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The Osteology of *Cheimarrichthys fosteri* Haast (Pisces, Percomorphi)

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Abstract

THE osteology of *Cheimarrichthys fosteri* is described. Although *Cheimarrichthys* is a Percomorph it has a reduced orbitosphenoid. It appears to differ from other families in the superfamily Trachinoidae. The presence of a hypurapophysis is noted. The skull, vertebral column and caudal skeleton are illustrated.

INTRODUCTION

Cheimarrichthys fosteri (Fig. 1) is the only species in the family Cheimarrichthyidae. It is restricted to New Zealand, living in fresh water, at least in the adult and juvenile stages. Woods (1963) and Stokell (1955) discuss what is known of its habitat and life history.

The spelling of both the family and the generic names are in question. Stokell (1955) and Bassett (1961) use Cheimarrichthydae and *Cheimarrichthys*. Woods (1963) uses the latter generic name. Phillipps (1927) uses Cheimarrichthyidae and the generic name similar to Woods and Stokell. Regan (1913) and Berg (1947) use Chimarrhichthyidae and *Chimarrhichthys*. Haast (1873) used *Cheimarrichthys* in his original description.

The International Code of Zoological Nomenclature, Article 29, states that a family name is to be formed by the addition of -idae to the stem. The form Cheimarrichthyidae is therefore correct.

MATERIALS AND METHODS

The specimens examined came from streams on the west coast of the South Island from the lower Buller River system to Hokitika.

Bone structure was examined by clearing and alizarine staining as described by Hollister (1934). The skulls were then picked of all muscle and examined. The remainder of the skeleton was examined *in situ*. The drawings were made with a 10 x 10 wipple disc and squared paper. All scales on the figures equal 1mm except Fig. 1, where the scale is 1cm.

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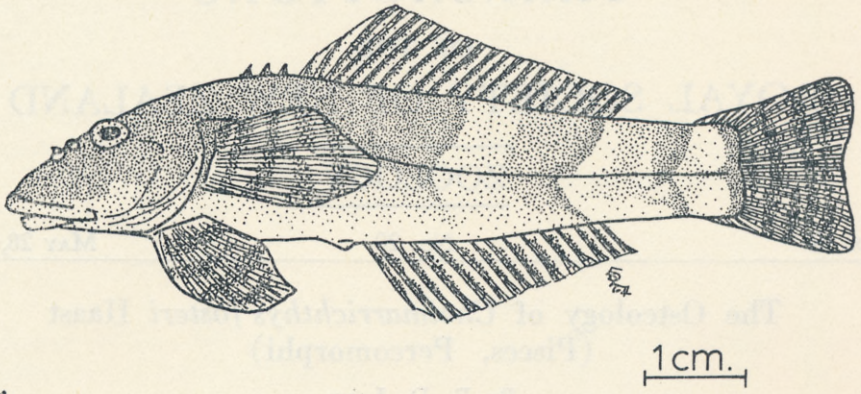

