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THE EELPOUT GENERA *LYCENCHELYS* GILL
AND *TARANETZELLA* ANDRIASHEV
(TELEOSTEI: ZOARCIDAE) IN THE EASTERN PACIFIC,
WITH DESCRIPTIONS OF NINE NEW SPECIES

By

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ABSTRACT: The 26 species of the eelpout genus *Lycenchelys* Gill, 1884 in the eastern Pacific Ocean are described from a total of 628 specimens. Nine are new to science: *L. callista* (Oregon and California), *L. chauliodus* (Peru), *L. folletti* (Mexico), *L. hadrogeneia* (Ecuador), *L. lonchoura* (Peru), *L. pearcyi* (Oregon to Mexico), *L. pentactina* (Peru), *L. pequenoi* (Peru and Chile) and *L. peruana* (Peru). The closely related *Taranetzella lyoderma* Andriashev, 1952 is included and redescribed on the basis of all 18 known specimens. Lectotypes are designated for *Lycodes anguis* Garman, 1899 and *Lycodes incisus* Garman, 1899. A key to all the species of *Lycenchelys* in the eastern Pacific is given and includes three from the Kuril-Kamchatka Trench that may occur within the area: *L. albeola*, *L. uschakovi* and *L. vitazi*.

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INTRODUCTION

The eelpout genus *Lycenchelys* was erected by Gill (1884) "for Collett's second group which have 'the body elongate'..." to distinguish four boreal Atlantic species (*L. muraena*, *L. paxilla*, *L. sarsi* and *L. verrillii*) from the more robust *Lycodes* Reinhardt. Gill did not designate a type species for *Lycenchelys*, but Jordan (1885) placed Goode and Bean's (1877) *Lycodes verrillii* in Gill's new genus. A type species (*Lycodes muraena* Collett, 1878) was finally designated by Jordan (1920). Andriashev (1955) redefined *Lycenchelys*, again on characters that separate it from *Lycodes*, chiefly: 1) large head pore size; 2) absence of mental crests (cartilage lamina under the dentary bones); 3) presence of oral valve (palatine

membrane); 4) inferior mouth; 5) teeth present on jaws, vomer and usually palatine bones; 6) lower jaw teeth in irregular series anteriorly. The first three characters have only limited validity, the others none, and Anderson (1994) expanded the generic description and redefined *Lycenchelys* on the basis of 76, mostly osteological, characters. The genus presently comprises some 56–57 species of derived lycodines with a reduced palatopterygoid series and without autapomorphies, and with or without large head pores, vomerine and palatine teeth, lateral line, pelvic fins, pseudobranch or pyloric caeca.

Many undescribed species of *Lycenchelys* from the eastern Pacific have been known in museum collections for about the last 30 years, but efforts to diagnose every species in the region have been impeded until now. Most of the

material described here was collected on oceanographic expeditions under the auspices of the Smithsonian Institution (most collections housed at the Los Angeles County Museum of Natural History), the Scripps Institution of Oceanography, Oregon State University, and the Moss Landing Marine Laboratories. Other specimens were made available from the Russian Academy of Sciences, Japanese and Peruvian fisheries vessels, and research cruises of the American yacht *Te Vega*. Previous papers on eastern Pacific eelpouts in a similar style include Peden and Anderson (1978) and Anderson and Peden (1988).

This paper treats all 26 species of *Lycenchelys* found in the eastern Pacific Ocean. As most species that are adequately known are broadly distributed, the entire Bering Sea is covered, from the Kamchatka Peninsula, around the North Pacific rim (including the Aleutian Islands), to Tierra del Fuego, Chile. Three abyssal species from the northern Kuril-Kamchatka Trench, *L. albeola*, *L. uschakovi* and *L. vitiazi*, still only known from the holotypes, are included in the key to species, as they probably occur throughout the Aleutian Basin (Bering Sea abyss). In previous papers on North Pacific lycodines (Andriashev, 1955; Fedorov, 1976; Toyoshima, 1985) genera related to *Lycenchelys* have been treated and I follow that tradition with the one remaining genus requiring updating, *Taranetzella* Andriashev, 1952 (*Embryx* Jordan and Evermann, 1898 was synonymized with *Lycenchelys* by Anderson, 1988). Anderson (1994) also diagnosed *Taranetzella* and other genera related to *Lycenchelys* in the eastern Pacific (*Derepodichthys*, *Eucryphycus*, *Lyconema*, and *Ophthalmolycus*).

Authors have treated the gender of *Lycenchelys* as masculine. However, the Greek root noun *εὐχέλυσ* (eel) is feminine, thus species-group adjectival suffices are emended here as required (see Anderson, 1982a:210). Specific names accepted as nouns include *crotalinus*, *hippopotamus* and *scaurus*.

METHODS AND MATERIALS

Measurements were made with dial calipers to the nearest 0.1 mm. Definitions of characters and measurements follow Anderson (1982a,

1994). Head pore terminology follows Gosztonyi (1977), the first to identify and name canals, and number their pores sequentially in an English language publication; however, his system was preceded by Fedorov (1976) in Russian. Gostonyi's system was modified slightly by Anderson (1982b; see also Anderson, 1994, fig. 4). Lateral line pattern terminology follows Andriashev (1954, fig. 142). Some discrepancies will be noticed when comparing morphometric characters in this paper with those published by previous authors who used total length in calculating some ratios; standard length (SL) is used herein, as SL is not subject to the vagaries of caudal fin wear in these often delicate, pliable fishes. Eye diameter in relation to head length (HL) is a measure of the entire spectacle, not just the pupil, and this affects snout length as well. Interorbital width of Fedorov (1976) and Toyoshima (1985) is more akin to interpupillary width here; my interorbital is the narrower bony distance. Some species of *Lycenchelys* have a ventral abdominal skinfold ("plica"), which can be white or blue. In previous publications I termed ray-less, dorsal-fin pterygiophores as "free" pterygiophores, also termed interneurals by authors, but here I refer to them as supraneurals following Mabee (1988). Institutional abbreviations follow Leviton et al. (1985), or as emended by Leviton and Gibbs (1988).

This review is based on 636 specimens, 49–428 mm SL, housed in 11 museums (listed by abbreviation in each account; specimen lengths are in SL). All type specimens were examined with the exception of the holotype of *Lycenchelys antarctica* (but see Anderson, 1988). Lectotypes of *Lycodes insisus* Garman, 1899 (valid) and *Lycodes anguis* Garman, 1899 (junior synonym of *Lycenchelys porifer* [Gilbert, 1890]) are designated. For ease of identification, diagnoses include some variable characters in addition to those that are important in combination or unique for a species. Expanded diagnoses only are given for two species, *Lycenchelys antarctica* and *L. monstrosa*, as these were fully described elsewhere (Anderson, 1982a, 1988, 1990). Species accounts are presented alphabetically.

KEY TO SPECIES OF EASTERN PACIFIC
LYCENCHELYS

This key is intended for late juvenile to adult specimens, as several characters, such as gill raker and tooth counts, or characters of the axial skeleton and fins are either not completely expressed or difficult to observe in small juveniles. One difficulty with zoarcids is that many good characters are skeletal, thus radiographs are essential for counts and fin characters in these variable fishes. Specimens with distorted or damaged skin will add to difficulties because of the importance of head pores and their positions. Data transposition errors were discovered for previously published pelvic ray counts in *L. antarctica* (3 rays, not 2-3; Anderson, 1988, 1990) and head length in *L. monstrosa* (13.7%-15.3% SL, not 5.0%-6.2% SL; Anderson, 1982a).

- 1a. Occipital pores absent 10
- 1b. Occipital pores present (rarely all absent in *L. scaurus*) 2
- 2a. Vomerine and palatine teeth present .. 4
- 2b. Vomerine and palatine teeth absent... 3
- 3a. Preoperculomandibular pores nine; interorbital pores absent; lateral line double, with mediolateral and ventral branches; gill rakers 15-21; pectoral fin rays 18-21; gill slit extending anterior to pelvic fins; chin without fleshy lobe (PANAMA-CHILE)
.....*Lycenchelys scaurus* (Garman)
- 3b. Preoperculomandibular pores eight; interorbital pore present; lateral line with mediolateral branch only; gill rakers 11-13; pectoral fin rays 17 (\pm); gill slit extending to just above lower end of pectoral base; chin with large fleshy lobe (ECUADOR)
.....*Lycenchelys hadrogeneia* sp. n.
- 4a. Pelvic fin rays three 7
- 4b. Pelvic fin rays two 5
- 5a. Nostril tube not reaching upper lip; interorbital pore absent (rarely present in *L. callista*) 6
- 5b. Nostril tube reaching or overhanging upper lip; interorbital pore present (OKHOTSK AND BERING SEAS)
.....*Lycenchelys rassi* Andriashev
- 6a. Gill slit extending ventrally to lower end of pectoral base and not extending forward dorsally; ventral abdominal fold (plica) present; dorsal fin origin associated with vertebrae 6-8 (OREGON AND CALIFORNIA)
.....*Lycenchelys callista* sp. n.
- 6b. Gill slit extending ventrally to just above lower end of pectoral base and continuing forward dorsally about one-third eye diameter; ventral abdominal plica absent; dorsal fin origin associated with vertebrae 5-6 (PERU)
.....*Lycenchelys peruana* sp. n.
- 7a. Suborbital pores 8-10; predorsal length longer than head length; dorsal fin origin associated with vertebrae 3-5; total vertebrae 106-137; gill rakers 8-17 .. 8
- 7b. Suborbital pores six (5 + 1); predorsal length shorter than head length; dorsal fin origin associated with vertebra two; total vertebrae 88; gill rakers 8-9 (AL-EUTIAN ISLANDS)
.....*Lycenchelys alta* Toyoshima
- 8a. Total vertebrae 106-115; 2-3 suborbital pores arising from ascending ramus of bone chain behind eye; first suborbital pore mesial to, or anteromesial to, nostril tube 9
- 8b. Total vertebrae 132-137; 0-1 pore arising from ascending ramus of suborbital bone chain behind eye; first suborbital pore anterior to (under) nostril tube (OKHOTSK AND BERING SEAS)
....*Lycenchelys hippopotamus* Shmidt
- 9a. Gill rakers 13-14; lateral line with mediolateral and ventral branches; first suborbital pore directly mesial to nostril tube (MEXICO-CHILE)
.....*Lycenchelys incisa* (Garman)
- 9b. Gill rakers 8-11; lateral line with ventral branch only; first suborbital pore anteromesial to nostril tube (KURIL ISLAND AND BERING SEA)
....*Lycenchelys ratmanovi* Andriashev
- 10a. Scales absent on nape and cheeks .. 12
- 10b. Scales present on nape and cheeks .. 11
- 11a. Vomerine and palatine teeth absent; lateral line single, coursing ventrally on abdomen, then rising to mediolateral position on tail; first suborbital pore anterior to (under) nostril tube; P 15-18; pseudobranch filaments 5-7 (BERING

- SEA—CALIFORNIA)
 *Lycenchelys crotalinus* (Gilbert)
- 11b. Vomerine and palatine teeth present; lateral line ventral on body and tail; first suborbital pore anteromesial to nostril tube; P 12–15; pseudobranch filaments 4–5 (BERING SEA—MEXICO) . . .
Lycenchelys camchatica (Gilbert and Burke)
- 12a. Pelvic fin rays three 19
 12b. Pelvic fin rays two, or fin absent . . 13
- 13a. Postorbital pores 1–2; precaudal vertebrae 26–30; dorsal fin origin associated with vertebrae 6–18; supraneurals 1–13 15
- 13b. Postorbital pores 4–5; precaudal vertebrae 23–25; dorsal fin origin associated with vertebra four; no supraneurals 14
- 14a. Interorbital pore present; nostril tube overhanging upper lip; mouth terminal; first suborbital pore mesial to nostril (PERU)
 *Lycenchelys chauliodus* sp. n.
- 14b. Interorbital pore absent; nostril tube not reaching upper lip; mouth subterminal; first suborbital pore anteromesial to nostril (PERU AND CHILE)
 *Lycenchelys pequenoii* sp. n.
- 15a. Lateral line with ventral branch only 17
- 15b. Lateral line with ventral and mediolateral branches 16
- 16a. White abdominal fold (plica) present on abdomen; pelvic fin length 19%–24% HL (NW PACIFIC)
 *Lycenchelys plicifera* Andriashev
- 16b. No abdominal plica; pelvic fins absent, or fin length 12% HL (MEXICO—PANAMA)
 *Lycenchelys monstrosa* Anderson
- 17a. Gill slit extending ventrally to opposite pelvic base; dorsal fin origin associated with vertebrae 11–18; supraneurals 7–13 18
- 17b. Gill slit extending ventrally to lower end of pectoral base; dorsal fin origin associated with vertebrae 6–7; supraneurals 1–3 (OREGON—MEXICO)
 *Lycenchelys pearcyi* sp. n.
- 18a. Interorbital pore absent; nostril tube not reaching upper lip; pyloric caeca present (KURIL-KAMCHATKA TRENCH)
 *Lycenchelys uschakovi* Andriashev
- 18b. Interorbital pore present; nostril tube reaching upper lip; pyloric caeca absent (BERING SEA)
 *Lycenchelys volki* Andriashev
- 19a. Total vertebrae 113–138 21
 19b. Total vertebrae 109 or less 20
- 20a. Vomerine and palatine teeth present; nostril tube reaching upper lip; pectoral fin rays 18; gill slit extending ventrally to opposite pelvic base; mouth terminal; pyloric caeca absent; pseudobranch filaments six (PERU)
 *Lycenchelys lonchoura* sp. n.
- 20b. Vomerine and palatine teeth absent; nostril tube not reaching upper lip; pectoral fin rays 14–15; gill slit extending ventrally to just above lower end of pectoral base; mouth inferior; pyloric caeca present; pseudobranch filaments 3–4 (MEXICO)
 *Lycenchelys folletti* sp. n.
- 21a. Color dark, with tones of black, brown, dark blue, or red; palatine teeth present; lateral line either ventral, mediolateral, both, or absent 22
- 21b. Color white; palatine teeth absent; lateral line dorsolateral (KURIL-KAMCHATKA TRENCH)
 *Lycenchelys albeola* Andriashev
- 22a. Color black or brown (abdomen usually dark blue); lateral line present; caudal fin rays 6–10; dorsal fin origin associated with vertebrae 4–21 23
- 22b. Color red; lateral line absent; caudal fin rays 10–11; dorsal fin origin associated with vertebra two (ALEUTIAN ISLANDS)
 *Lycenchelys rosea* Toyoshima
- 23a. Lateral line double, with ventral and mediolateral branches 26
- 23b. Lateral line single, with ventral branch running to tail tip, or short, mediolateral branch 24
- 24a. Branchiostegal rays six (rarely seven); postorbital pores 1–3; dorsal fin origin associated with vertebrae 8–21; nostril tube not reaching upper lip; gill slit extending ventrally below lower end of pectoral base; first suborbital pore anteromesial to nostril tube 25
- 24b. Branchiostegal rays five; postorbital

- pores five; dorsal fin origin associated with vertebra four; nostril tube overhanging upper lip; gill slit extending ventrally to just above lower end of pectoral base; first suborbital pore directly mesial to nostril tube (PERU)
 *Lycenchelys pentactina* sp. n.
- 25a. Interorbital pore absent; postorbital pores 1–2; lateral line ventral, complete to tail tip; supraneurals 6–16; ventral abdominal plica absent (CHILE—ANTARCTICA)
 *Lycenchelys antarctica* Regan
- 25b. Interorbital pore present; postorbital pores three; lateral line mediolateral, running only on body; one supraneural; abdominal plica present (KURIL-KAMCHATKA TRENCH)
 *Lycenchelys vitiazi* Andriashev
- 26a. Ventral abdominal plica present; first suborbital pore anteromesial to nostril tube; mouth terminal or subterminal 28
- 26b. Abdominal plica absent; first suborbital pore directly mesial to nostril tube; mouth inferior 27
- 27a. Precaudal vertebrae 23–26; nostril tube not reaching upper lip; pseudobranch filaments 3–7 (MEXICO—PERU)
 *Lycenchelys cicatrifer* (Garman)
- 27b. Precaudal vertebrae 27–30; nostril tube overhanging upper lip; pseudobranch filaments 0–4 (BERING SEA—MEXICO)
 *Lycenchelys micropora* Andriashev
- 28a. Mouth terminal; gill slit extending ventrally to opposite pelvic base; total vertebrae 128–133 (ALASKA—MEXICO)
 *Lycenchelys jordani* (Evermann and Goldsborough)
- 28b. Mouth subterminal; gill slit extending ventrally to lower end of pectoral base; total vertebrae 113–120 (MEXICO—PERU)
 *Lycenchelys porifer* (Gilbert)

DESCRIPTIONS

Lycenchelys alta Toyoshima, 1985

Lycenchelys altus Toyoshima, 1985:158–159, figs. 14–15 (original description. Type locality: off Buldir Isl., Aleutian Islands).

Lycenchelys alta Anderson, 1994:117.

DIAGNOSIS. — Vertebrae $21 + 67 = 88$; suborbital pores $5 + 1$; postorbital pores five; occipital pores two; interorbital pore present; lateral line ventral; dorsal fin origin associated with vertebra two; predorsal length less than head length; total gill rakers 8–9.

COUNTS AND MEASUREMENTS. — Vertebrae $21 + 67 = 88$; D 84; A 71; C 9; P 18; pelvic 3; vomerine teeth 5; palatine teeth 7–10; gill rakers $1 + 7/1 + 8$; branchiostegal rays 6; pseudobranch filaments 3. Following measurements in percent SL: head length 19.9; head width 7.5; head depth 8.1; pectoral fin length 10.6; predorsal length 18.1; preanal length 40.5; body height 8.3; gill slit length 6.1. Following measurements in percent HL: head width 38.0; head depth 41.3; upper jaw length 49.6; pectoral fin length 53.7; snout length 21.9; eye diameter 23.6; gill slit length 31.0; interorbital width 6.6; interpupillary width 17.8; pelvic fin length 17.8; caudal fin length 8.3. Pectoral base/length ratio 47.7.

DESCRIPTION. — Only holotype known. Head elongate, ovoid; dorsal profile convex, evenly sloping from snout to nape. Scales absent on head, nape, pectoral fin and base, and in pectoral axil. Scales present on body, abdomen to isthmus, tail and on unpaired fins, extending to about 60%–75% of their height. Eye ovoid, not entering dorsal profile of head. Gill slit extending ventrally nearly to pelvic fin base. Opercular flap at upper margin of gill slit well-developed, angular; slit extending anteriorly about half eye diameter. Pectoral fin origin slightly below body midline, insertion on abdomen; posterior margin of fin evenly rounded, ray tips very slightly exerted, more so ventrally; ventralmost six rays thickened.

