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BIOLOGICAL RESULTS OF THE UNIVERSITY OF MIAMI DEEP SEA EXPEDITIONS. 136.

A NEW EELPOUT (TELEOSTEI: ZOARCIDAE) FROM THE EASTERN TROPICAL PACIFIC OCEAN

M. Eric Anderson

ABSTRACT

A new eelpout, *Lycenchelys monstrosa*, is described from the lower continental slope of the Gulf of Panama, eastern Pacific Ocean. It is distinguished from all other *Lycenchelys* in the region by possessing nine preoperculomandibular pores, eight or nine suborbital pores, one postorbital pore, no occipital or interorbital pores, 126-132 vertebrae and far posterior dorsal fin origin, with three to seven free dorsal pterygiophores. The species appears to be somewhat peculiar among eelpouts in that 11 of the 12 known specimens lack pelvic fins; one of the fish without pelvic fins is the only one known with palatine teeth. Both characters have been used at the generic level in eelpouts. The species appears closest to three other congeners with nine preoperculomandibular pores, known from the North Pacific and Antarctic lower slopes. Characters of the new species lend support to earlier conclusions that the deeper living *Lycenchelys* have undergone morphological modification in a similar manner, though they do not necessarily form a monophyletic group.

Fishes of the genus *Lycenchelys* Gill are benthic slope and abyssal dwelling species occurring primarily in boreal seas (Goode and Bean, 1896; Jensen, 1904; Andriashev, 1955; 1958). A few species have penetrated into temperate and polar seas of the southern hemisphere (Regan, 1913; Andriashev and Permitin, 1968; Gosztanyi, 1977; DeWitt and Hureau, 1979). Garman (1899) reported the first collection of eelpouts from eastern tropical Pacific waters and since then no subsequent discoveries have been published. Andriashev (1955) referred five of Garman's eelpouts (*Lycodopsis scaurus*, *Lycodes anguis*, *L. serpens*, *L. incisus*, and *L. cicatrifer*) to *Lycenchelys* Gill, based on observations of North Pacific and North Atlantic forms.

In May, 1967, and January, 1972, during deep water bottom trawling operations in the Gulf of Panama, 12 specimens of a *Lycenchelys* species were captured by University of Miami personnel at the type locality of three of Garman's (1899) species. Because of the poor condition of Garman's specimens today, it is not presently possible to give thorough diagnoses for all of his species for comparative purposes. Nevertheless, sufficient observations on the type series of all Garman's species have been made and reveal that the 12 recent specimens represent a species new to science.

METHODS

Vertebral and unpaired fin ray counts were made from radiographs, all other counts from the specimens. Measurements were made with dial calipers to the nearest 0.1 mm. Procedures and definitions follow those in general use today for eelpouts (Andriashev and Permitin, 1968; Fedorov, 1976; Gosztanyi, 1977; Peden and Anderson, 1978; Anderson, In Press). In cases of discrepancy, methods follow Anderson (In Press). Institutional abbreviations are as follows: CAS, California Academy of Sciences, San Francisco; LACM, Natural History Museum of Los Angeles County, Los Angeles; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge; SIO, Scripps Institution of Oceanography, La Jolla; UMML, Rosenstiel School of Marine and Atmospheric Science, University of Miami; USNM, National Museum of Natural History, Washington, D.C.

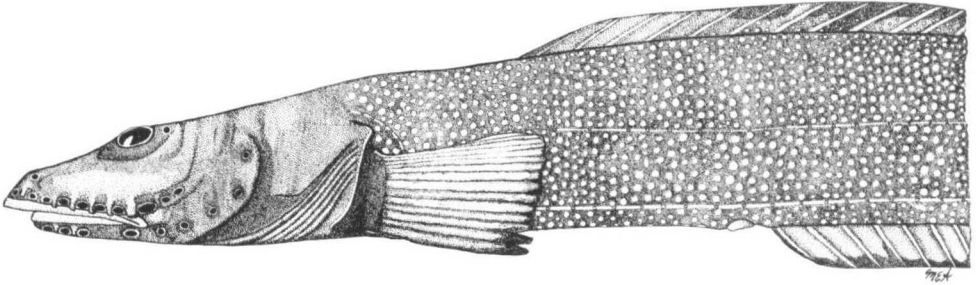


Figure 1. *Lycenchelys monstrosa*: holotype, USNM 224467, lateral aspect of head and body.