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Cheimarrichthys fosteri

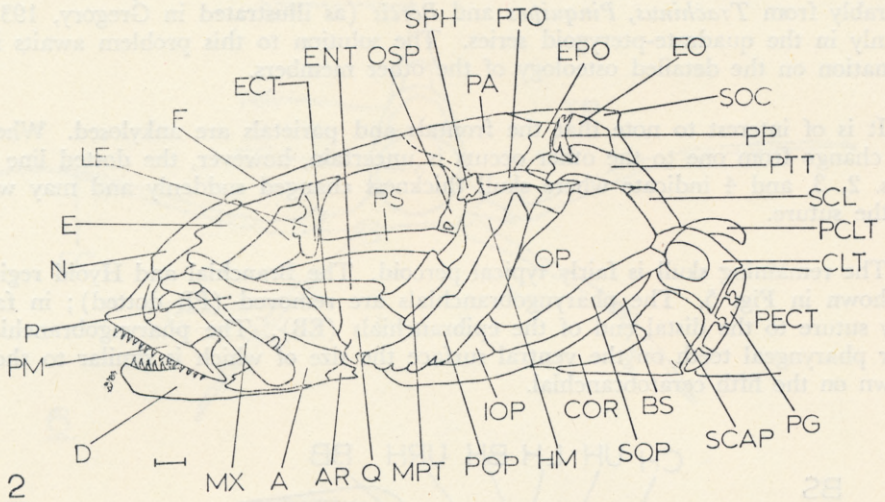
Skull

The symbol and names of the bones follow Harrington (1955). Figs. 2, 3, 4, and 5 show the skull. All the bones illustrated were well ossified; the suborbitals and supraorbitals were cartilaginous and greatly reduced with the exception of the lacrymal which was ossified and external to the region of the lateral ethmoid and ethmoid. Regan (1913), followed by Berg (1947), placed the family Cheimarrichthyidae in the Order Percomorphi (Perciformes), suborder Percoidae (Percoidei), Division Trachiniformes (Superfamily Trachinoidae). There are several interesting skull characteristics with respect to this classification. The Percomorphi are not supposed to have an orbitosphenoid. The *Cheimarrichthys* skulls I examined had a reduced orbitosphenoid at the posterior portion of the orbit (Figs. 2, 3). This bone is U-shaped, the base of the U joining the parasphenoid, the upper ends reaching level with, or slightly above the autosphenotic. I feel that *Cheimarrichthys* is a Percomorph, but the presence of the orbitosphenoid bone perhaps will affect its further classification.

Fig. 2.—Left lateral view of the skull. Upper jaw raised to show relationships more clearly. A—angular; AR—articular; BS—branchiostegals; CLT—cleithrum; COR—coracoid; D—dentary; E—ethmoid; ECT—ectopterygoid; ENT—endopterygoid; EO—exoccipital; EPO—epiotic; F—frontal; HM—hyomandibular; IOP—interopercular; LE—lateral ethmoid; MPT—metapterygoid; MX—maxillary; N—nasal; OP—opercular; OSP—orbitosphenoid; P—autopalatine; PA—parietal; PCLT—post cleithrum; PECT—pectoral fin; PG—ptergials (radials); PM—premaxillary; POP—preopercular; PP—medial extrascapular; PS—parasphenoid; PTO—autopterotic; PTT—post temporal; Q—quadrate; SCAP—scapula; SCL—supracleithrum; SOC—supraoccipital; SOP—subopercular; SPH—autosphenotic.

Fig. 3.—Left lateral view of neurocranium. BO—basioccipital; E—ethmoid; EO—exoccipital; EPO—epiotic; F—frontal; LE—lateral ethmoid; OSP—orbitosphenoid; PA—parietal; PRO—prootic; PS—parasphenoid; PTO—autopterotic; PTS—pterosphoid; PV—prevomer; SOC—supraoccipital; SPH—autosphenotic.

