Osteology of the Clupeiform fish, genus

Hyperlophus (I)

Yoshitaka YABUMOTO

Kitakyushu Museum of Natural History,
Nishihonmachi, Kitakyushu, 805 Japan

and

Teruya UYENO

National Science Museum, Tokyo, 160 Japan

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Introduction

Among Recent species of the family Clupeidae, fishes belonging to the genus Hyperlophus, which inhabit in Australian waters, have been considered to be the closest relative of the fossil “double armored herring”, Diplomystus and Knightia (SCHAEFFER, 1947). The extinct genus Diplomystus is geographically widespread, and chronologically extends from the Early Cretaceous to Miocene. The genus Knightia is mostly known from the Eocene in North America. Recently we reported on two species of “double armored herring” from the Early Cretaceous beds in northern Kyushu (UYENO, 1979; UYENO and YABUMOTO, 1980). As a first step to find out relationships between Recent and fossil double armored herrings, we studied osteological features of two species of the genus Hyperlophus: H. vittatus (CASTELNAU, 1875) and H. translucidens McCulloch, 1917. Although osteologically these two species are quite similar to each other, some differences were recognized in forms of the cranium, suspensorium, opercles, teeth, dorsal scutes and so forth.

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Material and methods

The specimen used for the present study are deposited at Kitakyushu Museum of Natural History. The data of the specimens examined for the anatomical study and measurement are as follows:
Hyperlophus vittatus KMNH (Kitakyushu Museum of Natural History) VR 100,086 and 100,087, two specimens, 47.8 and 42.0 mm in standard length, stained specimens; KMNH VR 100,088–100,090, three specimens, 47.0–59.5 mm in standard length, Port Hacking, Australia, 14 Nov., 1974.

H. translucidens KMNH VR 100,091, one specimen, 45.0 mm in standard length, stained specimen, Paramatta River, New South Wales, Australia, Sept., 1972.

The primary method of anatomical study used here is clearing and alizarin Red-S staining. After the bones had been stained the flesh was cleared by KOH and enzyme. The drawings of the bones were made with a binocular dissecting microscope, Wild M-8. The names of the bones and anatomical elements are based mainly on Harrington (1955), Tominaga (1968), Uyeno (1975), and Patterson and Rosen (1977).

Abbreviations
acc, anterior condyle of hyomandibular for cranium; act, actinost; ang, angular; arp, articular process of premaxillary; asp, ascending process of premaxillary; bab, basibranchial; bah, basihyal; bao, basioccipital; bap, basipterygium; bra, branchiostegal; cbr, ceratobranchial; cc, cranial condyle of maxillary; chy, ceratohyal;cle, cleithrum; cra, coracoid; cs, caudal scute; den, dentary; ecp, ectopterygoid; enp, endopterygoid; epb, epibranchial; eph, epihyal; epo, epiotic; epu, epural; eth, ethmoid; exo, exoccipital; fcps, flange and canal of preopercle overhanging preopercular sensory canal; fhm, foramen for hyomandibular trunk of facial nerve; fhy, facet for hyomandibular; fm, foramen magnum; fo, facet of opercle for posterior process of hyomandibular; fro, frontal; gha, groove for hyoidean artery; gpt, groove for sensory canal on posttemporal; gscl, groove for sensory canal on supracleithrum; hes, haemal spine; hpop, hypurapophysis; hyo, hyomandibular; hyp, hypobranchial; hyph lo, lower hypohyal; hyph up, upper hypohyal; hyu, hypural; ifo, infraorbital; inca, intercalar; inh, interhyal; ino, interopercle; ldp, lepidotrichia; lpp, lateral process of ethmoid for palatine; max, maxillary; mes, mesocoracoid; met, metapterygoid; nas, nasal; nes, neural spine; of, optic foramen; ope, opercle; ors, orbitosphenoid; pal, palatine; para, parasphenoid; parh, parhyphural bone; pari, parietal; pc, premaxillary condyle of maxillary; pec, posterior condyle of hyomandibular for cranium; per, process for ligament between epihyal and retroarticular; P2f, 1st pelvic fin ray; pha lo, lower pharyngeal; pha up, upper pharyngeal; plms, process for ligament between maxillary and second suborbital; pmp, process of maxillary for palatine; poc lo, lower postcleithrum; poc up, upper postcleithrum; pot, posttemporal;
Figure 1. The figure of the skeleton of *Hyperlophus vittatus*. KMNH VR 100,096, Port Haching, Australia, 14 Nov., 1974, 47.8 mm in standard length.
Figure 2. The cranium of Hyperlophus vittatus. A, dorsal view; B, lateral view; C, ventral view.
Figure 3. The cranium of *Hyperlophus translucidens*. A, dorsal view; B, lateral view; C, ventral view.
Figure 4. The cranium, infraorbitals, and dorsal scutes of Hyperlophus. A, posterior view of cranium; B, infraorbitals; and C, dorsal scutes of H. vittatus. D, posterior view of cranium; E, infraorbitals; and F, dorsal scutes of H. translucidens.
Figure 5. Some skeletal elements of *Hyperlophus viitatus*. A, gill arches; B, gill raker; C, urohyal; D, pelvic girdle; E, dorsal fin; F, anal fin; G, shoulder girdle; H, caudal skeleton.
Figure 6. The jaws, suspensorium, opercular bones, and hyoid arch of *Hyperlophus vittatus*.
Figure 7. The jaws, suspensorium, opercular bones, and hyoid arch of Hyperlophus translucidens.
pph, posterior process of hyomandibular; ppi, process of posttemporal for intercalar; pplm, process for cartilage between ectopterygoid and prefrontal; pre, process of posttemporal for epiotic and parietal; pref, prefrontal; prem, premaxillary; preo, preopercle; preu, preural centrum; prev, prevomer; pro, prootic; pte, pterosphenoid; pto, pterotic; ptr, pterygiophore; ptr dis, distal pterygiophore; ptr med, median pterygiophore; ptr pro, proximal pterygiophore; pul, process for ligament between urohyal and lower hypohyal; qua, quadrate; ret, retroarticular; scap, scapula; sph, autosphenotic; subop, subopercle; supc, supracleithrum; supm, supramaxillary; supo, supraoccipital; supr, supraorbital; supt, supratemporal; sym, symplectic; urn, uroneural bone; v ura, ural centrum; V, foramen for trigeminal nerve; VII, foramen for facial nerve; IX, foramen for glossopharyngeal nerve; X, foramen for vagus nerve.

**Literature Cited**