Mouth subterminal, upper jaw extending well behind posterior margin of eye. Nostril tube small, not reaching half way from its base to upper lip when pressed forward. Upper lip poorly delimited, adnate to snout tip. Labial lobe of lower jaw well-developed. Inner surface of lower jaw with large, swollen, papilliform lining. Oral valve not coalesced with sides of palate, and not reaching edge of vomer. Jaw teeth conical, sharp; upper jaw with two anterior tooth rows, lower jaw with four irregular tooth rows; teeth in outer row in both jaws can-

iniform, retrorse, four times as large as inner row. Vomerine teeth in small patch; palatine teeth in single row.

Cephalic lateralis system with five postorbital pores, arising from frontal, sphenotic, two from pterotic and lateral extrascapulars (positions 1–5). Two pairs of anterior supraorbital (nasal) pores, one set mesial to small nostril tube, the other dorsoposteriorly. Six suborbital bones and pores, five pores arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just posteroventral to first postorbital pore (formula 5 + 1). Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle. Interorbital pore present, set between middle of pupils. Occipital pores two (left and right laterals). Body lateral line ventral, complete, traceable as few groups of neuromasts to tail tip.

Dorsal fin origin associated with vertebra two, resulting in predorsal length shorter than head; no supraneurals. Anal fin origin associated with ultimate precaudal vertebra (21), with three ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fourth preural vertebra; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with its haemal spine. Caudal fin with two epural, four upper and three lower hypural rays.

Gill rakers 1 + 7 (right) and 1 + 8 (left), only dorsalmost on lower limb developed, others regressed, triangular or acute. Pseudobranch filaments short. Pyloric caeca two nublike swellings, poorly delimited owing to full stomach.

Color in alcohol dark reddish-brown. Head region dorsally, around opercle and on branchiostegal membranes black. Dorsal fin reddish brown. Anal fin dusky anteriorly. Pectoral fin base dusky, fin blackish proximally. Lining of orobranchial chamber black. Peritoneum dark brown, undoubtedly black in life. Stomach pale (unpigmented).

The single specimen measured 125 mm TL.

DISTRIBUTION. — Known only from the western Aleutian Islands in 336 m.

REMARKS. — Toyoshima (1985, fig. 15) mislabeled the first nasal and first suborbital (“infraorbital,” or IFP) head pores as the two nasal pores. He also labeled the sixth suborbital pore

(as IFP), but stated that only five are present in his description (twice). The upper jaw in the holotype is very long, but is not included in the diagnosis as the specimen is a mature male and females of *Lycenchelys* usually have shorter jaws than males, especially among the more primitive species, like *L. alta*. Characters indicating the primitiveness of *L. alta* are its few vertebrae, few suborbital pores, robust body, 18 pectoral rays and anteriorly placed dorsal fin origin. Also not included in the diagnosis, but requiring scrutiny when more specimens are available, is the low number of gill rakers and their development, and the specimen’s small size for being a ripe male (is this a dwarf species?). Unusual in this specimen, but also not verifiable for the species, is the combination of five lower suborbital pores and five postorbital pores (which will show some variation). In other species there are more suborbital pores than postorbitals.

MATERIAL EXAMINED. — HUMZ 88704 (holotype, 123 mm SL male); So. of Buldir Isl., Aleutian Islands; 52°03.7'N, 175°39.0'E; Japanese fisheries trawler; 336 m; 14 Aug. 1980.

Lycenchelys antarctica Regan, 1913

Lycenchelys antarcticus Regan, 1913:242, pl. IX, fig. 3 (original description. Type locality: off South Georgia Isl.). Grey, 1956:197.

Lycenchelys sp.: Parin and Makushok, 1973:175.

Lycenchelys atacamensis Andriashev, 1980:1105, figs. 1–4 (Peru-Chile Trench).

Lycenchelys antarctica: Anderson, 1988:88, fig. 28. Anderson, 1990:258, fig. 2. Anderson, 1994:65, 117, fig. 118.

DIAGNOSIS. — Vertebrae 26–29 + 92–109 = 120–138; D 102(?)–116; A 98–112; C 6–9; P 15–17; pelvic 3; vomerine teeth 2–12; palatine teeth 0–11; gill rakers 2–3 + 10–13 = 13–16; branchiostegal rays 6–7; pseudobranch filaments 0–4, small; pyloric caeca absent or present as low swellings only; dorsal fin origin associated with vertebrae 12–21, with 6–16 supraneurals; head 14.1%–18.0% SL, pectoral fin 8.0%–10.7% SL; predorsal length 27.1%–33.0% SL; body height 4.5%–7.0% SL; upper jaw 31.1%–44.3% HL; pelvic length 9.1%–16.3% HL; preoperculomandibular pores usually nine, but with poorly developed septum between pores five and six in some, producing

one large pore giving a count of eight; postorbital pores 1–2; suborbital pores 7–9; occipital and interorbital pores absent; body lateral line ventral, complete.

DISTRIBUTION. — Peru-Chile Trench in 4855–5320 m, Scotia Sea in 1976–3870 m, and Weddell Sea in 2037 m (MNHN 1990-645).

MATERIAL EXAMINED. — See Anderson (1988). Weddell Sea record (above) is a range extension.

Lycenchelys callista sp. nov.

(Fig. 1)

Lycenchelys "A" sp. n. Percy et al., 1982:387.

HOLOTYPE. — CAS 55412 (male, 190 mm); California, off Pt. Sur; 36°15.1'N, 122°25.5'W; *Cayuse* sta. SLS-16; 1580–1622 m; 0837–0907 hrs.; 26 July 1984; W. Wakefield, M. E. Anderson and party.

PARATYPES. — Oregon: OS 14376; (8; 119–174 mm); 44°24.1'N, 125°07.2'W; *Yaquina* sta. OTB-313; 1285 m; 2134–2220 hrs.; 19 Feb. 1970. California, off Farallon Isl.: CAS 39849 (5; 162–200 m); *Velero IV*, US EPA; 1464 m; Sept. 1977. California, off Pt. Sur: CAS 80630 (29; 148–190 mm); same coll. as holotype. CAS 55062 (2; 110–172 mm); 36°23.8'N, 122°14.6'W; *Cayuse* sta. SLS-12; 1200 m; 0743–0800 hrs.; 11 May 1984. SIO 84-249 (21; 123–190 mm); 36°29.2'N, 122°19.1'W; *Cayuse* sta. SLS-21; 1409–1429 m; 1037–1107 hrs.; 3 Oct. 1984. SIO 85-51 (22; 124–193 mm); 36°30.7'N, 122°19.2'W; *Cayuse* sta. SLS-12; 1410–1510 m; 0903–1003 hrs.; 7 Nov. 1984. California, Tanner Basin: SIO 71-141 (3; 133–163 mm); 32°47.0'N, 119°28.5'W; sta. R-41; 1390 m; 13 July 1971.

ADDITIONAL MATERIAL. — SIO 60-476 (1; 123 mm); California, off Farallon Isl.; U.S. Atomic Energy Commission; 1830 m; 11 Nov. 1960. Trawl damaged.

DIAGNOSIS. — Vertebrae 23–25 + 102–112 = 126–136; suborbital pores 7–9 + 1 = 8–10; postorbital pores three; occipital pores two; interorbital pore usually absent; lateral line ventral; dorsal fin origin associated with vertebrae 6–8; pelvic fin rays two; total gill rakers 12–15.

COUNTS AND MEASUREMENTS. — Values for holotype first, followed by range of paratypes in parentheses: vertebrae 23 + 108 = 131 (23–

25 + 102–112 = 126–136); D 125 (118–127); A 112 (108–118); C 8 (8–10); P 16 (14–16); pelvic 2 (2); vomerine teeth 4 (1–10); palatine teeth 1/2 (1–6); gill rakers 2 + 11 (2–3 + 9–12 = 12–15); branchiostegal rays 6 (6); pseudobranch filaments 4 (4–5). Following measurements in percent SL: head length 13.3 (12.2–15.5); head width 6.3 (4.4–6.1); head depth 5.4 (4.4–5.6); pectoral fin length 7.0 (6.7–9.7); predorsal length 18.0 (17.2–19.1); preanal length 29.7 (28.0–30.8); body height 5.6 (4.9–5.9); gill slit length 3.9 (3.3–4.4). Following measurements in percent HL: head width 47.3 (35.5–46.0); head depth 40.2 (34.6–40.6); upper jaw length 40.7 (29.1–41.5); pectoral fin length 52.7 (46.3–65.1); snout length 24.5 (19.1–26.9); eye diameter 20.3 (21.3–26.3); gill slit length 29.1 (26.7–34.1); interorbital width 7.3 (5.6–7.9); interpupillary width 25.7 (20.3–26.4); pelvic fin length 17.1 (17.4–22.3); caudal fin length 8.4 (6.7–12.4). Pectoral base/length ratio 43.3 (31.4–41.2).

DESCRIPTION. — Based on 92 known adults and juveniles. Head elongate, ovoid; dorsal profile gently convex or nearly flattened from anterior margin of eye to nape. Head somewhat longer in males than in females, length 12.4%–14.5% SL (\bar{x} = 13.6) in 25 males 149–185 mm SL, 12.2%–13.3% HL (\bar{x} = 13.0) in 26 females, 149–193 mm SL. Scales absent on head, nape, pectoral fin and base, and in pectoral axil immediately posterior to fin base only. Scales present on body, abdomen to line between pectoral bases, tail and on unpaired fins extending to about 50–75% of their height, the greatest extent posteriorly. Eye ovoid, just entering dorsal profile of head. Gill slit extending ventrally to lower end of pectoral base. No opercular flap at upper end of gill slit, instead slit fused above pectoral base to body, forming characteristic "siphon-shaped fold" (Andriashev, 1955); dorsally slit vertical, or nearly so, and not continued forward, or if so in a few, for very short distance. Pectoral fin origin at body midline, insertion on abdomen; posterior margin of fin evenly rounded, ray tips exserted, more so ventrally, ventralmost 6–7 rays thickened.

Mouth inferior, upper jaw extending to middle of eye or its anterior quarter. Upper jaw longer in adult males than in females, 32.7%–43.1% HL (\bar{x} = 37.4) in 25 males 149–185 mm SL, 29.1%–34.1% HL (\bar{x} = 30.2) in 26 females

149–193 mm SL. Nostril tube reaching more than half way from its base to upper lip when pressed forward, almost touching lip in some. Upper lip well-delimited, adnate to snout tip. Labial lobe of lower jaw well-developed, generally hidden when mouth is closed. Oral valve not coalesced with sides of palate, and extending to rictus, but not reaching vomer. Jaw teeth conical, sharp; upper jaw with single row in both sexes, lower jaw with 2–3 irregular rows near symphysis; anteriormost teeth in adult males caniniform, about three times the size of those in females. Numbers of teeth in both jaws significantly different for the sexes of similar sizes. Premaxillary teeth 7–12 (\bar{x} = 8.9) in 27 males 142–188 mm SL, 10–20 (\bar{x} = 13.1) in 26 females 149–193 mm SL. Dentary teeth 10–16 (\bar{x} = 13.6) in same males, 21–29 (\bar{x} = 24.0) in same females. Vomerine and palatine teeth relatively few, only 7% of total sample with more than four palatine teeth, 13% with more than four vomerine teeth.

Cephalic lateralis system with three postorbital pores, arising from frontal, pterotic and lateral extrascapulars (positions one, three and four). Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to small nostril tube, the other posteromesially. Usually nine suborbital pores, eight arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just ventral to first postorbital pore (8 + 1); suborbital pore variation rare, four fish with formula 7 + 0/7 + 0 and one with 8 + 1/9 + 1. Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle (no variation). Interorbital pore usually absent, present in only two specimens. Occipital pores two (left and right laterals). Body lateral line ventral, complete, steeply bowing on anterior portion of body in pectoral axil.

Dorsal fin origin above mid-pectoral fin, associated with vertebrae 6–8, with no supraneurals. Anal fin origin associated with ultimate or penultimate precaudal vertebrae, with 4–7 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with third through fifth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with 1–2 rays articulating with haemal spine. Caudal fin with 1–2

epural (usually two), 3–4 upper hypural and 2–4 (usually four) lower hypural rays.

Gill rakers on upper limb small, acute; on lower limb only ventralmost 6–8 acute, others more rectangular. Pseudobranch filaments long, usually 4–5. Pyloric caeca two nublike swellings, poorly delimited.

Color in alcohol dark brown or bluish, head and fins darker. Body color in life (pers. observ.) dark cobalt blue, fins black. Dorsal surface of head dark brown, cheek and opercular area dark blue. Pectoral fin with large, pale blue, iridescent blotch covering about half of fin surface, quickly fading after capture. Lining of orobranchial chamber and peritoneum black. Stomach pale (unpigmented).

This species reaches 203 mm TL. Ripening ova 2.2 mm in diameter were found in a 157 mm SL female (OS 14376). The largest ova were seen in a 188 mm SL specimen in SIO 85-51 at 3.5–3.6 mm in diameter. Stomach contents in specimens from off central California were about 80% bivalves, the rest gastropods and crustacean debris.

DISTRIBUTION.—Off central Oregon to southern California. Depth range: 1200–1830 m.

ETYMOLOGY.—From the Greek καλλιστος (most beautiful) in reference to the author's perception of the physical appearance of this species compared to its congeners.

REMARKS.—This species is closest to *L. rassi* Andriashev chiefly on the basis of its similar head pore patterns, fused gill opening, two pelvic fin rays, squamation and dentition. However, *L. callista* differs from *L. rassi* in sufficient characters to suggest sister-species status. These include *L. callista's* fewer vomerine and palatine teeth at comparable sizes, uncoalesced oral valve, lateral line steeply sloping in *L. callista*, gently declining in *L. rassi*, nostril tube not reaching upper lip in *L. callista*, reaching or overhanging upper lip in *L. rassi*, interorbital pore very rarely present in *L. callista*, always present in *L. rassi*, dorsal fin origin associated with vertebrae 6–8 in *L. callista*, vertebra five in *L. rassi*, generally more numerous vertebrae (126–136 in *L. callista*, 122–129 in *L. rassi*), and generally more numerous gill rakers (12–15 in *L. callista*, 11–13 in *L. rassi*).

Lycenchelys camchatica (Gilbert and Burke, 1912)

Lycodes camchaticus Gilbert and Burke, 1912:89, fig. 34 (original description. Type locality: off Avacha Bay, Kamchatka Penin., Russia). Soldatov and Lindberg, 1930:494. Rendahl, 1931:16. Popov, 1933:66. Quast and Hall, 1972:14.

Lycenchelys camchaticus: Andriashev, 1935:115. Andriashev, 1937:341–343, partim, text figs. 17, 19 only, pl. 2, fig. 26. Andriashev, 1955:354, 364–366, figs. 2, 9, 10. Andriashev, 1958:172, 174. Quast and Hall, 1972:13. Peden, 1973:117–119, fig. 1C. Fedorov, 1976:10–12. Pearcy et al., 1982:387. Toyoshima, 1985:149, 164–165, figs. 20–21, table 3.

Lycenchelys camchatica: Anderson et al., 1979:262–263. Hubbs et al., 1979:14. Pequeño, 1986:187. Anderson, 1994:117.

DIAGNOSIS. — Vertebrae 21–24 + 97–104 = 118–125; suborbital pores 7–8 + 0–1 = 7–9; postorbital pores two, opening from positions one and three; occipital and interorbital pores absent; lateral line ventral; dorsal fin origin associated with vertebrae 5–6; pectoral fin rays 12–15; scales present on nape and cheeks; total gill rakers 14–18.

COUNTS AND MEASUREMENTS. — Vertebrae 21–24 + 97–104 = 118–125; D 112–117; A 100–105; C 9–11; P 12–15; pelvic 3; vomerine teeth 2–6; palatine teeth 1–10; gill rakers 0–2 + 13–16 = 14–18; branchiostegal rays 6; pseudobranch filaments 4–5. Following measurements in percent SL: head length 13.5–16.1; head width 5.0–8.1; head depth 5.1–6.8; pectoral fin length 5.3–8.7; predorsal length 15.3–18.9; preanal length 29.9–31.9; body height 3.8–7.1; gill slit length 3.3–4.5. Following measurements in percent HL: head width 27.6–46.1; head depth 37.1–42.9; upper jaw length 32.0–46.8; pectoral fin length 37.7–60.5; snout length 22.7–35.3; eye diameter 19.2–28.1; gill slit length 23.8–29.6; interorbital width 5.2–7.9; interpupillary width 23.6–26.9; pelvic fin length 9.9–18.1; caudal fin length 8.7–11.6. Pectoral base/length ratio 36.6–43.9.

DESCRIPTION. — Based on 130 juveniles and adults; large adults rare. Head elongate, ovoid; dorsal profile gently convex or nearly flattened from snout tip to nape. Head length not longer in males than females in present sample of mostly juveniles. Scales present on nape, cheek and pectoral axil at sizes over about 100 mm

SL; scales present on pectoral fin and base at sizes over about 120 mm SL; scales present on body, abdomen and unpaired fins at all sizes; scales on unpaired fins extend to their margin in large specimens. Eye ovoid, entering dorsal profile of head in juveniles, excluded in adults. Gill slit extending ventrally to lower end of pectoral base or just above it. Weak opercular flap at upper end of gill slit; slit extending forward about one-third to one-fourth eye diameter. Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin evenly rounded, middle and ventral ray tips slightly exerted, ventralmost 4–5 rays thickened.

Mouth inferior, upper jaw extending to middle of eye, noticeably longer in largest males compared to females and juveniles of both sexes; upper jaw recessed in deep, fleshy pocket posteriorly. Nostril tube not reaching halfway from its base to upper lip when pressed forward. Upper lip poorly delimited, especially anteriorly. Labial lobe of lower jaw well-developed, not hidden when mouth is closed in some. Oral valve not coalesced with sides of palate, extending to rictus and just reaching edge of vomer. Jaw teeth conical, upper jaw with single row in both sexes, lower jaw with 3–4 irregular rows near symphysis; anteriormost teeth in adult males caniniform in lower jaw only. Numbers of jaw teeth not significantly different in present sample. Fedorov (1976) reported great individual variation in numbers of dentary teeth, but did not distinguish between the sexes. Vomerine and palatine teeth relatively few in both sexes.