***Lycenchelys monstrosa*, new species**
 Figures 1 and 2

Holotype.—USNM 224467, male, 242 mm SL, Pacific Ocean, Gulf of Panama, 6°52'N, 79°28'W, R/V JAMES M. GILLISS, sta. GS-1, 13 m otter trawl in 3,200–3,229 m; 2335–0135 hrs., 13–14 January 1972.

Paratypes.—Same collection as holotype: LACM 39977-1, female, 226 mm SL, male, 182 mm SL; CAS 47127, two females 275 and 276 mm SL; MCZ 56940, two females 224 and 245 mm SL; UMML 33483, male, 215 mm SL; USNM 224466, male, 209 mm SL, female, 237 mm SL.

Other Material Examined.—UMML 22861, two males, 164 and 235 mm SL, Gulf of Panama, 6°53'N, 79°27'W, R/V JOHN ELLIOTT PILLSBURY, sta. P-526, 13 m otter trawl in 3,193–3,201 m, 5 May 1967.

Diagnosis.—Distinguished from all other *Lycenchelys* by the following characters: precaudal vertebrae 26–30; total vertebrae 126–132; dorsal fin rays 111–118; anal fin rays 102–108; pectoral fin rays 15–17; preoperculomandibular pores 9; suborbital pores 8–9; postorbital pores 1 (2); interorbital and occipital pores absent; free dorsal fin pterygiophores 3–7; vomerine teeth 1–5; pelvic fins and palatine teeth usually absent.

Counts and Measurements.—Holotype first, followed in parentheses by range of all eleven others. Vertebrae 28 + 102 = 130 (126–132); dorsal fin rays 117 (111–118); anal fin rays 106 (102–108); pectoral fin rays 17 (15–17); pelvic fins absent (absent or with fins of two rays each); free dorsal fin pterygiophores 5 (3–7); dorsal fin associated with vertebra 9 (8–12); anal fin origin associated with vertebra 26 (24–28); gill rakers 3 + 10 = 13 (2–4 + 8–11 = 11–15); vomerine teeth 5 (1–15); palatine teeth absent (absent or with few teeth); branchiostegal rays 6 (6); pyloric caeca 2 (2); pseudobranchial filaments 3 (0–3). Following measurements in percent standard length: predorsal length 22.6 (21.1–25.5); preanal length 33.2 (33.2–36.2); head length 5.8 (5.0–6.2); body height 5.9 (4.8–6.3); pectoral fin length 8.6 (8.6–10.4); pectoral fin base height 3.5 (3.2–3.5). Following measurements in percent head length: eye diameter 17.2 (15.8–18.8); snout length 31.1 (26.7–31.3); upper jaw length 36.6 (26.5–36.6); gill slit length 30.3 (25.1–33.5); bony interorbital width 5.7 (4.6–6.7); interpupillary width 18.3 (15.8–20.8).

Description.—Body and tail elongate; body subcircular in cross section, tail quite laterally compressed, thinnest near tail tip. Head strongly dorsoventrally depressed, widest about half distance between posterior margin of eye and dorso-posterior edge of gill slit. Ventral profile of head nearly horizontal, dorsal profile very gradually elevated anteroposteriorly when viewed laterally. Eye ovoid, small, barely entering dorsal and lateral profiles.

Mouth subterminal, upper jaw extending posteriorly to vertical through middle

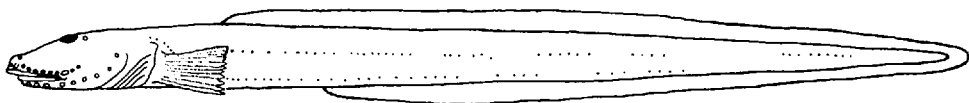


Figure 2. *Lycenchelys monstrosa*; composite outline drawing showing extent of lateral lines.

of eye, or just anterior to it. Upper lip thin and adnate to snout just posteroventral to very small nostril tubes (tubes not reaching upper lip). Anterior series of sub-orbital pores large, emanating through thickened, fleshy fold, typical of *Lycenchelys*. Lower lip without fleshy lobes, adnate to mandibular symphysis at vertical through middle of first mandibular pore. Slight, fleshy, transverse ridges between anterior three mandibular pores. Mandibular symphysis with similar low, fleshy ridge, with very slight underlying concave area.