Fig. 4.—Dorsal view of the neurocranium. E—ethmoid; EO—exoccipital; EPO—epiotic; F—frontal; LE—lateral ethmoid; PA—parietal; PTO—autopterotic; PV—prevomer; SOC—supraoccipital; SPH—autosphenotic.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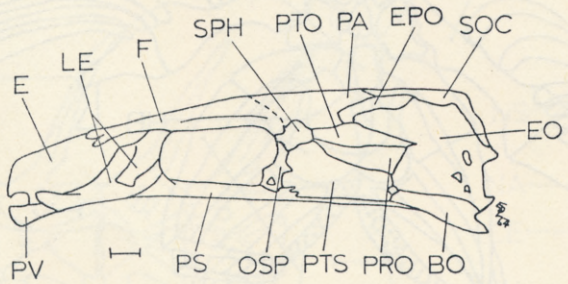
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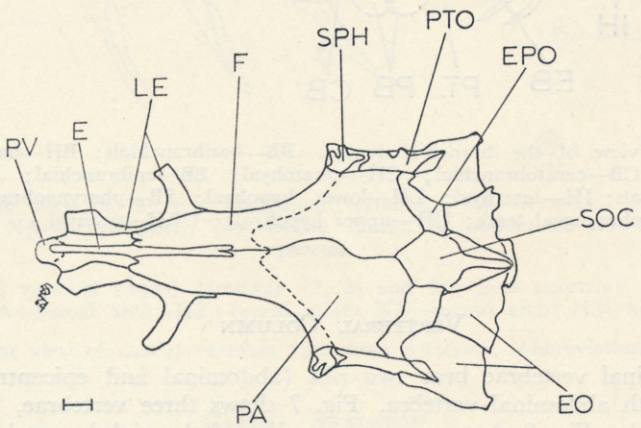
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At the division or superfamily level Regan and Berg place *Cheimarrichthys* in Trachiniformes (Trachinoidae). Regan (1913) admits this is a somewhat artificial assemblage of families and I must concur. *Cheimarrichthys* differs considerably from *Trachinus, Pinquipes* and *Percis* (as illustrated in Gregory, 1933) mainly in the quadrate-pterygoid series. The solution to this problem awaits information on the detailed osteology of the other members.

It is of interest to note that the frontals and parietals are ankylosed. Where the change from one to the other occurs is uncertain, however, the dotted line in Figs. 2, 3, and 4 indicate where skull thickness changed suddenly and may well be the suture.

The remaining skull is fairly typical percoid. The Branchial and Hyoid region is shown in Fig. 5. The pharyngobranchials are removed (PB dotted); in fact they suture to the distal end of the epibranchials (EB). The pharyngobranchials bear pharyngeal teeth on the ventral surface the size of which is similar to those shown on the fifth ceratobranchial.

