

## PART II. THE AMPHIBIA.

The Cephalic Muscles of Branchiate Amphibians: 1. The Dipnoi; 2. The Anuran Tadpole; 3. The Urodele Larva; 4. The Perennibranchiate Urodele; 5. Review.

The Cephalic Muscles of the Abranchiate Amphibians: 1. The Adult Caducibranchiate Urodeles; 2. The Adult Anura; 3. The Adult Caecilians; 4. Review; Appendix. The Laryngeal Muscles of the Amphibians.

The Skulls of the Amphibians: 1. The Skull of *Neoceratodus*; 2. The Skull in the Euamphibia; 3. The Skull in the Embolomeri.

The Origin of the Amphibia: 1. General considerations; 2. The Evidence of the Cephalic Muscles on the Phylogeny of the Amphibia; 3. The Serial Homology of certain of the Bones in the Skulls of the Amphibia, and their bearing on the Evolution of the Class.

## THE CEPHALIC MUSCLES OF BRANCHIATE AMPHIBIANS.

## INTRODUCTION.

The inclusion of the Dipnoi amongst the Amphibia and their discussion in this section of the work is in accord with the conclusions arrived at as a result of reviews of their anatomy and embryology published by myself elsewhere (Kesteven, 1931a, 1931b and 1941). Those conclusions were that the Dipnoi are the most primitive amphibians known. Therefore, since they may be regarded as the most primitive members of the group which next falls for description and discussion, they are dealt with first.

The nomenclature of the muscles will continue, as far as possible, to reflect the conclusions arrived at relative to their homologies throughout the vertebrate series. It may here be explained that throughout the whole of this work it has been my practice to become completely familiar with the musculature of each group before commencing the study of the next higher group. Thus, the musculature of the branchiate Amphibia was studied before any of the abranchiate forms were examined at all. The object was to avoid the possibility of interpreting the musculature of the lower groups in terms of the higher. This has involved the use of provisional nomenclature until the whole of the work was completed, and its alteration, where required, on the completion of the work. The revision of the typescript which was entailed by this policy has permitted the inclusion in a few places of paragraphs such as this and others which include references to observations made during later portions of the work.

The use of the designation "pterygoideus" for one of the muscles of mastication in the fishes is an example in illustration of substitution of a name conveying an intimation of the final conclusion arrived at and introduced only after the work on the Reptilia was completed.

There is, however, a limit to which this policy of introducing the final conclusion into the nomenclature may be carried. For instance, it is believed that the anterior belly of the *M. digastricus* was derived from the *Csv.1b*, the *M. intermandibularis*, but it would, clearly, be inadvisable to apply such a designation to a flat sheet of muscle fasciculi.

The Table of Homologies is introduced to bring the work up to date, as it were, and it is introduced at the beginning with a view to presenting the conclusions of the section on the Amphibia as an introduction indicating the trend of the work.

## LIST OF ABBREVIATIONS USED ON FIGURES 70-99.

A.c., Arytenoid cartilage; A.hy., *M. abdomino-hyoideus*; At.sc., *M. attrahens scapulae*; Br. 1 & 2, Branchial cartilages; Br.cl., Branchial cleft; C.he. & C.hy.e., *M. interhyoideus*; C.hy., Ceratohyoid cartilage; C.hy.a., *M. ceratohyoideus anterior*; Co., *M. claviculo-branchialis*; Co.hy.br., *M. claviculo-hyoideus*; C.p. & C.ph., *M. constrictor pharyngei*; Csd., Superficial dorsal constrictors; Csv.1a, *M. submentalis*; Csv.1b, *M. intermandibularis*; Csv.2a & 2b, Anterior and posterior parts of the *M. interhyoideus*; Cu., *M. cucullaris*; Dep.mn., *M. depressor mandibulae*; D.hy., *M. dilator hyoidei*; D.l. & D.lh., *M. dorso-laryngeus*; D.la., *M. dilator laryngei*; D.l.s., *M. depressor labii superioris*; E.br., The base of the external branchiae; Ep., Epithelium of the buccal mucosa; F.pr., Foramen prooticum; G.gl., *M. genioglossus*; G.hy., *M. geniohyoideus*; H.gl., *M. hyoglossus*; H.g.l.a., *M. hyoglossus anterior*; Hy.ph., *M. hyopharyngeus*; I.br., *Mm. interbranchiales*; I.h. & I.hy., *M. interhyoideus*; I.l.c., Inferior labial cartilage; I.sp., *M. infraspinatus*; L.a.b., *Mm. levatores arcuum branchialium*; L.br., The dorsal superficial branchial constrictor muscle; L.d., *M. latissimus dorsi*; L.hy., *M. levator hyoidei*; L.sc.l., *M. levator scapulae inferior*; L.sc.s., *M. levator scapulae superior*; L.v., *M. laryngeus ventralis*; Mas., *M. massetericus*; M.c. & Mk., Meckel's cartilage; Mm., *Mm. interbranchiales*; O-a.hy., *M. omo-abdomino-hyoideus*; Omo., *M. omo-hyoideus*; P.c., *Pars cephalognathica*; Pet.p., *M. petro-hyoideus posterior*; P.h.o., Posthyoid ossicle; P.n., *Pars notognathica*; Pr., Procoracoid; Pr.m., *Processus muscularis*; Pt., *M. pterygoideus*; Pt.a. & Pt.p., Anterior and posterior parts of the *M. pterygoideus*; Q-m., *M. quadrato mandibularis*; Qu., *Os quadratum*; R.ab., *M. rectus abdominis*; Rh.a., *M. rhomboideus anterior*; S.a.o. & S.a.ob., *M. subarcualis obliquus*; S.a.r., *M. subarcualis rectus*; S.a.t., *M. subarcualis transversus*; Sc., The scapula; S.c.t., *M. spino-capitis transversus*; S.l.c., Superior labial cartilage; Sph., *M. sphincter laryngei*; St.hy., Ceratohyoid cartilage; T., *M. temporalis*; V.mn., The mandibular ramus of the Vth nerve.