Cephalic lateralis system with usually two postorbital pores, arising from frontal and pterotic (positions one and three), pores rarely doubled at one position. Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to small nostril tube, the other posteromesially. Usually eight suborbital pores, seven arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just ventral to postorbital pore (8 + 0); suborbital pore variation rare, few fish with pore formulae 7 + 0 or 8 + 1. Eight preoperculo-mandibular pores, four arising from dentary, one from angulo-articular and three from preopercle (no variation). Interorbital pore usually absent, present in few specimens taken off Oregon. Occipital pores absent. Body lateral line ventral,

steeply sloping on anterior portion of body, not traceable to tail tip even in fresh specimens.

Dorsal fin origin above mid-pectoral fin, usually associated with vertebra five, with no supraneurals. Anal fin origin associated with ultimate precaudal vertebra, with 2–4 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with third or fourth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with 1–2 (usually two) rays articulating with haemal spine. Caudal fin with two epural, 4–5 (usually four) upper hypural rays and 3–4 (usually four) lower hypural rays.

Usually single, acute gill raker on upper limb of first gill arch, occasionally absent owing to inner membrane attachment to juncture between upper and lower limbs. All rakers slender, acute; ventralmost 5–6 more triangular (Andriashev, 1955, fig. 10). Pseudobranch filaments short. Pyloric caeca two, nublike.

Color in alcohol brown or bluish, head, fins and abdomen darker; some specimens faded to whitish-pink. Body color in life (pers. observ., specimens from California) uniformly purplish-blue; nape, cheeks and snout purple; branchiostegal membrane, lips, fins and abdomen blackish. Pectoral fin with large, bluish-green (females) or pale yellow (males), iridescent blotch covering more than half of fin surface, quickly fading after capture. Lining of orobranchial chamber and peritoneum black. Stomach pale (unpigmented). Gilbert and Burke (1912) stated the living color to be "olive-brown...with greenish gilt in varying amounts on top and sides of head and front face of pectorals, lower parts darker." In contrast to specimens described above from California, their description is of the Kamchatkan types, which must have been seen fresh by Gilbert, chief scientist of the 1906 *Albatross* cruise that captured them. Andriashev (1958) noted the sexual dichromatism of the pectoral fin blotch from ship records.

This species reaches 430 mm TL (Fedorov, 1976), but only 16 specimens over 200 mm were located. Approximately 160 specimens have been identified, several not studied or listed below. Specimens from the Bering Sea and California had eaten bivalves and gastropods in about equal amounts.

DISTRIBUTION. — A eurybathic, trans-Pacific species ranging at least from Avacha Bay, Kamchatka Peninsula, Russia, across the Bering Sea slope including the Aleutian Islands, to northern Mexico in 256–2100 m. No specimens known yet between the southeast Bering Sea and Washington. Andriashev's (1937) depth of "about 200 m" at Bering Island was an approximation and seems too shallow for this species. However, SIO 74-168 (misreported as SIO 74-166 in Anderson et al., 1979) was taken at 256 m off southern California. Toyoshima's (1985:165) statement that the species occurs in the Sea of Okhotsk is presently unconfirmed, but probable.

REMARKS. — This species is close to *L. crotalinus* chiefly in its similar counts of the axial skeleton and gill rakers, inner gill membrane attachment, head pore patterns, and head squamation. Indeed, it was confused with *L. crotalinus* in California waters for many years (see Anderson et al., 1979). It is mainly distinguished from *L. crotalinus* in possessing vomerine and palatine teeth, having a complete ventral lateral line, and having a lower pectoral fin ray count (12–15, usually 13–14, in *L. camchatica*, 15–18, usually 16–17, in *L. crotalinus*). Andriashev (1937) described great sexual dimorphism in the species but later discovered that the males in his collection were of another species which he named *Lycenchelys ratmanovi* (Andriashev, 1955). Fedorov's (1976:10) records of 17 pectoral fin rays and 90 caudal vertebrae for this species are in error, the latter error was typographical.

MATERIAL EXAMINED. — Russia: USNM 74396 (holotype, male, 239 mm), SU 22366 (paratype, 243 mm) and USNM 70928 (2 paratypes, 236–241 mm); off Avacha Bay; 52°37.5'N, 158°50.0'W; *Albatross* sta. 4797; 1247 m; 20 June 1906; U. S. Fish Commission. ZIN 30012 (2; 216–232 mm); off Avacha Bay; 52°41'N, 159°13'E; *Dal'nevostochnik* sta. 3; 800–1000 m; 15 July 1932; A. P. Andriashev. ZIN 42023 (2; 180–191 mm); Shirshov Ridge; 57°53'N, 170°58'E; *Professor* sta. 327; 1050 m; 15 Sept. 1974. ZIN 40538 (1; 189 mm); So. of C. Navarin; 61°08'N, 175°45'E; *Ekvator* sta. 501; 980 m; 2 Oct. 1969. Eastern Bering Sea (Alaska): ZIN 41881 (1; 350 mm); 58°21'N, 175°11'W; *Adler* sta. 29; 630–720 m; 5 Feb. 1967. HUMZ 83128 (1; 218 mm); 54°39.1'N,

- 167°20.1'W; *Yakushi Maru*; 500 m; 11 June 1979; M. Yabe. UW 25162 (1; 188 mm); 54°34'N, 167°43'W; trawl 135; ca. 950–980 m; 27 Aug. 1983. HUMZ 81814 (1; 140 mm); 54°20.5'N, 167°12.5'W; *Yakushi Maru*; 800 m; 14 June 1979; M. Yabe. USNM 221091 (2; 182–202 mm); *Yakushi Maru* sta. 22; 900–930 m; 27 June 1979; D.M. Cohen. Washington: USNM 135634 (2; 116–144 mm); off Gray's Harbor; 46°55'N, 125°11'W; *Albatross* sta. 2871; 1022 m; 23 Sept. 1888; U.S. Fish Commission. Oregon, off Columbia R. mouth: CAS 81719 (1; 114 mm); 45°47.9'N, 125°32.2'W; *Cayuse* sta. OTB-242; 2100 m; 2 Apr. 1968. Oregon, off Yaquina Bay: CAS 39568 (2; 90–136 mm); 44°40.0'N, 124°58.2'W; *Yaquina* sta. BMT-311; 950 m (not 825 m as in Anderson et al., 1979); 1940–2012 hrs.; 22 Oct. 1972. OS 14368 (2; 134–141 mm); same data as preceding. OS 14386 (2; 49–56 mm); 44°38.0'N, 124°52.6'W; *Yaquina* sta. BMT-182; 620 m; 15 Mar. 1970. OS 14402 (2; 90–106 mm); 44°34.0'N, 124°55.8'W; *Yaquina* sta. OTB-385; 786 m; 21 Feb. 1971. OS 14401 (1; 87 mm); 44°24.1'N, 125°07.2'W; *Yaquina* sta. OTB-313; 1285 m; 2134–2220 hrs.; 19 Feb. 1970. Oregon, off Coos Bay: OS 14407 (5; 147–153 mm); 43°30.4'N, 125°10.6'W; *Cayuse* sta. OTB-530; 1550 m; 8 Aug. 1973. OS 14387 (1; 155 mm); 43°28.5'N, 124°52.4'W; *Yaquina* sta. BMT-457; 675 m; 26 Mar. 1975. OS 14385 (1; 147 mm); 43°27.9'N, 124°48.8'W; *Cayuse* sta. BMT-353; 534 m; 7 June 1974. OS 14406 (1; 103 mm); 43°27.5'N, 124°53.3'W; *Cayuse* sta. BMT-381; 690 m; 6 July 1974. OS 14405 (4; 65–88 mm); 43°23.3'N, 124°51.4'W; *Cayuse* sta. OTB-553; 635 m; 27 Oct. 1973. OS 14404 (2; 78–84 mm); 43°23.3'N, 124°51.4'W; *Yaquina* sta. OTB-557; 635 m; 28 Oct. 1973. OS 14370 (1; 109 mm); 43°21.6'N, 124°48.4'W; *Yaquina* sta. BMT-463; 630 m; 27 Mar. 1975. USNM 149788 (1; 230+ mm); 43°01.0'N, 125°12.5'W; *Albatross* sta. 3788; 1946 m; 27 Apr. 1901; U. S. Fish Commission. California, off Farallon Isl.: CAS 57930 (1); 37°26.3'N, 123°05.0'W; *D. S. Jordan* sta. 3; 705–925 m; 0500–0715 hrs.; 16 Dec. 1985; T. Iwamoto. California, Monterey Bay: CAS 31495 (1; 114 mm); 36°46.7'N, 121°59.5'W; *Artemia*; 768–915 m; 22 Sept. 1974; M. G. Bradbury and M. E. Anderson. California, off Pt. Sur: CAS 56234 (2); 36°29.9'N, 122°18.3'W; *Cayuse* sta. SLS-27 (MEA 85-8); 1400–1430 hrs. 0331–0401 hrs.; 6 Feb. 1985; W. Wakefield, M. E. Anderson. SIO 85-45 (2; 148–161 mm); same data as preceding. SIO 84-48 (4; 105–134 mm); 36°25.2'N, 122°08.6'W; *Cayuse* sta. SLS-11; 850–860 m; 2230–2300 hrs.; 10 May 1984; W. Wakefield, M. E. Anderson. CAS 56250 (2); 36°22.9'N, 122°04.7'W; *Cayuse* sta. MEA 85-12; 640–630 m; 0136–0146 hrs.; 7 Feb. 1985; W. Wakefield, M. E. Anderson. CAS 56245 (1); 36°20.5'N, 122°10.5'W; *Cayuse* sta. MEA 85-11; 800–850 m; 2127–2137 hrs.; 6 Feb. 1985; W. Wakefield, M. E. Anderson. CAS 56242 (8); 36°19.6'N, 122°14.7'W; *Cayuse* sta. MEA 85-10; 990–995 m; 1556–1616 hrs.; 6 Feb. 1985; W. Wakefield, M. E. Anderson. CAS 55406 (1; 153 mm); 36°18.6'N, 122°16.0'W; *Cayuse* sta. SLS-15; 950–1010 m; 1314–1404 hrs.; 25 July 1984; W. Wakefield, M. E. Anderson. SIO 88-130 (1; 147 mm); 36°02.4'N, 121°50.4'W; *D. S. Jordan* haul 53; 1010–1017 m; 1649–1930 hrs.; 2 Apr. 1988; G. Moser. California, off Pt. Piedras Blancas: SIO 74-168 (1; 142 mm); 35°32.4'N, 121°35.7'W; trawl in 256 m; 1–2 Apr. 1974. SIO 74-166 (48; 104–163 mm); 35°29.3'N, 121°35.7'W; trawl in 905 m; 1 Apr. 1974. California, off San Luis Obispo Bay: CAS 38304 (1; 142 mm); 35°13.4'N, 121°39.5'W; *D. S. Jordan* sta. 7; 1021 m; 2334–0354 hrs.; 6–7 Sept. 1976; W. Eschmeyer. California, Catalina Basin: SIO 84-65 (1; 141 mm); *Thomas Washington* sta. SLS-6; 1160 m; 1541–1612 hrs.; 24 Sept. 1984; W. Wakefield, R. Cowen. California, La Jolla Canyon: SIO 71-162 (1; 126 mm); 32°56.0'N, 117°31.8'W; *Alexander Agassiz* sta. M6-2; 786–790 m; 0135–0430 hrs.; 13 Aug. 1971; T. Matsui. California, Tanner Basin: SIO 71-13 (1; 167 mm); 32°52.2'N, 119°32.5'W; *Alexander Agassiz*; 1390 m; 21 Jan. 1971; T. Matsui. SIO 74-198 (3; 122–152 mm); 32°50.2'N, 119°31.7'W; *Oconostota*; ca. 1100 m; 0400 hrs.; 5 Sept. 1974; J. Siebenaller. SIO 74-197 (3); 32°43.5'N, 119°28.9'W; *Oconostota* sta. 6; 1363 m; 0100 hrs.; 5 Sept. 1974; J. Siebenaller. California, West Cortez Basin: SIO 76-174 (1; 187 mm); 32°25.3'N, 119°30.4'W; trawl in 1362 m; 7 May 1975. Mexico: South Tanner Bank: SIO 85-167 (2; 115–129 mm); 32°28.7'N, 118°48.0'W; *D. S. Jordan*, bottom trawl; 1332 m; 26 Sept. 1985; T. Matsui. Mex-

ico: San Diego Trough: SIO 71-90 (3; 147–151 mm); 32°25.3'N, 117°28.9'W; M-4, sta. 1; 1211–1235 m; 1306–1649 hrs.; 22 June 1971 (date, depth incorrect in Anderson et al., 1979). SIO 72-55 (3); 32°25.8'N, 117°28.8'W; M-7, sta. 1; 1225–1244 m; 1228–1538 hrs.; 14 Sept. 1971. SIO 71-201 (2; 147–148 mm); 32°24.4'N, 117°29.5'W; *Alexander Agassiz* sta. M8-1; 1207–1244 m; 1325–1845 hrs.; 1 Nov. 1971.

Lycenchelys chauliodus sp. nov.
(Fig. 2)

HOLOTYPE. — LACM 45600-1 (male, 142 mm SL); Peru, off Trujillo; 07°58'S, 80°37'W; *Anton Bruun* sta. 88; 1105–1124 m; 14 Oct. 1965; R. J. Menzies.

DIAGNOSIS. — Vertebrae 24 + 96 = 120; suborbital pores 6 + 1; postorbital pores five; occipital pores absent; interorbital pore present; dorsal fin origin associated with vertebra four; pelvic fin rays two; gill slit above lower end of pectoral base; nostril tube overhanging upper lip; mouth terminal; total gill rakers 14.

COUNTS AND MEASUREMENTS. — Vertebrae 24 + 96 = 120; D 115; A 100; C 10; P 15; pelvic 2; vomerine teeth 9; palatine teeth 9/10; gill rakers 3 + 11; branchiostegal rays 6; pseudobranch filaments 3. Following measurements in percent SL: head length 15.4; head width 7.2; head depth 6.7; pectoral fin length 8.5; predorsal length 19.3; preanal length 34.5; body height 6.7; gill slit length 4.7. Following measurements in percent HL: head width 46.8; head depth 43.6; upper jaw length 42.7; pectoral fin length 55.1; snout length 22.0; eye diameter 21.1; gill slit length 30.3; interorbital width 7.3; interpupillary width 19.7; pelvic fin length 18.4; caudal fin length 9.2. Pectoral base/length ratio: 43.3.

DESCRIPTION. — Only holotype known. Head elongate, ovoid; dorsal profile declined, nearly straight from snout to nape. Scales absent on head, pectoral fin, pectoral axil and base. Scales present on body, abdomen (forward to line about one-third eye diameter posterior to pectoral bases), tail, and on unpaired fins extending to about 50%–80% of their height, the greatest extent posteriorly. Eye ovoid, just entering dorsal profile of head. Gill slit extending ventrally to opposite 13th pecto-

ral ray, well above lower end of pectoral base. Opercular flap at upper end of gill slit weak, angular; slit extending forward about one-third eye diameter. Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin evenly rounded, ray tips deeply exerted, more so ventrally, ventralmost six rays thickened.

Mouth terminal, upper jaw extending to just behind middle of eye. Nostril tube overhanging upper lip and extending almost to its anterior edge. Upper lip thin, poorly delimited anteriorly. Labial lobe of lower jaw weak and thin. Oral valve coalesced with sides of palate, not reaching vomer. Jaw teeth conical, sharp; upper jaw with three rows anteriorly, lower jaw with 2–3 rows anteriorly, outermost teeth in both jaws three times larger than inner teeth. Lower jaw inner membrane papillose. Vomerine and palatine teeth relatively numerous, strong, retrose.

Cephalic lateralis system with five postorbital pores, arising from frontal, sphenotic, two from pterotic, and lateral extrascapulars. Two pairs of anterior supraorbital (nasal) pores, one set mesial to long nostril tube, the other posteromesial. Seven suborbital pores, six arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just posteroventral to first postorbital pore (6 + 1). Eight preoperculumandibular pores, four arising from dentary, one from anguloarticular and three from preopercle. Interorbital pore anterior in position, set almost on line joining anterior margins of eyes. Occipital pores absent, supra-temporal commissure appears absent as well. Body lateral line undetectable (specimen faded).

Dorsal fin origin above anterior third of pectoral fin, associated with vertebra four, with no supraneurals. Anal fin origin associated with penultimate precaudal vertebra, with five ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fourth preural vertebra; pterygiophore of last anal ray associated with second preural vertebra, with one ray articulating with haemal spine. Caudal fin with two epural, four upper hypural and four lower hypural rays.

Gill rakers slender, acute, first one minute; lowermost five more triangular. Pseudobranch

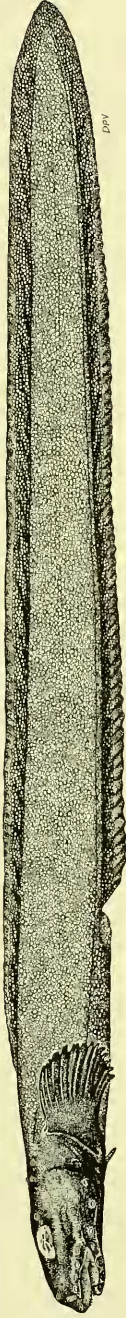


FIGURE 1. *Lycenchelys callista* sp. n., CAS 55412, holotype, 190 mm SL, off Pt. Sur, California.

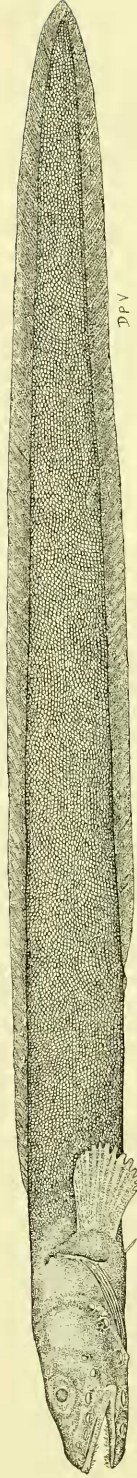


FIGURE 2. *Lycenchelys chautiodus* sp. n., LACM 45600-1, holotype, 142 mm SL, off Trujillo, Peru.

filaments short. Pyloric caeca two, nublike, but well-delimited, about one-half eye diameter in length.

Color in alcohol faded to uniform pinkish brown, jaws and fins whitish. Lining of orobranchial chamber and peritoneum dark brown, undoubtedly black in life. Stomach pale (unpigmented).

DISTRIBUTION. — Known only from off Peru in 1005–1124 m.

ETYMOLOGY. — From the Greek word *χαυλιοδουσ* (having prominent teeth), alluding to the large teeth in so small a specimen. Treated as a noun in apposition.