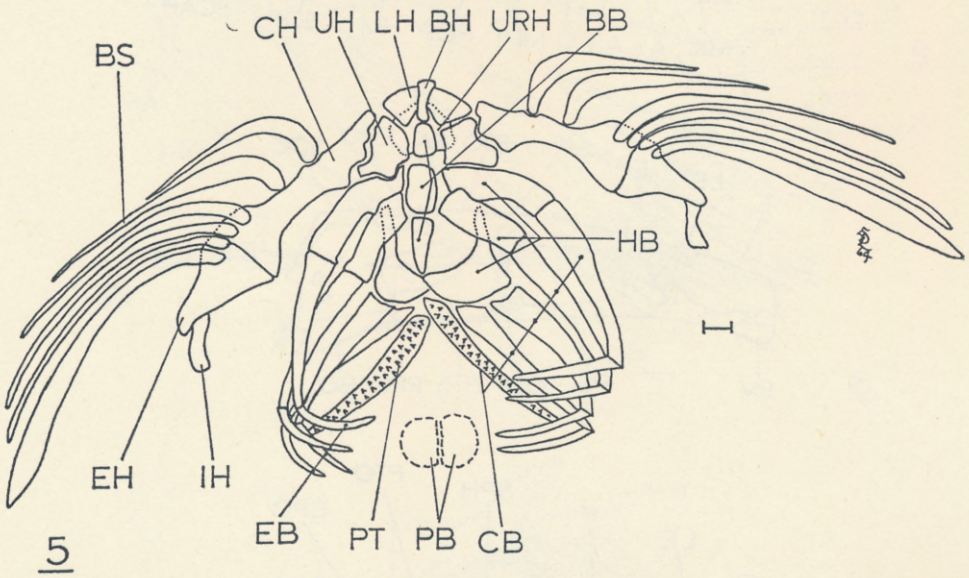
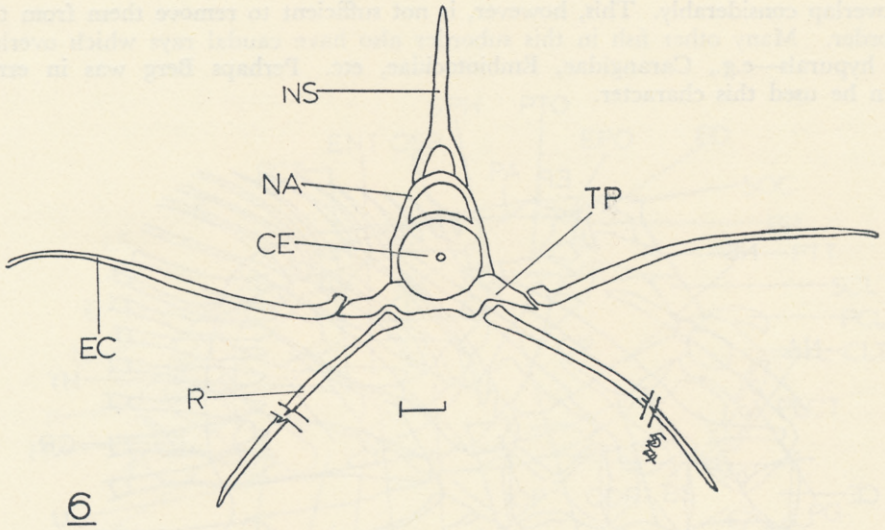
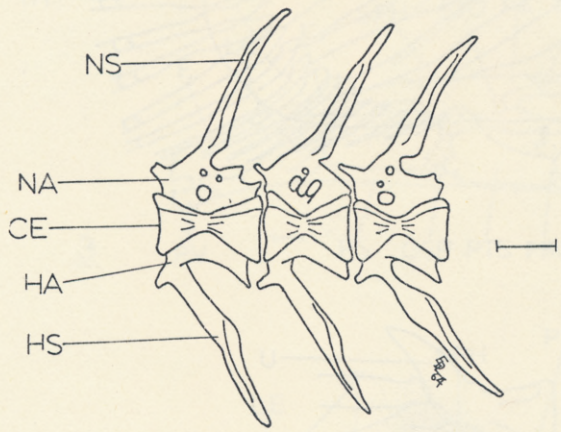


Fig. 5.—Dorsal view of the branchial region. BB—basibranchials; BH—basihyal; BS—branchiostegals; CB—ceratobranchial; CH—ceratohyal; EB—epibranchial; EH—epihyal; HB—hypobranchials; IH—interhyal; LH—lower hypohyal; PB—pharyngobranchial; PT—pharyngeal teeth; UH—upper hypohyal; URH—urohyal.

Vertebral Column

The abdominal vertebrae bear two ribs (abdominal and epicentral). Fig. 6 shows the eighth abdominal vertebra. Fig. 7 shows three vertebrae, 7, 8 and 9, from the urostyle. Fig. 8 shows a posterior view of the eighth vertebra from the urostyle. The ratio between the fin spines and rays, pterygiophores, and the neural or hemal spines is 1:1:1. This also corresponds to the muscle myomeres (Regan, 1913). The specimens examined had 32–33 vertebra.





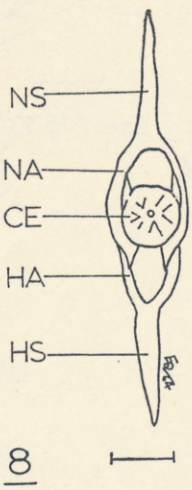


FIG. 6.—Anterior view of the 8th abdominal vertebra. CE—vertebral centrum; EC—epicentral rib; NA—neural arch; NS—neural spine; R—abdominal rib; TP—transverse process.