Teeth on jaws moderately strong; anterior, outer teeth longer than inner or posterior teeth; dentary with 15–20 teeth; premaxilla with 10–19 teeth. Teeth sharp, conical, not greatly recurved. Teeth on vomer usually two or three, strong, slightly recurved. Palatine teeth absent, except for two very small teeth developed on right palatine of MCZ 56940. Palatal membrane weak, more closely fused to palate medially than laterally.

Dorsal margin of gill slit extending anteriorly about $\frac{3}{4}$ eye diameters, bending forward ventrally, reaching just to or slightly above ventral edge of pectoral fin base. Four gill arches, slits behind first three complete; slit extending only half way down fourth arch. Gill rakers short, roughly triangular, without denticles. Pseudobranchiae usually absent, of two or three very small filaments when present. Two small, nub-like pyloric caeca present.

Lateral line apparently with complete mediolateral and ventrolateral branches (Andriashev, 1954). Mediolateral branch extending from posterior margin of pectoral fin, traceable in holotype and one paratype to about one head length posterior to vertical through anal fin origin. On holotype several free neuromasts and lateral line nerve evident on tail. Ventrolateral branch descending very steeply on abdomen from upper edge of operculum, coursing parallel to anal fin base posterior to vertical with posterior margin of pectoral fin. Ventrolateral branch also traceable in holotype and one paratype to about one head length posterior to vertical through anal fin origin, but several neuromasts and connecting nerve also visible on tail. Greatly faded and abraded skin accounts for observational difficulties.

Preopercular and mandibular canals separate; the former with four pores opening from foramina in preopercle, the latter with five pores, four opening from foramina in dentary and one from anguloarticular (Anderson, In Press). Suborbital pores eight in all specimens where pores clearly visible, except holotype, which has nine. Difference between holotype and others is possession of extra, posterior pore posteroventral to eye (Fig. 1). Single postorbital pore on both sides of head just posterior to eye, except one paratype (CAS 47127) which has two small pores on one side opening where normally one larger pore develops, a variation similar to that in some *Gymnelus* (Anderson, In Press). Two anterior supraorbital pores, one anteroventral, other dorsoposterior to nostril. Interorbital and occipital (supratemporal) pores absent.

Dorsal and anal fins long, low, confluent with caudal fin, greatest length of rays of both dorsal and anal fins about two eye diameters. Origin of dorsal fin placed moderately posteriad, with three to seven free anterior pterygiophores. Anal fin origin associated with last to second to last precaudal vertebra; three to eight

anal fin pterygiophores, all with rays, anterior to haemal spine of first caudal vertebra. Caudal fin with eight rays (4 + 4) on hypurals and one or two rays attached to single epural. Pectoral fin moderate, third through sixth rays moderately exerted beyond membrane, tips of these expanded, skin thickened. Pelvic fins absent, except in USNM 224466 (female) which has pelvic fins with two joined rays each; fin length 11.6% of head length. Radiographs of specimens without rays reveals no trace of rudimentary rays under skin; right and left pelvic bones equal in size in all fish.

Minute cycloid scales cover body and tail from about vertical through dorso-posterior edge of operculum to tail tip where they continue onto dorsal, anal and caudal fins nearly to margin. Scales on dorsal fin at midlength sparse, not extending to half fin height; scales present on anal fin in only posterior $\frac{2}{3}$ of this fin. Scales present on ventral surface of abdomen, extending anteriorly to just beneath axil, absent on axil, pectoral base and throat. About 30–34 irregular rows of scales along vertical through anal fin origin to dorsal fin base.

Specimens quite faded in preservative, skin much abraded, apparently by trawls. Specimens least damaged with uniformly dark brown head, throat and pectoral fins. Same dark brown in patches on body, but lighter on tail. Margin of dorsal and anal fins light brown. Life color probably a uniform dark brown or purplish, similar to many other *Lycenchelys* (Andriashev, 1955; Peden, 1973; Anderson et al., 1979). Lining of mouth, gill cavity and peritoneum also dark brown, with scattered black melanophores. Stomach and anterior portion of intestine dark, probably black in life.

Etymology.—From the Latin *monstrosus* (monstrous, strange) in reference to the (apparent) usual lack of pelvic fins (except in one specimen) and usual lack of palatine teeth (except in one). Both characters are typically present in other *Lycenchelys* and are consistent within a species. The gender of *Lycenchelys* is feminine, contrary to the opinion of Andriashev (1973), as the root noun, *εὐχέλυσ* (eel), is feminine (Bulletin of Zoological Nomenclature 27 (1): 33–38, 5 June 1970).