REMARKS. — The very large, ripe gonad of the relatively small holotype indicates that *L. chauliodus* may be a dwarf species.

Lycenchelys cicatrifer (Garman, 1899)
(Fig. 3)

Lycodes cicatrifer Garman, 1899:136, pl. 31, fig. 1 (original description. Type locality: Gulf of Panama). Jordan et al., 1930:475. Grey, 1956:197.

Lycenchelys cicatrifer: Andriashev, 1955:351. Parin and Makushok, 1973:175 (lapsus calami, *cicatrifer*), 182. Anderson, 1982a:210. Pequeño, 1986:186. Anderson, 1994:117.

DIAGNOSIS. — Vertebrae 23–26 + 92–100 = 116–124; suborbital pores 7–8 + 0–1, usually 7 + 0; postorbital pores 3–4, usually three; occipital pores absent; interorbital pore usually absent; lateral line double (mediolateral and ventral); dorsal fin origin associated with vertebrae 5–7; total gill rakers 10–13.

COUNTS AND MEASUREMENTS. — Vertebrae 23–26 + 92–100 = 116–124; D 108–115; A 97–104; C 9–10; P 16–18; pelvic 3; vomerine teeth 4–11; palatine teeth 1–8; gill rakers 2 + 8–11 = 10–13; branchiostegal rays 6; pseudobranch filaments 3–7. Following measurements in percent SL: head length 15.1–19.2; head width 6.6–10.3; head depth 7.1–8.0; pectoral fin length 8.2–12.3; predorsal length 20.8–22.1; preanal length 33.8–36.6; body height 5.8–8.1; gill slit length 5.7–6.8. Following measurements in percent HL: head width 38.8–45.5; head depth 38.9–46.6; upper jaw length 34.9–48.8; pectoral fin length 54.3–62.3; snout length 21.5–27.8; eye diameter 20.9–30.3; gill slit length 32.7–36.9; interorbital width 5.3–6.1; interpupillary width 19.1–25.1; pelvic fin length

12.9–19.7; caudal fin length 5.8–11.3. Pectoral base/length ratio: 28.0–48.9.

DESCRIPTION. — Based on 30 known adults and juveniles; by far, most specimens are large, mature adults. Head elongate, ovoid; dorsal profile gently convex to snout area, more depressed behind eye in adult males than females. Head somewhat longer in males than in females, length 16.1%–18.0% SL (\bar{x} = 17.0) in 10 males 222–280 mm SL, 15.1–17.6 (\bar{x} = 16.5) in 12 females 205–278 mm SL. Scales absent on head, pectoral base and pectoral axil immediately posterior to fin base only. Scales present on nape, pectoral fin (occasionally absent), abdomen to isthmus in largest specimens, tail and on unpaired fins extending to about 50%–90% of their height, the greatest extent posteriorly. Eye ovoid, entering dorsal profile of head. Gill slit extending ventrally to lower end of pectoral base. Opercular flap at upper end of gill slit well-developed, angular; slit extending forward about half eye diameter. Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin evenly rounded dorsally, ray tips exerted except uppermost 4–5, deeply exerted ventrally, lowermost 7–8 rays thickened.

Mouth inferior, upper jaw extending to middle of eye or its posterior quarter (large males). Upper jaw longer in adult males than in females, 38.7%–48.8% HL (\bar{x} = 42.1) in 10 males 222–280 mm SL, 34.9%–39.4% HL (\bar{x} = 36.6) in 15 females 128–278 mm SL. Nostril tube not reaching upper lip. Upper lip well-developed, broadly adnate to snout tip. Labial lobe of lower jaw well developed. Oral valve not coalesced with sides of palate, extending almost to rictus, but not reaching vomer. Jaw teeth conical, upper jaw with 2–3 rows anteriorly, single row (males) or double (some females) posteriorly, lower jaw with 2–3 irregular tooth rows near symphysis, often rear row is of few teeth, single row posteriorly. Numbers of teeth in both jaws insignificant between the sexes. Vomerine teeth in irregular patch. Palatine teeth in single series.

Cephalic lateralis system usually with three postorbital pores, arising from frontal, pterotic and lateral extrascapulars (positions one, three and four); four individuals with pore two (sphenotic) present on at least one side. Two pairs of anterior supraorbital (nasal) pores, one set mesial to nostril tube, the other posteriorly.

Usually seven suborbital pores, all arising from ventral ramus of bone chain under eye; five individuals with eight ventrals on at least one side; one individual with eight ventrals on one side, seven on the other and one pore in the ascending ramus behind eye, resulting in the unusual formula $8 + 0/7 + 1$. Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle (no variation). Interorbital pore absent except in one specimen in LACM 43764-1. Occipital pores absent. Body lateral line with ventral branch steeply sloping on anterior quarter of body and mediolateral branch originating about two-thirds pectoral fin length posterior to pectoral base; both running to tail tip.

Dorsal fin origin above posterior third of pectoral fin, associated with vertebrae 5–7, usually 6–7, with no supraneurals. Anal fin origin associated with ultimate or penultimate precaudal vertebrae, with 2–5, usually 4–5, ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with third through fifth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with haemal spine. Caudal fin with two epural, four upper hypural and 3–4, usually three, lower hypural rays.

Gill rakers short, only dorsalmost acute (both limbs); on lower limb, ventralmost rakers triangular. Pseudobranch filaments long, usually 4–5. Pyloric caeca two nublike swellings, not well-delimited in some specimens.

Color in alcohol dark brown, head and fins darker, stated to be black in fresh material (Garman, 1899). Lining of orobranchial chamber and peritoneum likewise probably black in life. Stomach pale (unpigmented).

This species reaches 282 mm SL. Most specimens examined had stomach contents: exclusively bivalves in most, with a few also having eaten gastropods and some unidentifiable crustacean.

DISTRIBUTION. — Guaymas Basin, Gulf of California, to southern Peru. Depth range: 1430–3058 m.

REMARKS. — This species is very close to *L. porifer* but is distinguished by its inferior mouth, pale stomach, position of first suborbital

pore, lack of an abdominal plica, and more scaly vertical fins.

MATERIAL EXAMINED. — Mexico, Gulf of California: ZIN 48143 (2; 188–205 mm); 27°00.3'N, 111°25.3'W; *Akademik Mstislav Keldysh* sta. 1551; 2023–2026 m; 22 Nov. 1986. Panama: MCZ 28684 (holotype; ca. 230 mm); 06°17.0'N, 82°05'W; *Albatross* sta. 3360; 3058 m; 24 Feb. 1891; U.S. Fish Commission. Peru: LACM 43764-1 (20; 220–280 mm); 04°10.2'S, 81°26.5'W; *Anton Bruun* sta. 766; 1860–1815 m; 9 Sept. 1966; L. W. Knapp. USNM 135618 (1; 253 mm); 05°46'S, 81°32'W; *Albatross* sta. 4654; 1895 m; 12 Nov. 1904; A. Agassiz. ZIN 45775 (1; 209 mm); 05°59'S, 81°15'W; *Akademik Kurchatov* sta. 300; 1940 m; 0410–0450 hrs.; 4 Nov. 1968; N. V. Parin. ZIN uncat. (5; 128–168 mm); 14°44'S, 76°12'W; *Dmitry Mendeleev* sta. 1654; 1495–1430 m; 2335–0120 hrs.; 19–20 Mar. 1978; N. V. Parin.

Lycenchelys crotalinus (Gilbert, 1890)

Lycodopsis crotalinus Gilbert, 1890:105 (original description. Type locality: Santa Cruz Basin, southern California).

Lycodopsis crassilabris Gilbert, 1890:106. Jordan and Evermann, 1898:2459.

Lycodopsis crotalinus: Gilbert, 1896:454, pl. 32. Jordan and Evermann, 1896:478.

Embryx crotalinus (Gilbert): Jordan and Evermann, 1898:2458. Jordan and Evermann, 1900, fig. 851. Hubbs, 1928:15. Ulrey, 1929:11. Jordan, Evermann and Clark, 1930:473. Barnhart, 1936:89, fig. 269. Schultz, 1936:195. Schultz and DeLacy, 1936:141. Taranetz, 1937:161. Andriashev, 1939:27, 51, 79. Shmidt, 1950:258. Andriashev, 1955:30. Grinols, 1965:95. Alton, 1972:590. Peden, 1973:115, 116, 119, 120. Fedorov, 1973a:24. Fedorov, 1973b:56. Fedorov, 1976:12–17. Percy et al., 1982:387. Eschmeyer and Herald, 1983:104. Toyoshima, 1985:178, figs. 132–133.

Embryx crassilabris (Gilbert): Jordan and Evermann, 1898:2458. Starks and Morris, 1907:240. Townsend and Nichols, 1925:15, 20, pl. 3, fig. 2. Ulrey and Greeley, 1928:44. Ulrey, 1929:11. Andriashev, 1955:30. Grinols, 1965:96. Fitch and Lavenberg, 1968:142. Peden, 1973:119.

Lyciscus crotalinus (Gilbert): Jordan and Gilbert, 1899:484. Evermann and Goldsborough, 1907:342.

Embryx parallelus Gilbert, 1915:360, pls. 9, 10. Jordan et al., 1930:474. Andriashev, 1955:30. Grinols, 1965:96. Peden, 1973:119.

Embryx crotalina (Gilbert): Bayliff, 1954:19, 77–81, pls. 4, 9. Wilimovsky, 1954:288. Wilimovsky, 1958:92. Bayliff, 1959:78. Fitch and Lavenberg, 1968:42. Müller and Lea, 1972:78–79. Quast and Hall, 1972:13. Kukowski, 1972:21. Percy et al., 1982:395.

Embryx parallela (Gilbert): Fitch and Lavenberg, 1968:142. Kukowski, 1972:11, 27.

Lycenchelys crotalinus: Anderson, 1988:87; 1994:65, 117.

DIAGNOSIS. — Vertebrae 22–24 + 98–109 = 121–131; suborbital pores 7–8 + 1–2 = 8–10; postorbital pores usually two, in positions one and three; occipital and interorbital pores absent; lateral line coursing to ventral position anteriorly, then rising to mediolateral position at mid-tail; dorsal fin origin associated with vertebrae 4–6; vomerine and palatine teeth absent; scales present on nape and cheeks; total gill rakers 15–18.

COUNTS AND MEASUREMENTS. — Vertebrae 22–24 + 98–109 = 121–131; D 118–125; A 103–113; C 10–11; P 15–18; pelvic 3; vomerine and palatine teeth absent; gill rakers 0–2 + 14–18 = 15–18; branchiostegal rays 6; pseudobranch filaments 5–7. Following measurements in percent SL: head length 12.7–17.9; head width 4.8–8.2; head depth 5.5–7.5; pectoral fin length 6.6–10.1; predorsal length 16.8–20.7; preanal length 28.6–33.3; body height 5.2–7.6; gill slit length 5.4–6.3. Following measurements in percent HL: head width 33.6–66.6; head depth 38.5–50.1; upper jaw length 30.2–41.1; pectoral fin length 38.8–65.5; snout length 17.3–27.9; eye diameter 17.6–25.3; gill slit length 30.7–41.1; interorbital width 4.3–7.9; interpupillary width 21.9–29.1; pelvic fin length 9.6–20.7; caudal fin length 5.5–9.0. Pectoral base/length ratio 33.1–46.7.

DESCRIPTION. — Head elongate, ovoid; dorsal profile more dorsoventrally depressed in large specimens than in small juveniles. Head somewhat longer in large males than females of comparable sizes, length 15.3%–17.5% SL (\bar{x} = 16.6) in 23 males over 320 mm SL, 14.3%–16.8% SL (\bar{x} = 15.5) in 26 females over 320 mm. Head broader in males than in females owing to development of adductor mandibulae muscles (Toyoshima, 1985, fig. 33). Scales in adults and subadults present on back of head, nape, cheeks, pectoral axil, lower pectoral fin (but not on base), abdomen to pelvic base or

anterior to it, body, tail, and unpaired fins to about 60%–80% of their height, the greatest extent posteriorly. Eye ovoid, entering dorsal profile of head in juveniles, but not adults. Gill slit usually extending beyond lower end of pectoral base, reaching pelvic base in some specimens, or just reaching lower end of pectoral base in others. Opercular flap at upper end of gill slit well-developed, angular; slit extending forward up to three-quarters eye diameter. Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin wedge-shaped in adults, ray tips exerted, more so ventrally, ventralmost 7–8 rays thickened.

Mouth inferior, upper jaw extending to middle of eye or its anterior quarter; posterior end hidden in deep, fleshy pocket. Upper jaw longer in adult males than in females, 34.3%–42.1% HL (\bar{x} = 38.3) in 23 males over 320 mm SL, 30.2%–35.7% HL (\bar{x} = 33.1) in 26 females over 320 mm SL. Nostril tube reaching upper lip in most adults, reaching about half way from its base in small juveniles. Upper lip well-delimited, broadly adnate to snout tip. Labial lobe of lower jaw somewhat elongate, mostly hidden when mouth is closed. Oral valve usually a low fold in large specimens, not coalesced with sides of palate in all sizes, not extending to rictus and not reaching vomer. No sexual differences in numbers of jaw teeth; dentary with 4–5 irregular rows of teeth near symphysis, premaxilla with single row throughout. Palate without teeth.

Cephalic lateralis system with usually two postorbital pores, arising from frontal and pterotic (positions one and three), rarely with a third pore from position four. Two pairs of anterior supraorbital (nasal) pores, one set anterior to nostril tube, the other posteriorly. Usually eight suborbital pores, seven arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just ventral to first postorbital pore (7 + 1); rarely 8 + 1, even more rarely 8 + 2 or 7 + 2. Eight preoperculo-mandibular pores, four arising from dentary, one from angulo-articular and three from preopercle (no variation). Interorbital and occipital pores absent. Body lateral line pattern unique in genus: anteriorly ventral, with steep bow under pectoral fin, rising on tail to mediolateral position (Toyoshima, 1985, fig. 32).

Dorsal fin origin above mid-pectoral fin, associated with vertebrae 4–6, usually five, with no supraneurals. Anal fin origin associated with ultimate or penultimate precaudal vertebrae, with 3–5, usually 3–4, ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with third or fourth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with haemal spine. Caudal fin with two epural, 4–5 upper hypural and 3–4 lower hypural rays.

Usually single, acute gill raker on upper limb of first gill arch, occasionally absent owing to inner membrane attachment to juncture between upper and lower limbs. All rakers slender, acute, ventralmost 5–8 more slender than those above. Pseudobranch filaments long. Pyloric caeca two small nubs.

Fresh coloration (pers. observ.) dark, chocolate brown, snout, lips, branchiostegal membranes, opercular area and fins black or brownish black. Inner lining of anterior head pores bluish white. Pectoral fin with large, ovoid, iridescent bluish white or greenish blue blotch surrounded by narrow, black margin, blotch quickly fading after capture; inner surface of tips of lower pectoral rays whitish. Lining of orobranchial chamber and peritoneum black. Stomach pale (unpigmented).

This species reaches 468 mm TL (Toyoshima, 1985). Fedorov (1976) reported the bivalve *Yoldia* and polychaetes from stomachs of Bering Sea specimens. Bivalves, ostracods and gastropods were found in California specimens.

DISTRIBUTION. — Western Bering Sea from Commander Plateau east of Bering Island and Shirshov Ridge across the Bering Sea slope to southern California. Recorded depths range from 200–2816 m, but rare above 700 m or below 1500 m regardless of locality.

REMARKS. — This species is close to *L. camchatica* (see above). Toyoshima (1985) attempted to describe the sexual dimorphism exhibited by *L. crotalinus*, but had only two adult females, 338 and 368 mm TL. Nonetheless, his small sample did reflect the species' dimorphic head proportions. As with other species in his paper on *Lycenchelys*, Fedorov (1976) detailed morphometric variation in *L. crotalinus* but

stated it all to be age-related, failing to see the sexual dimorphism. Other shortcomings in Fedorov's work are an incorrect pectoral fin ray count of 14 and a statement that the oral valve is absent. The species name has been treated as adjectival, but it is derived from "krotalon", Greek for rattle, which has been used as a generic name for New World rattlesnakes (as *Crotalus*). The name is here interpreted as a diminutive noun in apposition, i.e., "little rattlesnake."

MATERIAL EXAMINED. — Approximately 250 specimens have been identified. The following 62 were used for descriptive purposes. Russia, Commander Islands: ZIN 39306 (2); 55°30'N, 165°30'E; *Adler* sta. 11; 200–305 m; 8 Mar. 1963. Russia, Shirshov Ridge: ZIN 42664 (14); 59°22'N, 170°50'E; *Professor* sta. 318; 1000 m; 12 Sept. 1974; V. Fedorov. Russia, Koryak coast: ZIN 40530 (1, 220 mm); 61°06'N, 176°04'E; *Ekvator* sta. 502; 1220 m; 2 Oct. 1969. British Columbia, off Queen Charlotte Islands: NMC 72-62 (1); 53°00.8'N, 132°55.8'W; 1317 m; 18 Sept. 1971. Oregon: UW 17571 (2; 280–335 mm); 46°06.0'N, 125°05.0'W; 1463 m; 30 May 1964; R. B. Grinols. UW 18191 (3; 325–365 mm); 46°00.0'N, 124°00.0'W; 732 m; 5 Sept. 1964; R. B. Grinols. OS 14373 (1; 69 mm); 44°42.0'N, 124°58.5'W; *Cayuse* sta. OTB-53; 799 m; 14 Jan. 1965. OS 14372 (4, 151–311 mm); 44°40.0'N, 124°58.2'W; *Yaquina* sta. BMT-311; 950 m; 1940–2012 hrs.; 22 Oct. 1972. CAS 81720 (1; 170 mm); 44°37.6'N, 125°39.9'W; *Yaquina* sta. BMT-185; 2816 m; 1517–1717 hrs.; 16 Mar. 1970. OS 14403 (1; 90 mm); 44°34.0'N, 124°55.8'W; *Yaquina* sta. OTB-385; 786 m; 21 Feb. 1971. OS 14371 (3; 322–385 mm); 44°24.7'N, 125°07.0'W; *Yaquina* sta. OTB-313; 1285 m; 2134–2220 hrs.; 19 Feb. 1970. UW 21537 (1; 347 mm); 44°09.5'N, 125°01.3'W; *Halfmoon Bay* sta. 37; 951 m; 16 Sept. 1984. OS 12742 (1; 337 mm); 42°54'N, 125°02'W; *Jaguar*; 1006 m; 6 Mar. 1990; D. Markle. California, off Cape Mendocino: HSU 29000–10 (18 orig.; 137–428 mm); 40°10.1'N, 124°58.0'W; *Pacific Raider*; 961 m; 26 Jan. 1973. California, Monterey Bay: USNM 75818 (holotype of *Embryx parallelus*, 388 mm male); 36°46.2'N, 122°04.5'W; *Albatross* sta. 4514; 743–721 m; 23 May 1904; U. S. Fish Commission. California, off Pt. Sur:

SIO 84-48 (2; 204–235 mm); 36°25.2'N, 122°08.6'W; Cayuse sta. SLS-11; 850–860 m; 2230–2300 hrs.; 10 May 1984; W. Wakefield and M. E. Anderson. California, Santa Cruz Basin: USNM 44279 (holotype of *Lycodopsis crotalinus*, 318 mm male); 33°49.8'N, 119°24.5'W; Albatross sta. 2980; 1103 m; 12 Feb. 1889; U. S. Fish Commission. California: Catalina Basin: USNM 44280 (holotype of *Lycodopsis crassilabris*, 295 mm male); 33°08.8'N, 118°40.0'W; Albatross sta. 2839; 757 m; 8 May 1888; U.S. Fish Commission. California, Tanner Basin: SIO 71–141 (4; 182–286 mm); 32°51.0'N, 119°32.0'W; 1390 m; 13 July 1971. SIO 89-107 (1; 255 mm); trawl in 1400 m; 5 July 1989; R. Kaufman.