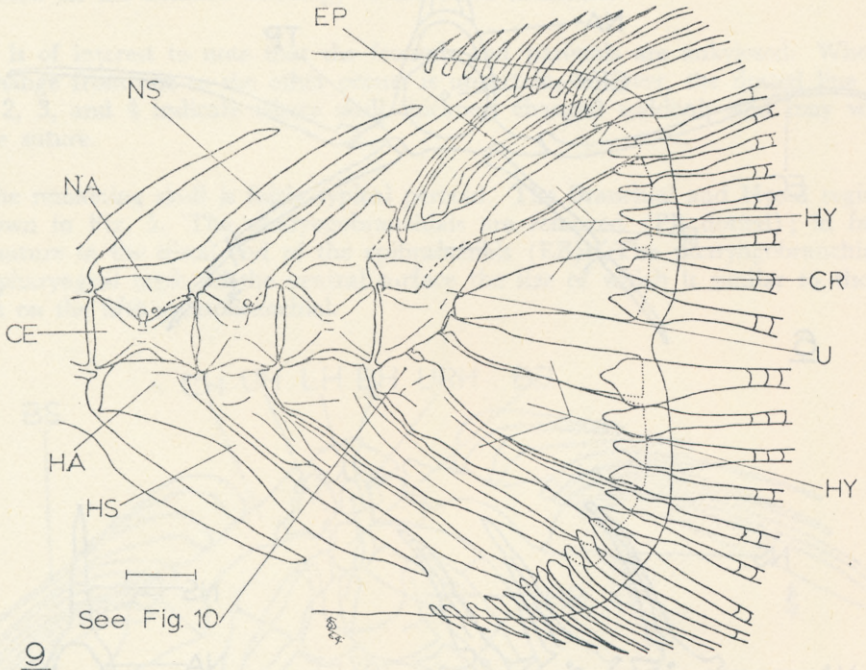
FIG. 7.—Lateral view of caudal vertebrae (7, 8, and 9th from urostyle). CE—vertebral centrum; HA—hemal arch; HS—hemal spine; NA—neural arch; NS—neural spine.

FIG. 8.—Posterior view of caudal vertebra (8th from urostyle). Abbreviations as in Fig. 7.

CAUDAL SKELETON

The caudal skeleton is shown on Figs. 9 and 10. It is moderately primitive compared to the rest of the skeleton. Berg (1947) states that in the suborder Percoidei the caudal rays do not overlap the hypurals. In *Cheimarrichthys* they

do overlap considerably. This, however, is not sufficient to remove them from the suborder. Many other fish in this suborder also have caudal rays which overlap the hypurals—e.g., Carangidae, Embiotocidae, etc. Perhaps Berg was in error when he used this character.



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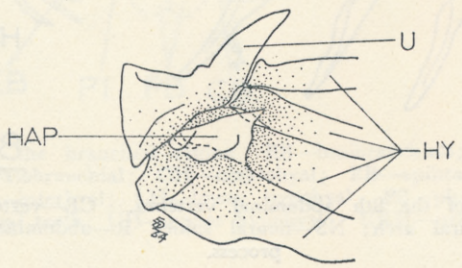

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Fig. 9.—Lateral view of caudal skeleton. CE—vertebral centrum; CR—caudal ray; EP—epurals; HA—hemal arch; HS—hemal spine; HY—hypurals; NA—neural arch; NS—neural spine; U—urostyle.

Fig. 10.—Ventral hypurals showing hypurapophysis. Lateral view. HAP—hypurapophysis; HY—hypurals; U—urostyle.

Cheimarrichthyidae is the thirty-fifth family in which a hypurapophysis is found. Nursall (1963) reported the presence of the structure in 34 families. These families represent an array of orders, and it is obvious that the presence of a hypurapophysis is of no phylogenetic importance. The hypurapophysis (Fig. 10) is located on the posterior edge of the most anterior ventral hypural and permits greater muscle attachment to the hypural area. Nursall states that this structure is always located on the ventral anterior hypural of the terminal vertebrae.

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