes the result of his own observations upon the subject. Krauss's description of the membrane surrounding the fish is substantially correct. It appears to be designed to protect the animal from damage during its æstivation;