Lycenchelys folletti sp. nov.
(Fig. 4)

HOLOTYPE. — SIO 68-83 (female, 148 mm); Gulf of California, Guaymas Basin; 27°40.0'N, 111°22.6'W; Thomas Washington sta. MV 68-I-50; 931–953 m; 0908–1220 hrs.; 16 Jan. 1968; C. L. Hubbs and party.

PARATYPES. — SIO 68-83 (four females, two males and one indeterminate, 90–156 mm); same collection as holotype.

ADDITIONAL MATERIAL. — CAS 57833 (indet., 138 mm); Mexico, south of Cabo Corrientes; 19°43.5'N, 105°35.5'W; Te Vega sta. 19–17; 660–800 m; 1025–1305 hrs.; 10 July 1968; M. G. Bradbury. Trawl damaged.

DIAGNOSIS. — Vertebrae 21–22 + 80–88 = 102–109; suborbital pores 7 + 1; postorbital pores three; occipital and interorbital pores absent; dorsal fin origin associated with vertebrae 3–4; vomerine and palatine teeth absent; total gill rakers 14–15.

COUNTS AND MEASUREMENTS. — Values for holotype first, followed by range of other specimens in parentheses: vertebrae 21 + 88 = 109 (21–22 + 80–86 = 102–108); D 104 (97–102); A 92 (83–90); C 11 (10–11); P 15 (14–15); pelvic 3 (3); vomerine and palatine teeth absent; gill rakers 1 + 14 (1 + 13–14); branchiostegal rays 6 (6); pseudobranch filaments 3 (3–4). Following measurements in percent SL: head length 19.7 (18.9–20.2); head width 7.2 (6.9–9.0); head depth 8.7 (8.2–9.7); pectoral fin length 7.6 (8.3–9.1); predorsal length 21.8 (21.6–24.2); preanal length 37.0 (34.1–37.0);

body height 5.9 (6.0–6.8); gill slit length 6.6 (6.1–7.9). Following measurements in percent HL: head width 36.3 (36.4–47.0); head depth 44.2 (43.5–48.0); upper jaw length 33.9 (31.2–38.6); pectoral fin length 38.4 (44.1–44.8); snout length 24.3 (25.9–26.0); eye diameter 17.6 (15.9–16.6); gill slit length 33.6 (32.4–38.9); interorbital width 4.3 (6.6–7.4); interpuillary width 15.8 (16.5–18.0); pelvic fin length 13.7 (13.3–13.5); caudal fin length 6.9 (not present). Pectoral base/length ratio: 51.8 (38.7–42.7).

DESCRIPTION. — Based on nine known specimens, all juveniles: five females, two males and two of indeterminate sex. All were damaged in some way, the types appear to have dehydrated somewhat before preservation. Head elongate, ovoid or nearly triangular; dorsal profile evenly declined from behind eye to steeply sloping snout tip; nape rather hunched in the more desiccated specimens. Scales absent on head, nape, pectoral fin, base and its axil, and dorsal and anal fins except posteriorly. Scales present on body, abdomen to mid-pectoral region in largest specimen, tail and on unpaired fins in their posterior eighth, extending to about 25% of their height; no scales on unpaired fins in smallest specimens. Eye ovoid, just entering dorsal profile of head. Gill slit extending ventrally to just above lower end of pectoral base. Opercular flap at upper end of gill slit well-developed; slit extending forward about one-half eye diameter or more; flap distorted (folded forward) in present material. Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin evenly rounded, ray tips slightly exerted, more so ventrally; ventralmost 6–7 rays thickened.

Mouth inferior, upper jaw extending to middle of eye or its posterior quarter. Nostril tube not reaching half way from its base to upper lip when pressed forward. Upper lip poorly delimited. Labial lobe of lower jaw poorly developed, a mere flap with ventral margin parallel with ventral margin of jaw. Oral valve coalesced with sides of palate and not reaching vomer. Jaw teeth conical, sharp; upper jaw with single row, lower jaw with two rows near symphysis blending into single, posterior row. No vomerine or palatine teeth.

Cephalic lateralis system with three postorbital pores, arising from frontal, pterotic and

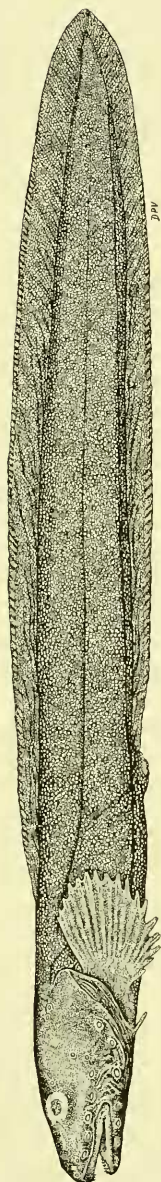


FIGURE 3. *Lycenchelys cicatrifer* (Garman, 1899), LACM 43764-1, 274 mm SL, off Peru.

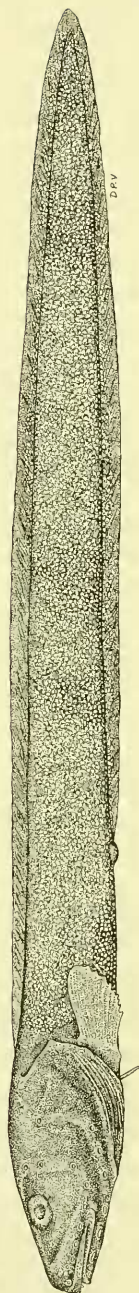


FIGURE 4. *Lycenchelys folletti* sp. n., SIO 68-83, holotype, 148 mm SL, Gulf of California.

lateral extrascapulars (positions one, three and four). Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to small nostril tube, the other set posteromesially. Eight suborbital pores, seven arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just ventral to first postorbital pores (7 + 1). Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle. Interorbital and occipital pores absent. Body lateral line undetectable in these faded specimens. Dorsal fin origin above pectoral base, associated with vertebrae 3–4, with no supraneurals. Anal fin origin associated with ultimate pre-caudal vertebra, with 3–4 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fourth preural vertebra; pterygiophore of last anal ray associated with second preural vertebra, with 1–2 rays articulating with haemal spine. Caudal fin with two epural, 4–5 upper hypural and four lower hypural rays.

Upper gill rakers on lower limb short, with squared-off tips; single upper limb raker and lowermost blunt, pyramidal. Pseudobranch filaments short, usually four. Pyloric caeca two small nubs.

Body color in alcohol faded to uniform dark brown, fins pale. Lining of orobranchial chamber and peritoneum dark brown, probably black in life. Stomach and intestines pale (unpigmented).

Juveniles only, the largest 158 mm TL. Small gastropods were found in the stomachs of a few specimens.

DISTRIBUTION. — Gulf of California to central Mexico. Depth range: 660–953 m.

ETYMOLOGY. — Named in honor of Mr. Wilbur Irving ("Bill") Follett (1901–1992), late Curator in the Department of Ichthyology, California Academy of Sciences, friend, inspiration and benefactor, in recognition of his many contributions (1927–1990) to ichthyology, zoological nomenclature and archaeology.

REMARKS. — *Lycenchelys folletti* shares some characters with two other eastern Pacific congeners without vomerine and palatine teeth, but is easily distinguished from both. Notable differences from *L. hadrogeneia* include the lack of interorbital and occipital pores in *L.*

folletti, its three (vs. four) postorbital pores, its more numerous gill rakers (14–15 vs. 11–13), fewer pectoral rays (14–15 vs. 17) and fewer vertebrae (102–109 vs. 110–112), although there is probably overlap in the last character. *Lycenchelys crotalinus* possesses more gill rakers (15–18), more pectoral fin rays (usually 16–18), more vertebrae (121–131) and has scales on the cheeks. An additional requirement to the diagnosis of this species is observation on the course of the body lateral line.

Lycenchelys hadrogeneia sp. n.
(Fig. 5)

HOLOTYPE. — CAS 55589 (male, 180 mm); Ecuador, off Gulf of Guayaquil; 02°25'S, 81°10'W; *Te Vega* sta. 19-148; 700–1000 m; 0850–1210 hrs.; 1 Sept. 1968; M. G. Bradbury.

PARATYPES. — CAS 81540 (4; 86, 162, 166 and 174 mm); same collection as holotype.

DIAGNOSIS. — Vertebrae 21–23 + 87–90 = 110–112; suborbital pores 7 + 1–2; postorbital pores four; occipital pores two; interorbital pore present; lateral line mediolateral (?); dorsal fin origin associated with vertebrae 3–4; vomerine and palatine teeth absent; chin tip with fleshy lobe, mandibular symphysis length 15.3–17.7 HL; total gill rakers 11–13.

COUNTS AND MEASUREMENTS. — Values for holotype first, followed by range of paratypes in parentheses: vertebrae 21 + 89 = 110 (22–23 + 87–90 = 110–112); D 105 (105–106); A 92 (92–93); C 11 (10–11); P 17 (17); pelvic 3 (3); vomerine and palatine teeth absent (absent); gill rakers 2 + 10 (1–2 + 9–11 = 11–13); branchiostegal rays 6 (6); pseudobranch filaments 4 (5). Following measurements in percent SL: head length 18.2 (15.1–16.4); head width 10.3 (6.2–8.9); head depth 8.5 (7.8–8.0); pectoral fin length 9.1 (9.3–12.2); predorsal length 19.0 (16.2–17.1); preanal length 33.0 (31.6–34.0); body height 7.4 (5.9–7.8); gill slit length 7.7 (4.8–6.8). Following measurements in percent HL: head width 56.6 (40.8–54.2); head depth 46.8 (48.6–51.5); upper jaw length 60.6 (32.7–41.0); pectoral fin length 49.9 (56.3–80.3); snout length 23.6 (23.1–29.2); eye diameter 18.4 (21.0–24.6); gill slit length 42.2 (31.5–41.6); interorbital width 7.2 (7.0–7.7); interpupillary width 24.2 (22.3–25.9); pelvic fin length 15.3 (17.8–23.1); caudal fin length 6.1 (10.5–

15.4). Pectoral base/length ratio: 50.9 (33.5–49.4).

DESCRIPTION. — Only type series known: a small juvenile male, an adult male, and three young adult females. Head short, ovoid; dorsal profile gently convex, snout steeply sloping anteriorly. Head longer in adult male (18.2% SL) than in females (16.4%–16.9% SL), typical of genus. Head broader in adult male (10.3% SL) than in females (7.6%–8.9% SL). Scales absent on head, nape, abdomen, pectoral fin and base and in pectoral axil. Scales present on body, tail, and on unpaired fins extending to about 30%–70% of their height in adults, but absent in juvenile male. Eye ovoid, not entering dorsal profile of head. Gill slit extending ventrally to level just above pelvic fin base. Opercular flap at upper end of gill slit well-developed, angular; slit extending forward about one-half eye diameter, or slightly less. Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin evenly rounded, middle and lower rays exerted, more so ventrally; ventralmost 7–8 rays thickened.

Mouth subterminal, upper jaw extending to middle of eye (females), just before it (juvenile male), or well beyond it (adult male; Fig. 5). Upper jaw length 32.7% HL in juvenile, 38.1%–41.0% HL in females and 60.6% HL in adult male. Nostril tube small, reaching from about one-third to one-half the distance from its base to upper lip when pressed forward. Upper lip well-delimited. Labial lobe of lower jaw well-developed, mostly hidden when mouth is closed, outer margin of lobe parallel with edge of jaw. Chin with characteristic fleshy lobe, producing thick mandibular symphysis, as in *Lycenchelys aratrirostris* (Andriashev and Permitin, 1968, fig. 2; Anderson, 1988, fig. 31; Anderson, 1990, fig. 3). Oral valve not coalesced with sides of palate, and extending to rictus, but not reaching vomer. Jaw teeth conical, sharp; upper jaw with single row of teeth in juvenile, 2–3 irregular rows in others; lower jaw the same except in adult male, which has four rows of teeth anteriorly. Vomerine and palatine teeth absent.

Cephalic lateralis system with four postorbital pores, arising from frontal, sphenotic, pterotic and lateral extrascapulars (positions 1–4). Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to small nostril tube,

the other posteromesially. Eight suborbital pores, seven arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just ventral to first postorbital pore (7 + 1); suborbital pore variation observed in juvenile male, which had 7 + 1 on right side and 7 + 2 on left. Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle. Anterior interorbital pore present. Occipital pores two (left and right laterals). Body lateral line difficult to observe in these faded specimens, neuromasts of mediolateral branch seen in three specimens on body, none on tail; no trace of ventral branch.

Dorsal fin origin just posterior to vertical through pectoral fin base, associated with vertebrae 3–4, with no supraneurals. Anal fin origin associated with ultimate precaudal vertebra, with 2–3 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophores of last dorsal ray associated with fourth preural vertebra; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with haemal spine. Caudal fin with two epural, 4–5 upper hypural and four lower hypural rays.

Gill rakers on upper limb small, acute; on lower limb bluntly triangular in juvenile male, longer and more acute, especially ventrally, in others. Pseudobranch filaments long, slender. Pyloric caeca two small nubs.

Color in alcohol faded to pale pinkish gray. Fins and areas on head and body dark brown; eye blue. Lining of orobranchial chamber and peritoneum dark brown, probably black in life. Stomach pale (unpigmented).

Largest specimen measured 182 mm TL.

DISTRIBUTION.—Known only from off Ecuador in 700–1000 m.

ETYMOLOGY.—From the Greek $\alpha\delta\rho\sigma$ (strong) and $\chi\epsilon\upsilon\epsilon\lambda\omicron\nu$ (chin) alluding to the prominent, fleshy chin lobe.

REMARKS.—This species appears close to *Lycenchelys aratrirostris* from the Antarctic chiefly on the basis of its relatively few vertebrae and thick, fleshy mandibular symphysis. It differs from *L. aratrirostris* primarily in its head pore pattern, lack of vomerine and palatine teeth, and (apparently) ventral lateral line.

Lycenchelys hippopotamus Schmidt, 1950

Lycenchelys hippopotamus: Schmidt, 1935:35 (nomen nudum). Taranetz, 1937:161 (nomen nudum).

Lycenchelys hippopotamus Schmidt, 1950:106, fig. 4, pl. IX (original description. Type locality: Sea of Okhotsk). Andriashev, 1955:354, 361, figs. 2, 7, 8. Fedorov, 1976:8. Toyoshima, 1983:267, 332, text fig. Toyoshima, 1985:169, figs. 24, 25. Anderson, 1994:65, 117.

DIAGNOSIS. — Vertebrae 23–25 + 107–114 = 132–137; suborbital pores 7–9 + 0–1 = 8–10; postorbital pores 3–4; occipital pores 1–2; interorbital pores 1–2; lateral line ventral; dorsal fin origin associated with vertebrae 4–5; first suborbital pore at snout tip directly below nostril tube; rostral fold well-developed; total gill rakers 12–17.

COUNTS AND MEASUREMENTS. — Vertebrae 23–25 + 107–114 = 132–137; D 125–132; A 113–120; C 9–11; P 13–16; pelvic 3; vomerine teeth 4–6; palatine teeth 2–7; gill rakers 1–3 + 11–14 = 12–17; branchiostegal rays 6; pseudobranch filaments 3–4. Following measurements in percent SL: head length 12.2–14.7; head width 3.9–5.1; head depth 4.8–5.2; pectoral fin length 7.4–9.1; predorsal length 14.1–15.9; preanal length 27.0–29.8; body height 3.6–6.2; gill slit length 4.0–4.9. Following measurements in percent HL: head width 31.4–40.8; head depth 35.4–40.8; upper jaw length 27.0–38.5; pectoral fin length 52.4–69.1; snout length 22.8–27.4; eye diameter 18.8–26.0; gill slit length 29.8–36.8; interorbital width 4.9–7.1; interpillary width 16.2–22.6; pelvic fin length 18.8–27.7; caudal fin length 4.9–18.1. Pectoral base/length ratio 27.5–37.7.

DESCRIPTION. — Based on 18 known specimens, only six of which are considered adults, none mature. Head elongate, ovoid; dorsal profile gently convex or dorsoventrally depressed behind eye; snout steeply sloping. Snout tip with thick, fleshy lobe overhanging upper lip (rostral fold), which may be variously wrinkled and distorted in preservative. Head lengths of adults not detectably different owing to small sample size. Scales absent on head, nape, pectoral fin and base, and in pectoral axil. Few, isolated scales on inner and outer surfaces of pectoral fin in larger specimens. Scales present on body, abdomen to isthmus, tail and on unpaired fins, extending to about 50%–70% of

their height posteriorly in large specimens. Eye ovoid, entering dorsal profile of head. Gill slit extending ventrally to lower end of pectoral fin base. Opercular flap at upper end of gill slit well-developed; slit extending forward one-half or more eye diameter. Pectoral fin origin at body midline, insertion on abdomen; posterior margin of fin evenly rounded; ventral ray tips greatly exerted; ventralmost 7–8 rays thickened; rays 13–14 except in one specimen (ZIN 40536), which has 16.