Comparative Remarks.—The interspecific relationships of *Lycenchelys* are presently unclear. *Lycenchelys monstrosa* primarily differs from all other species reported from the eastern Pacific in possessing nine preoperculomandibular pores, in having more vertebrae and possessing free dorsal fin pterygiophores. The presence of pelvic fins in one specimen is particularly confounding and puts in question the significance of this rudimentary feature in the classification of eelpouts. Andriashev (1979) established *Apodolycus* for a *Lycenchelys*-like species on the basis of its lack of pelvic fins, but this species (*A. hureaui*) appears closer to species described in *Lycenchelys* from the southern hemisphere than to *L. monstrosa* (Andriashev and Permitin, 1968; Gosztonyi, 1977; DeWitt and Hureau, 1979). Thus, I refer *monstrosa* to the earlier available genus, *Lycenchelys*, rather than *Apodolycus*, pending future analysis of all similar forms.

It is currently not possible to give thorough diagnoses of Garman's (1899) Gulf of Panama species that were referred to *Lycenchelys* by Andriashev (1955) in order to compare them with *L. monstrosa*. However, observations on Garman's specimens and recent collections of *Lycenchelys porifer* (Gilbert, 1891) reveal significant differences in addition to those noted above. *Lycenchelys scaura* (MCZ 28689), all known specimens of which lack palatine teeth, differs from *L. monstrosa* in also lacking vomerine teeth, possessing fewer vertebrae (102), having no free dorsal fin pterygiophores and having 21 pectoral fin rays. *Lycenchelys cicatrifer* (MCZ 28684) has fewer vertebrae (119), greater scalation on unpaired

fins, ten vomerine teeth, four palatine teeth on each bone, seven suborbital pores and three postorbital pores. *Lycenchelys incisa* (MCZ 28685) possesses fewer vertebrae (106 in one), more vomerine teeth (11 or 12), six to ten palatine teeth, ten suborbital pores, an anterior and posterior postorbital pore and probably two (or three?) occipital pores and no free dorsal fin pterygiophores. *Lycenchelys porifer* (SIO 70-247, 70-248, MCZ 28686, 28687, 28688¹) also has fewer vertebrae (115-120), more vomerine teeth (7-10), 3-7 palatine teeth, six suborbital pores, an anterior and posterior postorbital pore and no free dorsal fin pterygiophores.

Lycenchelys monstrosa seems closest to a poorly known group of very deep living (greater than about 2,000 m) congeners with nine preoperculo-mandibular pores. These include *L. antarctica* Regan, *L. plicifera* Andriashev and one undescribed species from the North Pacific off Oregon. Those species known to me (all but *L. plicifera*) have unconnected preopercular and mandibular canals. *Lycenchelys antarctica* exhibits some individual variation in the number of preoperculo-mandibular pores; most specimens known have nine pores, but a few have eight (S. R. Johnson, pers. comm.).

Certain characters of *L. monstrosa* and its known depth of occurrence place it within Andriashev's (1955; 1958) scheme of morphological modification in the genus. Andriashev defined a deep-living ("abyssal") group of species caught on the lower continental slope and rise, to which *L. monstrosa* seems to belong and which all differ from upper slope-dwelling congeners. This deeper-living group possesses more than 24 precaudal vertebrae, tends to lose pairs of postorbital pores, tends to lose all occipital pores and commissure, possesses several free dorsal fin pterygiophores, has poorly developed ribs and has smaller eyes. Despite sharing all these characters, these species variously possess eight or nine preoperculo-mandibular pores, have small or large lateralis pores, have well developed or poorly developed lateral lines (for eelpouts) and relatively long or reduced gill slits, among other characters of uncertain utility. The states of these characters and the species' widespread geographic distribution suggests that the deeper-living group is not monophyletic and morphological modification to life in very deep water has occurred in a similar manner in different *Lycenchelys* species groups.

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¹ Specimens MCZ 28686, *Lycodes serpens* Garman and MCZ 28687, 28688, *Lycodes anguis* Garman are identical with *Lycodes* (= *Lycenchelys*) *porifer* Gilbert. USNM 44384 (author's unpublished data).

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