Mouth inferior, upper jaw extending to front of eye or its anterior quarter. Upper jaw apparently longer in adult males (length 34.7%–38.5% HL in two) than in adult females (30.4%–36.2% HL in four). Nostril tube small, not reaching half way from its base to upper lip when pressed forward. Upper lip well-delimited, anteriorly hidden by rostral fold. Labial lobe of lower jaw weak, posterior end of outer margin nearly parallel with ventral margin of jaw. Oral valve not coalesced with sides of palate, extending nearly to rictus, and not reaching vomer. Jaw teeth conical, sharp; upper jaw with single row except in adult females, which may have an inner row consisting of few teeth, lower jaw with 2–4 irregular rows near symphysis; anteriormost teeth in adult males greatly enlarged fangs, up to 10 times as large as inner teeth. Vomerine and palatine teeth relatively few; palatine teeth in single series.

Cephalic lateralis system with 3–4, usually three, postorbital pores, arising from frontal, pterotic and lateral extrascapulars (positions 1, 3, 4); when four pores present, two arising from pterotic, never one from sphenotic. Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to small nostril tube, the other posteromesially. Usually nine suborbital pores, eight arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just ventral to first postorbital pore (8 + 1); suborbital variation as follows: three fish with pores 7 + 1/ 7 + 1, one with pores 8 + 1/9 + 1 and one with pores 8 + 1/8 + 0; first suborbital pore swung forward of usual position, lying directly beneath nostril tube. Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle; some specimens with a doubling of anguloarticular (fifth) pore in shallow pocket to produce nine pores, but new position

not created. Interorbital region with 1–2 pores along midline (when one, located either above mid-eye or on vertical through its posterior margins). Occipital pores two (left and right laterals), except in one specimen with a median pore. Body lateral line ventral, complete, gently sloping on anterior portion of body and running relatively high above anal fin base to tail tip.

Dorsal fin origin above anterior quarter of pectoral fin, associated with vertebrae 4–5, with no supraneurals. Anal fin origin associated with ultimate, penultimate or antepenultimate precaudal vertebrae, with 4–7 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fourth or fifth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with haemal spine. Caudal fin with two epural, 4–5 upper hypural and 3–4 lower hypural rays.

Gill rakers on upper limb small, acute; on lower limb, ventralmost 5–8 acute, others with blunt tips. Pseudobranch filaments long, usually four. Pyloric caeca two small nubs.

Live coloration unknown, color in alcohol purplish to brown, abdomen, fins and head darker. Lining of orobranchial chamber and peritoneum in recent material black, eye blue. Stomach pale (unpigmented).

This species reaches 223 mm TL (a ripening female with ova up to 1.8 mm in diameter). Bivalves, gastropods and ostracods were found in a few stomachs.

DISTRIBUTION. — Throughout the southern Sea of Okhotsk to the northwestern Bering Sea off Cape Navarin. Depth range: 840–1340 m. The depth of 160–170 m recorded for ZIN 46786 (below) may be in error.

REMARKS. — Originally described on the basis of three specimens, a lectotype was designated by Andriashev (1955:363, footnote). As this was inadequate with regard to the 1985 Code of Zoological Nomenclature (Recommendations 73C and 74C), the specimen's data are presented below. Andriashev gave incorrect vertebral counts for the lectotype in my view (23 + 112 = 135; printer's error puts precaudal vertebrae as "123" in original), which is here corrected to 24 + 111 = 135. The lengths of the types given by Shmidt (1950, table 18) are in error (noted by Andriashev, 1955), as is the

name of the Soviet vessel that captured them in Fedorov (1976). Other errors in Fedorov (1976) include 17 pectoral fin rays for ZIN 40536 (there are 16) and 4–5 preopercular pores (there are three; Fedorov included the anguloarticular pores). Toyoshima (1985) gave erroneous vertebral counts for the three HUMZ specimens, and these are corrected to 23–24 + 113–114 = 136–137. Toyoshima, like Fedorov, also counted the anguloarticular pore as a preopercular, but miscounted these and arrived at six. Andriashev (1955) also characterized and illustrated *L. hippopotamus* with six "external gustatory organs" under the rostral fold. These are superficial neuromasts (free lateralis organs elsewhere), are tactile organs, and are present in many *Lycenchelys* species. Their occurrence and positions are not diagnostic.

MATERIAL EXAMINED. — Lectotype: ZIN 24826 (female, 208 mm); Sea of Okhotsk, east coast of Sakhalin Isl.; 53°09.5'N, 149°52.0'E; *Gagara* sta. 229; 1150 m; 7 Aug. 1932. Paralectotypes: ZIN 24826b (male, 167 mm; female, 198 mm); same collection as lectotype. Non-types, Sea of Okhotsk: ZIN 32958 (2; 174–204 mm); 54°32.2'N, 147°25.0'E; *Vityaz'* sta. 101; 840–880 m; 12 Sept. 1949. ZIN 32959 (1; 208 mm); ca. 52°N, 145°E; *Vityaz'* sta. 116; 1030 m; 17 Nov. 1949. ZIN 46787 (3; 139–172 mm); E. of Sakhalin Isl.; *Ara* sta. 29; 1150 m; 11 Nov. 1932; P. Shmidt. ZIN 46786 (1; 215 mm); 46°48.7'N, 152°01.9'E; *Shantar* sta. 196; 160–170 m (?); 2 June 1978. HUMZ 77571 (1; 195 mm); 44°25.0'N, 145°04.0'E; 1320–1340 m; 11 Oct. 1978. HUMZ 77774 (1; 201 mm); 44°22.5'N, 144°29.5'E; 1310–1340 m; 26 Sept. 1978. HUMZ 77573 (1; 221 mm); 44°20.6'N, 144°56.5'E; 1000–1010 m; 12 Oct. 1978. NW Bering Sea: ZIN 40536 (1; 100 mm); 57°30.3'N, 170°25.0'E; *Ekvator* sta. 204; 990–1000 m; 2 Aug. 1969. ZIN 42015 (3; 107–128 mm); 61°02.6'N, 175°35.0'E; *Professor* sta. 210; 1000 m; 4 Aug. 1974; V. Fedorov. ZIN 42016 (1; 131 mm); 61°22.0'N, 177°44.0'E; *Professor* sta. 221; 1000 m; 7 Aug. 1974; V. Fedorov.

Lycenchelys incisa (Garman, 1899)
(Fig. 6)

Lycodes incisus Garman, 1899:135, pl. 30, fig. 2
(original description. Type locality: off Panama).

Jordan et al., 1930:475.

Lycenchelys incisus: Andriashev, 1955:351.

Lycenchelys incisa: Anderson, 1982a:211. Anderson, 1994:117.

DIAGNOSIS. — Vertebrae 22–24 + 83–88 = 106–110; suborbital pores 7 + 2; postorbital pores 4–5; occipital pores three; interorbital pore present; lateral lines mediolateral and ventral; dorsal fin origin associated with vertebrae 3–4; total gill rakers 13–14.

COUNTS AND MEASUREMENTS. — Vertebrae 22–24 + 83–88 = 106–110; D 100–104; A 85–88; C 9–10; P 16–18; pelvic 3; vomerine teeth 2–12; palatine teeth 3–10; gill rakers 1–2 + 11=13 = 13–14; branchiostegal rays 6; pseudobranch filaments 5–6. Following measurements in percent SL: head length 15.7–21.8; head width 5.5–9.5; head depth 6.5–9.6; pectoral fin length 7.8–9.7; predorsal length 16.5–22.0; preanal length 33.3–39.5; body height 4.7–7.8; gill slit length 5.7–8.1. Following measurements in percent HL: head width 33.5–44.8; head depth 40.5–45.3; upper jaw length 32.8–54.8; pectoral fin length 38.6–58.8; snout length 21.5–26.8; eye diameter 15.5–30.4; gill slit length 34.3–40.6; interorbital width 5.7–6.8; interpupillary width 19.3–24.0; pelvic fin length 9.2–15.3; caudal fin length 4.6–8.6. Pectoral base/length ratio: 34.5–46.4.

DESCRIPTION. — Based on all known specimens: two adult males, one adult female and four juvenile females, one a post-hatchling. Head elongate, ovoid in young, more triangular in large males; dorsal profile gently convex or evenly declined from nape to snout tip. Scales absent on head, nape, pectoral fin and base, pectoral axil and dorsal fin anteriorly in smaller specimens. Scales present on body, abdomen to pelvic base in adult males, tail and on unpaired fins, extending to about 50%–75% of their height, the greatest extent posteriorly. Eye ovoid, not entering dorsal profile of head. Gill slit angular in larger specimens, more rounded in juveniles, extending ventrally to lower end of pectoral base. Opercular flap at upper end of gill slit well developed; slit extending forward about one-half eye diameter in small specimens to more than an eye diameter in largest male. Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin evenly rounded in small specimens, more

wedge-shaped in largest male; ray tips exerted, more so ventrally; ventralmost 6–8 rays thickened.

Mouth subterminal, upper jaw extending to middle of eye in young to well behind its posterior margin in largest male (Fig. 6). Upper jaw apparently longer in adult males than in adult females, 43.6%–54.8% HL in the two males, 41.6% HL in adult female (32.8%–36.9% HL in the juveniles). Nostril tube not reaching upper lip when pressed forward except in largest male. Upper lip well-delimited. Labial lobe of lower jaw well-developed, mostly hidden when mouth closed; ventral margin of lobe generally parallel with ventral margin of jaw. Oral valve not coalesced with sides of palate, and extending to rictus, but not reaching vomer. Jaw teeth conical, sharp; upper jaw with double row anteriorly in both sexes, lower jaw near symphysis with three irregular rows in juvenile females, five rows in largest male; anteriormost teeth in both sexes not especially enlarged, those of adult males about the same relative size as those of females. Vomerine and palatine teeth relatively numerous; vomerine teeth in irregular patch, palatine teeth in single row.

Cephalic lateralis system with 4–5 postorbital pores, usually four, arising from frontal, sphenotic (in one), anteriorly and posteriorly from pterotic, and lateral extrascapulars (positions 1–4 or 1–5). Two pairs of anterior supraorbital (nasal) pores, one set mesial to small nostril tube, the other posteriorly. Nine suborbital pores, seven arising from ventral ramus of bone chain under eye and two from ascending ramus (7 + 2). Garman (1899, pl. 30) illustrates one of the types with pores 7 + 3, but this cannot be confirmed as the skin disintegrated long ago. Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle (no variation). Single interorbital pore, located on plane passing through anterior quarter of eye. Occipital pores three, mesial and two laterals. Body lateral line with ventral branch traceable in present material only anteriorly on body, mediolateral branch commencing behind pectoral fin margin, complete.

Dorsal fin origin above anterior quarter of pectoral fin, associated with vertebrae 3–4, with no supraneurals. Anal fin origin associated with

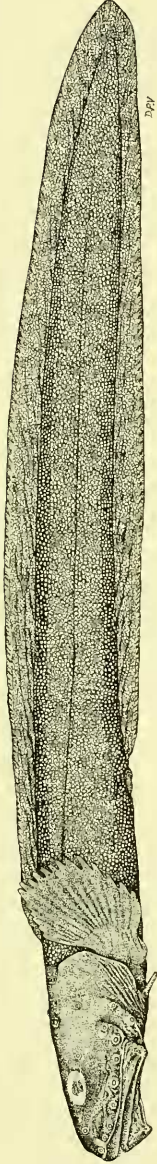


FIGURE 5. *Lycenchelys hadrogeneta* sp. n., CAS 55589, holotype, 180 mm SL, off Ecuador.

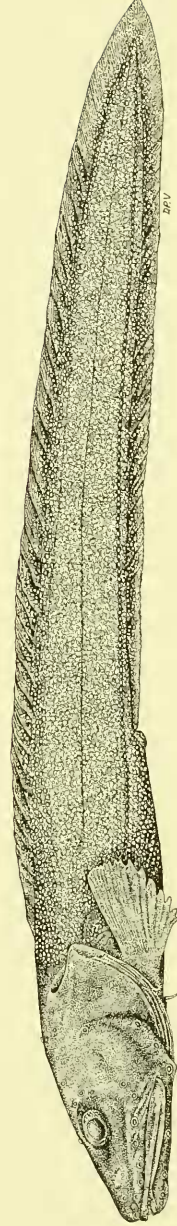


FIGURE 6. *Lycenchelys incisa* (Garman, 1899), SIO 68-105, 264 mm SL, Gulf of California.

ultimate precaudal vertebra, with three ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra in all. Pterygiophore of last dorsal ray associated with fourth or fifth preural vertebra; pterygiophore of last anal ray associated with second preural vertebra, with 1–2 rays articulating with haemal spine. Caudal fin with two epural, four upper hypural and 3–4 lower hypural rays.

Gill rakers on upper limb slender, acute; on lower limb, ventralmost few triangular in small specimens, more blunt-tipped in largest male. Pseudobranch filaments long, usually six. Pyloric caeca two small nubs.

Color in alcohol faded to brown or purplish, head fins and throat dark brown. Abdomen and eye blue in most-recently caught specimens. Lining of orobranchial chamber and peritoneum black or faded pale. Stomach pale (unpigmented).

This species reaches 268 mm TL. A ripening female (CAS 57836), 122 mm SL, had ova 3.2–3.8 mm in diameter. Four specimens had guts packed with ophiuroids and nothing else.

DISTRIBUTION. — Southern Gulf of California to central Chile. Depth range: 700–1475 m.

REMARKS. — Lectotype (herein designated): MCZ 28685 (female, 195 mm SL); off Penin. de Azuero, Panama; 07°06.3'N, 80°34.0'W; *Albatross* sta. 3353; 1271 m; 23 Feb. 1891. Paralectotype: MCZ 122484 (female, ca. 240 mm); same collection as lectotype. Both damaged.

MATERIAL EXAMINED. — Mexico, Gulf of California, Carmen Basin: SIO 68-105 (1; 264 mm); 25°53.7'N, 110°35.4'W; *Thomas Washington* sta. MV 68-I-76; 1321–1344 m; 1744–2115 hrs.; 22 Jan. 1968; C. L. Hubbs. Mexico, WNW of Acapulco: CAS 57836 (1; 122 mm); 17°24'N, 101°31'W; *Te Vega* sta. 19-19; 940–1000 m; 1150–1250 hrs.; 12 July 1968; M. G. Bradbury. Panama: type specimens, see above. Ecuador, off Gulf of Guayaquil; CAS 55591 (1; 141 mm); 02°25'S, 81°10'W; *Te Vega* sta. 19-148; 700–1000 m; 0850–1210 hrs.; 1 Sept. 1968; M. G. Bradbury. Peru, S. of Pta. Negra: CAS 60112 (1; 245 mm); 06°26'S, 81°05'W; 1025–1086 m; 23 Jan. 1972; E. del Solar. Chile, off Pta. Topocalma: MCZ 49373 (1; 49 mm); 34°06'S, 72°26'W; *Anton Bruun* sta. AB13-61; 1400–1475 m; 2103–2337 hrs.; 3 Feb. 1966.

Lycenchelys jordani (Evermann and Goldsborough, 1907)
(Fig. 7)

Lycodes jordani Evermann and Goldsborough, 1907:343, fig. 120 (original description. Type locality: off southern Oregon; paratype: southeastern Alaska). Jordan et al., 1930:474. Schultz, 1936:195; Schultz and DeLacy, 1936:142.

Lycenchelys jordani: Taranets, 1937:161; Andriashev, 1937:343. Shmidt, 1950:106; Bayliff, 1954:71–74, table 27. Andriashev, 1955:349, 351, 359. Grey, 1956:197. Bayliff, 1959:78. Grinols, 1965:96–97. Fitch and Lavenberg, 1968:142. Alton, 1972:590. Quast and Hall, 1972:13. Hart, 1973:238, text fig. Peden, 1973:118–119, fig. 1, table 1. Hubbs et al., 1979:14; Percy et al., 1982:387. Pequeño, 1986:187. Anderson, 1994:117.

DIAGNOSIS. — Vertebrae 24–26 + 102–110 = 128–135; suborbital pores 7–8 + 0–1 = 7–8; postorbital pores three; occipital and interorbital pores absent; lateral lines mediolateral and ventral, complete; dorsal fin origin associated with vertebrae 6–8; stomach and duodenum black; mouth terminal; total gill rakers 11–15.

COUNTS AND MEASUREMENTS. — Vertebrae 24–26 + 102–110 = 128–135; D 119–124; A 106–114; C 8–10; P 16–19; pelvic 3; vomerine teeth 2–12; palatine teeth 3–12; gill rakers 2–3 + 9–12 = 11–15; branchiostegal rays 6; pseudobranch filaments 4–7. Following measurements in percent SL: head length 14.1–17.3; head width 4.8–8.1; head depth 5.1–7.3; pectoral fin length 6.9–10.2; predorsal length 18.7–23.4; preanal length 30.4–34.7; body height 5.4–7.8; gill slit length 4.6–5.9. Following measurements in percent HL: head width 33.1–51.9; head depth 34.2–45.3; upper jaw length 32.1–46.5; pectoral fin length 48.2–68.3; snout length 18.3–29.4; eye diameter 19.6–28.7; gill slit length 26.5–39.0; interorbital width 5.0–7.5; interpupillary width 20.0–28.2; pelvic fin length 13.7–26.3; caudal fin length 4.5–12.5. Pectoral base/length ratio 30.4–44.8.

DESCRIPTION. — Based on 53 known adults and juveniles. Head elongate, ovoid; dorsal profile gently convex or more dorsoventrally depressed from snout to nape. Some individuals with angular nape. Head longer in adult males than in females. Head length 14.8%–17.3% SL (\bar{x} = 15.8) in 16 males 247–375 mm SL,

14.1%–15.2% SL (\bar{x} = 14.7) in 13 females 263–383 mm SL. Scales absent on head, nape, pectoral fin and base (few, scattered scales may be present on base of largest males) and pectoral axil. Scales present on body, abdomen to between pectoral bases or, in largest adults, a narrow band of scales reaching pelvic base, tail and unpaired fins extending to about 30%–90% of their height, the greatest extent posteriorly in largest specimens. Eye ovoid, not entering dorsal profile of head. Gill slit extending ventrally to just above pelvic base. Opercular flap at upper end of gill slit well-developed; slit extending forward about one-third (juveniles) to one-half (adults) eye diameter. Pectoral fin origin just below body midline, insertion on abdomen; posterior margin of fin evenly rounded, middle and lower ray tips exerted, more so ventrally; ventralmost 8–10 rays thickened.

Mouth terminal, upper jaw extending to middle of eye or its anterior quarter. Upper jaw longer in adult males than in females, 36.3%–46.5% HL (\bar{x} = 43.0) in 16 males 247–375 mm SL, 32.1%–38.4% HL (\bar{x} = 35.3) in 13 females 263–383 mm SL. Nostril tube small, not reaching half way from its base to upper lip when pressed forward, 2.7%–3.5% HL. Upper lip well-delimited, especially in juveniles, broadly adnate to snout. Labial lobe of lower jaw well-developed, gently rounded. Oral valve coalesced with sides of palate, not extending to rictus or anterior edge of vomer and better developed in adults than in juveniles. Jaw teeth conical, sharp; upper jaw with 2–3 rows anteriorly (all sizes), lower jaw with 3–5 irregular rows near symphysis. Numbers of jaw teeth not different between the sexes; great individual variation. Vomerine and palatine teeth retrorse, in single row on palatine bones.

Cephalic lateralis system with three postorbital pores, arising from frontal, pterotic and lateral extrascapulars (positions one, three and four). Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to nostril tube, the other posteromesially. Usually seven suborbital pores arising from ventral ramus of bone chain under eye and none from ascending ramus (7 + 0); suborbital pore variation rare, two specimens with pattern 7 + 0 on one side of head, 7 + 1 on the other, and one with 7 + 0/8 + 0. Eight preoperculo- and mandibular pores, four arising from dentary, one from anguloarticular and

three from preopercle (no variation). Interorbital and occipital pores absent. Body lateral line double, with mediolateral branch originating about one-third pectoral fin length posterior to pectoral margin, and ventral branch originating just above gill slit, steeply sloping down anterior portion of body and coursing above anal fin base to tail tip.

Dorsal fin origin above posterior quarter of pectoral fin, associated with vertebrae 6–8, usually 7–8, with no supraneurals. Anal fin origin associated with ultimate or penultimate precaudal vertebrae, with 3–7 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with second through fifth, usually fourth or fifth, preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with two (rarely one) rays articulating with haemal spine. Caudal fin with two epural, 3–4 upper hypural and 3–4 lower hypural rays.

Gill rakers on upper limb small, more acute in adults; on lower limb, blunt, triangular, changing little in shape with growth. Pseudobranch filaments long, usually 5–6. Pyloric caeca two small nubs.

Color uniformly dark chocolate brown, head and fins darker. Small juveniles with blue abdomen and black head and fins. Lining of orobranchial chamber black. Eye blue. Stomach and duodenum (especially latter) black; posterior portion of fundus becoming paler in large adults, as melanophores disperse.

This species reaches 389 mm TL. Bivalves and ophiuroids were found in several stomachs.

DISTRIBUTION. — Southeastern Alaska off Sitka Sound to off Cabo Colnett, Baja California Norte, Mexico. Depth range: 1500–2570 m.

REMARKS. — See remarks section on *L. micropora* (below) for comments on relationships. The Puget Sound record of Jordan et al. (1930) is considered erroneous (see Schultz, 1936; Schultz and DeLacy, 1936; Bayliff, 1959). Schultz and DeLacy (1936) give the locality of the holotype as northern California (an error perpetuated by Andriashev, 1955:359), however, a more accurate plotting puts it off Cape Blanco, or Bandon, Oregon.

MATERIAL EXAMINED. — Alaska, off Sitka Sound: SU 20014 (paratype; 208 mm); Cape Edgecumbe S 84°, E 21 miles; *Albatross* sta.

4267; 1686 m; 1731 hrs.; 31 July 1903; U. S. Fish Commission. British Columbia: NMC 68-1783 (1; 320 mm); 50°54.5'N, 130°06.0'W; *G. B. Reed*; 2103–2196 m; 11 Sept. 1964. Oregon: UW 19082 (3; 247–283 mm); 45°51.0'N, 125°06.0'W; *John N. Cobb*; 1536 m; 16 June 1966; R. B. Grinols. UW 17700 (8; 263 + seven badly damaged); 45°50.0'N, 125°11.0'W; *John N. Cobb*; 1646 m; 29 May 1964; R. B. Grinols. USNM 57828 (holotype; 328 mm); 43°01.0'N, 125°12.5'W; *Albatross* sta. 3788; 1946 m; 27 Apr. 1901; U. S. Fish Commission. California, off Farallon Islands: RUSI 37099 (1; 337 mm); 37°38.9'N, 123°23.7'W; *Wecoma* sta. 11; 2570–2470 m; 0744–0840 hrs.; 29 July 1991; G. M. Cailliet. RUSI 37100 (4; 315–383 mm); 37°38.4'N, 123°21.5'W; *Wecoma* sta. 12; 2375–2300 m; 1220–1310 hrs.; 29 July 1991; G. M. Cailliet. CAS 81727 and RUSI 44303 (19; 289–375 mm); 37°26.2'N, 123°18.6'W; *Golden Fleece* sta 3A-1; 1683–1674 m; 1620–1650 hrs.; 20 Sept. 1991; G. M. Cailliet. SIO 60-475 (9; 110–365 mm); otter trawl, ca. 1830 m; 10 Nov. 1960; Atomic Energy Commission. California, off Pt. Sur: CAS 78979 (1; 110 mm); 36°15.1'N, 122°25.5'W; *Cayuse* sta. SLS-16; 1580–1622 m; 0837–0907 hrs.; 26 July 1984; W. Wakefield and M. E. Anderson. California, San Clemente Basin: SIO 74-200 (1; 222 mm); 32°26.4'N, 117°54.0'W; *Oconostota* sta. 9; 1646 m; 0900 hrs.; 5 Sept. 1974; J. Siebenaller. SIO 89-108 (2; 222–243 mm); 32°36.1'N, 118°10.2'W; *R. G. Sproul*; 1500–1940 m; 12–13 Sept. 1989; R. S. Kaufman. California, East Cortez Basin: CAS 56192 (1; 254 mm); 32°15.9'N, 118°41.2'W; *Atlantis II* sta. MEA 85-6; 1678–1617 m; 2000–2100 hrs.; 20 Jan. 1985; M. E. Anderson, J. A. Seigel, R. S. Carney. Mexico, Baja California Norte: SIO 61-168 (2; 205–251 mm); 30°52'N, 116°53'W; otter trawl sta. P-274-61; 1948–1957 m; 2205–0245 hrs.; 28–29 Apr. 1961; R. Parker.

Lycenchelys lonchoura sp. n.
(Fig. 8)

HOLOTYPE. — CAS 58150 (female, 355 mm); Peru, NW of Pt. Coles; 17°08.5'S, 72°07.4'W; commercial trawler; 860 m; 0914 hrs.; 21 Jan. 1972; E. del Solar.

DIAGNOSIS. — Vertebrae 24 + 83 = 107; sub-orbital pores 7 + 1; postorbital pores three; oc-

cipital and interorbital pores absent; lateral line ventral, complete; dorsal fin origin associated with vertebra two; caudal fin length 4.3% SL, 24.0% HL; mouth terminal; pyloric caeca absent; total gill rakers 13.

COUNTS AND MEASUREMENTS. — Vertebrae 24 + 83 = 107; D 103; A 86; C 10; P 18; pelvic 3; vomerine teeth 4; palatine teeth 6/7; gill rakers 3 + 10; branchiostegal rays 6; pseudobranch filaments 6. Following measurements in percent SL: head length 17.7; head width 8.9; head depth 9.8; pectoral fin length 8.0; predorsal length 18.1; preanal length 38.1; body height 9.3; gill slit length 9.2. Following measurements in percent HL: head width 50.2; head depth 55.3; upper jaw length 42.0; pectoral fin length 45.5; snout length 22.8; eye diameter 17.1; gill slit length 52.3; interorbital width 8.8; interpupillary width 22.5; pelvic fin length 8.3/11.2; caudal fin length 23.9. Pectoral base/length ratio: 59.0.

DESCRIPTION. — Only holotype known. Head elongate, ovoid; dorsal profile gently declined from nape to steeper snout tip. Scales absent on head, nape, pectoral axil and anteriorly on dorsal and anal fins. Scales present and deeply imbedded on body, abdomen to pelvic base, tail, pectoral base and fin proximally and unpaired fins to about half their height or less posteriorly. Eye round, entering dorsal profile of head. Gill slit extending ventrally to pelvic base. Opercular flap at upper end of gill slit well-developed, rounded; slit extending forward about two eye diameters. Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin wedge-shaped, ray tips exserted, more so ventrally; ventralmost seven rays thickened.

Mouth terminal, upper jaw extending to vertical through posterior margin of eye. Nostril tube reaching upper lip when pressed forward. Upper lip well-delimited. Labial lobe of lower jaw not well-developed, narrow and mostly hidden when mouth is closed; ventral margin of lobe parallel with ventral margin of jaw. Oral valve not coalesced with sides of palate, almost extending to rictus, and just reaching vomer. Jaw teeth small, conical, sharp; both jaws with three irregular rows of teeth anteriorly, narrowing into single row posteriorly. Vomerine teeth four, in small patch; palatine teeth in single series.

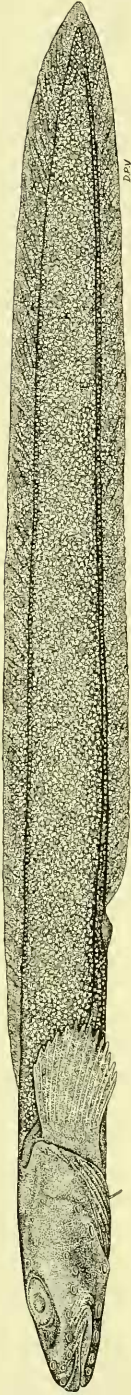


FIGURE 7. *Lycenchelys jordani* (Evermann and Goldsborough, 1907), CAS 56192, 254 mm SL, off southern California.

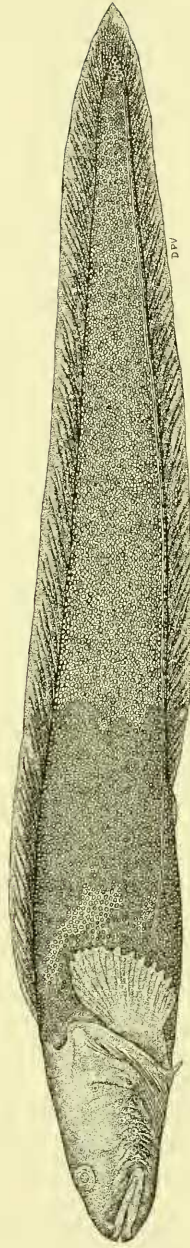


FIGURE 8. *Lycenchelys lonchoura* sp. n., CAS 58150, holotype, 355 mm SL, off Peru.

Cephalic lateralis system with three postorbital pores, arising from frontal, pterotic and lateral extrascapulars (positions one, three and four). Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to nostril tube, the other posteriorly. Eight suborbital pores, seven arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just below first postorbital pore (7 + 1). Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle. Interorbital and occipital pores absent. Body lateral line ventral, complete, steeply sloping on anterior portion of body.

Dorsal fin origin above pectoral base, associated with vertebra two, with no supraneurals; predorsal length only slightly more than head length. Anal fin origin associated with ultimate precaudal vertebra (24), with four ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fourth preural vertebra; pterygiophore of last anal ray associated with second preural vertebra, with one ray articulating with haemal spine. Caudal fin with one epural, four upper hypural and five lower hypural rays.

Tips of gill rakers roughly squared-off, with small, fleshy lateral projection; first and last gill rakers somewhat acute, without projection. Pseudobranch filaments long, slender. Pyloric caeca absent.

Color in alcohol uniformly dark brown, head darker, fins pale. Eyes blue. Lining of orobranchial chamber dark brown, probably black in life. Stomach and intestines pale (unpigmented).

Single specimen, 370 mm TL, a ripe female with ova averaging 6.2 mm in diameter.

DISTRIBUTION. — Known only off Peru in 860 m.

ETYMOLOGY. — From the Greek *λονχί* (spearhead, lance) and *οὐρα* (tail) referring to the shape and great length of the caudal fin.

Lycenchelys micropora Andriashev, 1955
(Fig. 9)

Lycenchelys microporus Andriashev, 1955:367, figs. 2, 11, 12 (original description. Type locality: Bering Sea abyss). Andriashev, 1958:178. Quast and Hall, 1972:13. Toyoshima, 1985:152.

Lycenchelys "B" sp. n. Percy et al., 1982:387.
Lycenchelys micropora: Anderson, 1994:117.

DIAGNOSIS. — Vertebrae 27–30 + 96–106 = 124–135; suborbital pores 7 + 0; postorbital pores 2–3; interorbital and occipital pores absent; lateral lines ventral and mediolateral, complete; dorsal fin origin associated with vertebrae 5–7; nostril tube length 7.8%–11.6% HL; palatine teeth present or absent; total gill rakers 10–14.

COUNTS AND MEASUREMENTS. — Vertebrae 27–30 + 94–106 = 123–135; D 115–127; A 99–109; C 8–9; P 15–18; pelvic 3; vomerine teeth 1–16; palatine teeth 0–10; gill rakers 2–3 + 8–11 = 10–14; branchiostegal rays 6–7; pseudobranch filaments 0–4. Following measurements in percent SL: head length 12.8–15.6; head width 4.8–8.7; head depth 5.1–7.5; pectoral fin length 7.1–10.0; predorsal length 15.7–19.9; preanal length 27.9–37.9; body height 4.1–7.4; gill slit length 3.7–5.8. Following measurements in percent HL: head width 35.2–57.7; head depth 37.6–52.7; upper jaw length 29.5–47.8; pectoral fin length 52.0–73.0; snout length 25.7–34.8; eye diameter 14.1–22.6; gill slit length 26.5–39.9; interorbital width 4.7–10.6; interpupillary width 18.4–26.2; pelvic fin length 11.3–23.8; caudal fin length 2.5–14.9. Pectoral base/length ratio: 31.4–50.9.

DESCRIPTION. — Forty adult and juvenile specimens are known of this species. Head elongate, ovoid, deeper in adults than in juveniles; dorsal profile more dorsoventrally depressed in juveniles than in adults. Head not longer in males than in females. Scales absent on head, nape, pectoral base, axil, and fin. Scales present on body, abdomen to a line between pectoral bases, tail and on unpaired fins extending to about 50%–80% of their height, the greatest extent posteriorly. Eye round, not entering dorsal profile of head. Gill slit extending ventrally to just below lower end of pectoral base. Slight, angular opercular flap at upper end of gill slit; slit extending forward about one-quarter to one-third eye diameter. Pectoral fin origin below body midline, more so in thicker-bodied adults than in the more slender juveniles; pectoral insertion on abdomen; posterior margin of fin evenly rounded, ray tips exerted, more so ventrally, ventralmost 8–9 rays thickened. Eastern Pacific specimens usually with

15–16 pectoral rays; holotype with 18 rays.

Mouth inferior, upper jaw extending to vertical through anterior margin of eye or its anterior quarter. Upper jaw longer in adult males than in females, 38.1%–47.8% HL (\bar{x} = 40.5) in 10 males, 33.5%–38.6% HL (\bar{x} = 35.6) in six females. Nostril tube elongate, reaching anterior edge of upper lip, or extending beyond it (but subject to considerable shrinkage in alcohol). Upper lip poorly delimited, broadly adnate to snout anteriorly. Labial lobe of lower jaw weak, not evident when mouth is closed. Oral valve coalesced with sides of palate, but just reaching anterior edge of vomer in some. Jaw teeth conical, sharp, retrorse; upper jaw with double row anteriorly only in largest specimens (inner row consisting of few teeth in these); lower jaw with 2–3 irregular rows near symphysis, again only in largest specimens. Numbers of jaw teeth not significantly different in present sample. Vomerine and palatine teeth relatively few in smaller fish; 62.5% of present sample lacking palatine teeth; several large females with palatine teeth in two irregular rows (including holotype); vomerine teeth continually added with growth, one 267 mm female with 16 teeth.

Cephalic lateralis system with 2–3 postorbital pores (76.9% of sample with two), arising from frontal and pterotic, or both plus lateral extrascapulars (positions 1, 3 or 1, 3, 4); one anomalous specimen with pores 1, 3 on one side of head, pores 1, 3, and a doubling at position 4 on the other. Two pairs of anterior supraorbital (nasal) pores, one set mesial to nostril tube, the other posteromesially. Seven suborbital pores arising from ventral ramus of bone chain and none from ascending ramus (7 + 0); one anomalous specimen with 7 + 0 on one side of head, 8 + 0 on the other. Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle (no variation). Interorbital and occipital pores absent, except one specimen with tiny, anterior interorbital pore. Body lateral line double, complete; mediolateral branch commencing at or just behind posterior margin of pectoral fin when appressed, ventral branch commencing above upper end of gill slit, coursing down abdomen without bowing, then running just above anal fin base; both branches extending to tail tip; original illustration of ho-

lotype not showing mediolateral branch (Andriashev, 1955, figs. 2, 11).

Dorsal fin origin above mid-pectoral fin, associated with vertebrae 5–6, except one specimen with vertebra seven, with no supraneurals. Anal fin origin associated with ultimate or penultimate precaudal vertebrae, with 4–8, usually 4–5, ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with third or fourth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with 1–2 rays articulating with haemal spine. Caudal fin with two epural, 3–4 upper hypural and three lower hypural rays.

Gill rakers on upper limb small, on lower limb blunt and triangular in juveniles, becoming longer and more acute in adults. Pseudobranch filaments small, absent in two specimens (in one of these, one tiny filament present on left side). Pyloric caeca two small nubs. Branchiostegal rays six, except one specimen (CAS 81705) with seven: five articulating with ceratohyal and two with epihyal.

Color of fresh specimens uniformly dark brown; head, pectoral fins and margins of unpaired fins darker (“bluish-black” according to Andriashev, 1955). Eye blue. Lining of orobranchial chamber and peritoneum black. Stomach pale (unpigmented).

This species reaches 349 mm TL (holotype). Ripe females had ova 3.0–4.8 mm in diameter; in CAS 81704, 215 mm SL, the entire complement was just 17 eggs.

DISTRIBUTION. — Bering Sea to off central Mexico. Depth range: 2377–3512 m.

REMARKS. — *Lycenchelys micropora* is close to *L. jordani* (above) on the basis of many characters, but differs chiefly in its more numerous precaudal vertebrae (27–30 vs. 24–26), longer nostril tube (length 7.8%–11.6% HL vs. 2.7%–3.5% HL), and fewer pectoral fin rays (usually 15–16 vs. usually 17–18). *Lycenchelys micropora* also occurs at greater depths than *L. jordani* (2377–3512 m vs. 1536–2570 m). The two southernmost specimens, SIO 58-420, are identified on the basis of their vertebral, gill raker and fin ray counts, dorsal fin insertion, long nostril tube and great capture depth. Both are skinned, broken and generally badly trawl damaged.

MATERIAL EXAMINED. — Aleutian Basin,

Bering Sea: ZIN 32963 (holotype, female, 342 mm SL); *Vityaz'* sta. 541; 3120 m; 26 Aug. 1950. Oregon, Cascadia Abyssal Plain: CAS 81705 (1; 239 mm); 45°57.6'N, 125°51.2'W; *Cayuse* sta. BMT-251; 2377 m; 1626–1826 hrs.; 27 Sept. 1970. CAS 56431 (1; 70 mm); 45°56.0'N, 127°37.1'W; *Yaquina* sta. BMT-323; 2763 m; 1157–1340 hrs.; 13 Mar. 1973. CAS 81707 (1; 267 mm); 45°48.2'N, 126°28.2'W; *Yaquina* sta. BMT-158; 2651 m; 0125–0325 hrs.; 17 Jan. 1970. CAS 81700 (1; 170); 45°27.8'N, 126°17.4'W; *Yaquina* sta. BMT-157; 2606 m; 1510–1714 hrs.; 17 Jan. 1970. CAS 81692 (2; 116–125 mm); 45°18.0'N, 125°47.2'W; *Yaquina* sta. BMT-191; 2597 m; 1854–2055 hrs.; 18 Mar. 1970. OS 14380 (1; 196 mm); 45°18.0'N, 126°26.4'W; *Yaquina* sta. BMT-266; 2710 m; 1600–1800 hrs.; 18 Feb. 1971. CAS 81697 (1; 152 mm); 45°14.5'N, 125°47.4'W; *Yaquina* sta. BMT-190; 2597 m; 1142–1342 hrs.; 18 Mar. 1970. CAS 81712 (1; 235 mm); 45°10.8'N, 126°43.0'W; *Yaquina* sta. BMT-160; 2784 m; 1815–2030 hrs.; 18 Jan. 1970. CAS 81709 (3; 145–213 mm); 45°09.3'N, 125°38.3'W; *Yaquina* sta. BMT-93; 2669 m; 2320–0125 hrs.; 15–16 July 1969. OS 14378 (1; 220 mm); 45°01.6'N, 127°31.0'W; *Cayuse* sta. BMT-336; 2850 m; 5 Nov. 1973. LACM 45999-1 (3; 195–217 mm); 44°58.8'N, 125°34.0'W; *Yaquina* sta. BMT-94; 2688 m; 1046–1220 hrs.; 16 July 1969. CAS 81702 (1; 156 mm); 44°58.5'N, 125°44.3'W; *Yaquina* sta. BMT-188; 2792 m; 1750–1950 hrs.; 17 Mar. 1970. CAS 81701 (1; 243 mm); 44°56.1'N, 125°39.8'W; *Yaquina* sta. BMT-187; 2770 m; 1100–1300 hrs.; 17 Mar. 1970. CAS 81698 (1; 202 mm); 44°46.7'N, 125°41.8'W; *Cayuse* sta. BMT-252; 2800 m; 0350–0550 hrs.; 30 Sept. 1970. CAS 81703 (1; 206 mm); 44°41.7'N, 125°33.5'W; *Yaquina* sta. BMT-120; 2825 m; 1002–1130 hrs.; 6 Oct. 1969. CAS 81694 (1; 220 mm); 44°44.1'N, 127°21.2'W; *Yaquina* sta. BMT-407; 3041 m; 1 Aug. 1974. OS 14374 (2; 209–211 mm); 44°36.9'N, 125°35.0'W; *Cayuse* sta. OTB-155; 2800 m; 1325–1532 hrs.; 10 Jan. 1967. CAS 81695 (1; 210 mm); 44°05.3'N, 125°23.6'W; *Yaquina* sta. BMT-288; 2940 m; 2053–2300 hrs.; 14 June 1972. CAS 81699 (1; 197 mm); 44°05.0'N, 125°24.0'W; *Yaquina* sta. BMT-291; 2926 m; 2027–2200 hrs.; 15 June 1972. CAS 81696 (3; 120–197 mm); 44°04.9'N,

125°24.5'W; *Yaquina* sta. BMT-290; 2938 m; 1330–1500 hrs.; 15 June 1972. CAS 81704 (1; 215 mm); 44°04.2'N, 125°24.1'W; *Yaquina* sta. BMT-289; 2926 m; 0615–0745 hrs.; 15 June 1972. OS 14375 (4; 103–215 mm); 43°43.2'N, 125°29.6'W; *Yaquina* sta. BMT-293; 3000 m; 0622–0755 hrs.; 17 June 1972. California, off Farallon Isl.: CAS 81708 (1; 259 mm); 37°39.1'N, 123°27.4'W; *Wecoma* sta. 9; 2840–2775 m; 2120–2241 hrs.; 28 July 1991; G. Cailliet. CAS 81716 (1; 321 mm); 37°39.0'N, 123°27.7'W; *Wecoma* sta. 6; 2865–2760 m; 0316–0409 hrs.; 28 July 1991; G. Cailliet. CAS 81717 (1; 298 mm); 37°38.5'N, 123°29.8'W; *Wecoma* sta. 1; 3010–2975 m; 0141–0204 hrs.; 27 July 1991; G. Cailliet. CAS 81714 (male, 318 mm); California, off Farallon Is.; 37°37.5'N, 123°30.0'W; *Wecoma* sta. 16; beam trawl; 2900 m; 1350–1435 hrs.; 30 July 1991; G. M. Cailliet. Mexico, Gulf of Tehuantepec: SIO 58-420 (2; 168+, 173 mm); 14°28'N, 93°09'W; dredge; 3512 m; 2110–0400 hrs.; 18–19 Nov. 1958; R. Wisner and R. Parker.

Lycenchelys monstrosa Anderson, 1982

Lycenchelys monstrosa Anderson, 1982a:208, figs. 1–2 (original description. Type locality: Gulf of Panama). Anderson, 1994:65, 117.

DIAGNOSIS.—Vertebrae 26–30 + 96–105 = 124–132; D 111–118; A 98–108; C 9–10; P 15–17; pelvic 0–2; vomerine teeth 1–5; palatine teeth 0–2; gill rakers 2–4 + 8–11 = 11–15; branchiostegal rays 6; pseudobranch filaments 0–3, minute; pyloric caeca 0–2; dorsal fin origin associated with vertebrae 6–12, with 1–7 supraneurals; head 13.7%–15.3% SL (not 5.0%–6.2% SL as reported by Anderson, 1982); pectoral fin 8.6%–10.4% SL; predorsal length 20.2%–25.5% SL; body height 4.8%–6.3% SL; upper jaw 26.5%–36.6% HL; pelvic length (N = 2; all others lack pelvic fins) 11.6%–17.4% HL; preoperculumandibular pores nine; first postorbital pore only (doubled on one side, one specimen); suborbital pores 7–9; occipital and interorbital pores absent; body lateral line with mediolateral and ventral branches, complete.

DISTRIBUTION.—Central Baja California to Gulf of Panama. Depth range: 3193–4188 m.

MATERIAL EXAMINED.—See Anderson

(1982). Baja California record is a range and depth extension: SIO 61-176 (1; 204 mm); 27°20.0'N, 115°23.1'W; beam trawl; 4161–4188 m; 1635–0040 hrs.; 6–7 May 1961; R. Parker.

Lycenchelys pearcyi sp. n.
(Fig. 10)

Lycenchelys "C" sp. n. Percy et al., 1982:387.

HOLOTYPE. — CAS 81715 (male, 382 mm SL); Oregon, Cascadia Abyssal Plain; 45°17.0'N, 126°38.8'W; *Yaquina* sta. BMT-159; 2753 m; 1330–1530 hrs.; 18 Jan. 1970.

PARATYPES. — Oregon, Cascadia Abyssal Plain: OS 14379 (1; 188+ mm); 45°38.2'N, 126°47.9'W; *Yaquina* sta. BMT-262; 2721 m; 17 Feb. 1971. CAS 81706 (1; 268 mm); 45°20.6'N, 126°35.7'W; *Yaquina* sta. BMT-264; 2750 m; 0130–0330 hrs.; 17 Feb. 1971. OS 14187 (1); 44°58.2'N, 126°38.9'W; *Yaquina* sta. BMT-267; 2795 m; 0035–0501 hrs.; 18 Feb. 1971. CAS 81710 (1; 293 mm); 44°37.5'N, 127°31.5'W; *Yaquina* sta. BMT-282; 2816 m; 19 May 1971. CAS 81718 (1; 350 mm); 44°36.9'N, 125°35.0'W; *Cayuse* sta. OTB-155; 2800 m; 1325–1532 hrs.; 10 Jan. 1967. CAS 81711 (2; 122–293 mm); 44°04.9'N, 125°24.5'W; *Yaquina* sta. BMT-290; 2938 m; 1330–1500 hrs.; 15 June 1972. CAS 81693 (1; 71 mm); 44°04.2'N, 125°24.1'W; *Yaquina* sta. BMT-289; 2926 m; 0615–0745 hrs.; 15 June 1972. OS 14377 (1; 184 mm); 43°43.2'N, 125°29.6'W; *Yaquina* sta. BMT-293; 3000 m; 0622–0755 hrs.; 17 June 1972. CAS 81713 (1; 329 mm); 43°16.0'N, 125°50.5'W; *Cayuse* sta. OTB-76; 3051 m; 1310–1505 hrs.; 27 July 1965. Mexico, off Cabo Falso, Baja California Sur: SIO 62-366 (1; 275 mm); 22°35.6'N, 110°06.5'W; dredge sta. VSS-17; 2663–2707 m; 0840–1400 hrs.; 26 Mar. 1959; R. Parker.

DIAGNOSIS. — Vertebrae 27–30 + 100–104 = 128–134; preoperculummandibular pores usually nine; suborbital pores 8–11, usually nine; postorbital pores 1–2; occipital pores absent; interorbital pore absent, except in holotype; lateral line ventral; dorsal fin origin associated with vertebrae 6–7, with 1–3 supraneurals; pelvic fin rays two; pyloric caeca absent; total gill rakers 13–15.

COUNTS AND MEASUREMENTS. — Values for holotype first, followed by range of paratypes in parentheses: vertebrae 29 + 101 = 130 (27–30 + 100–104 = 128–134); D 118 (118–124); A 106 (104–109); C 8 (9–11); P 16 (16–17); pelvic 2 (2); vomerine teeth 17 (3–12); palatine teeth 5/9 (2–5); gill rakers 2 + 12 (2–3 + 11–12 = 13–15); branchiostegal rays 6 (6); pseudobranch filaments 3 (3–5). Following measurements in percent SL: head length 18.4 (14.9–17.7); head width 6.9 (4.7–7.9); head depth 7.0 (4.8–7.2); pectoral fin length 7.2 (6.8–9.5); predorsal length 20.5 (17.6–21.9); preanal length 38.1 (34.4–37.1); body height 5.6 (3.6–7.7); gill slit length 5.6 (3.9–6.3). Following measurements in percent HL: head width 37.8 (31.1–50.5); head depth 38.2 (30.3–45.8); upper jaw length 42.6 (29.7–38.5); pectoral fin length 39.2 (39.4–59.5); snout length 33.3 (29.6–37.4); eye diameter 12.7 (12.1–19.8); gill slit length 30.6 (25.9–35.3); interorbital width 6.0 (5.3–7.7); interpupillary width 14.4 (14.1–18.8); pelvic fin length 8.1 (10.2–22.4); caudal fin length 4.3 (3.3–18.9). Pectoral base/length ratio: 54.6 (35.3–58.2).

DESCRIPTION. — Based on all 11 specimens of both sexes. Adults or subadults are three males and four females. Head elongate, dorsoventrally depressed, almost triangular; dorsal profile gently declined anterior to nape, snout tip steeply sloping, more so in juveniles than adults. Head lengths of males and females not different in present, small sample. Scales absent on head, nape to line connecting upper end of gill slits, pectoral fin and base, and in pectoral axil. Scales present in adults on body, abdomen to line connecting pectoral bases, tail and unpaired fins extending to about 60%–80% of their height; scales absent on fins of two smallest specimens. Eye somewhat ovoid in small specimens, entering dorsal profile of head, rounded in adults and excluded from profile. Gill slit extending ventrally to opposite lower end of pectoral base, which is closer to pelvic base in adults than in juveniles. Opercular flap at upper end of gill slit well-developed, angular; slit extending forward from about half an eye diameter in largest (holotype). Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin wedge-shaped, only ventral ray tips exerted; ventralmost 5–6 rays thickened. Ventral abdominal plica pres-

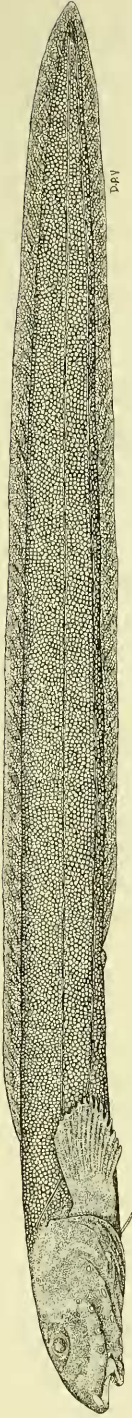


FIGURE 9. *Lycenchelys micropora* Andriashev, 1955, CAS 81708, 259 mm SL, off Farallon Isl., California.

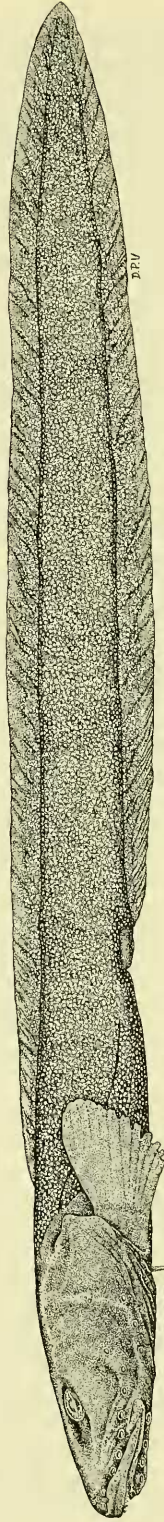


FIGURE 10. *Lycenchelys pearcyi* sp. n., CAS 81715, holotype, 382 mm SL, off Oregon.

ent, but not evident in larger, faded specimens (including holotype); plica white in better preserved, small specimens.

Mouth inferior, upper jaw extending to anterior margin of eye (smallest specimen) or its middle (holotype). Upper jaw apparently longer in adult males than in females, 37.4%–42.6% SL in three males, 32.8%–37.4% SL in four females. Nostril tube small, just reaching upper lip when pressed forward. Upper lip poorly delimited anteriorly in larger specimens, as snout tip becomes flaccid with growth. Labial lobe of lower jaw moderately well-developed, hidden when mouth is closed, but more fleshy in adults than in juveniles. Oral valve coalesced with sides of palate and not reaching vomer. Jaw teeth conical, sharp; upper jaw with single row in small specimens, three rows in holotype; lower jaw with single row in small specimens, four rows in holotype. Vomerine teeth in patch or row in small specimens, in large, ovoid patch of 17 teeth in holotype; palatine teeth in two short rows in holotype, single row in others.

Cephalic lateralis system with 1–2 postorbital pores, arising from frontal only (usually), or frontal and lateral extrascapulars (one specimen, one side; positions 1 and 4 in this). First postorbital pore doubled in three specimens. Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to small nostril tube, the other set posteromesially; holotype with a third pore on left side set at posterior base of nostril. Usually nine suborbital pores, eight arising from ventral ramus of bone chain under eye, and one from ascending ramus behind eye (8 + 1); suborbital pore variation great, one fish with pattern 9 + 2/8 + 1, one with 8 + 1/8 + 0, one with 8 + 2/8 + 2 and one with 8 + 0/8 + 0. Nine preoperculomandibular pores, four arising from dentary, one from anguloarticular and four from preopercle; in one specimen, lowermost preopercular pore (no. 6) of the left side is doubled, producing 10 pores; in same specimen on right side pores two and three are nearly completely joined, with just a detached fleshy septum separating them. Conjoined pores five and six similarly occur in three other specimens, but these are counted as separate pores. Interorbital and occipital pores absent, except holotype with one interorbital pore set before anterior margin of eyes. Body lateral line ventral, traceable in present faded material only an-

teriorly on body.

Dorsal fin origin above anterior quarter of pectoral fin, associated with vertebrae 6–7, with 1–3 supraneurals. Anal fin origin associated with ultimate or penultimate precaudal vertebrae, with 4–6 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with third or fourth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with haemal spine. Caudal fin with two epural, 3–5 upper hypural and 2–4 lower hypural rays.

Gill rakers on upper limb small, acute at all sizes; on lower limb acute, triangular in juveniles, ventralmost blunter in adults; tips never squared-off. Pseudobranch filaments long, shape greatly distorted in most specimens. Pyloric caeca absent.

Color in alcohol faded to pinkish brown or dark brown, head and fins darker. Lining of orobranchial chamber and peritoneum dark brown, probably black in life. Stomach pale; duodenum with dense array of melanophores, rest of intestine pale.

This species reaches 385 mm TL. A 293 mm female had 53 ripe ova measuring 4.7–5.8 mm in diameter.

DISTRIBUTION. — Off northern Oregon to southern tip of Baja California, Mexico. Depth range: 2663–3051 m.

ETYMOLOGY. — Named in honor of William G. Percy, professor of oceanography at Oregon State University, Corvallis, in recognition of his many contributions to the biology of North Pacific fishes.

REMARKS. — Of the Pacific species of *Lycenchelys* with nine preoperculomandibular pores, *L. pearcyi* appears closest to *L. plicifera* in also sharing the ventral, white plica (naked skin fold). It differs chiefly from *L. plicifera* in its more numerous suborbital pores (8–11 [usually nine] vs. 7–8), more pseudobranch filaments (3–5 vs. 1–2), more numerous vertebrae (128–134 vs. 122–126, although overlap probably occurs), more anteriorly placed dorsal fin (predorsal length 17.6%–21.9% SL vs. 22.3%–27.0% SL and fin origin associated with vertebrae 6–7 vs. 9–11), fewer free dorsal pterygiophores (supraneurals; 0–3 vs. 5–6) and absence of pyloric caeca.

Lycenchelys pentactina sp. n.
(Fig. 11)

HOLOTYPE. — ZIN 48392 (male, 150 mm); Peru, off Pta. Santa Maria; 14°44'S, 76°12'W; Dmitry Mendeleev sta. 1654; 1495–1430 m; 2335–0120 hrs.; 19–20 Mar. 1978; N. V. Parin.

DIAGNOSIS. — Vertebrae 25 + 95 = 120; suborbital pores 6 + 1; postorbital pores five, one arising from sphenotic; occipital pores absent; interorbital pore present; lateral line ventral, complete; dorsal fin origin associated with vertebra four; branchiostegal rays five; total gill rakers 12.

COUNTS AND MEASUREMENTS. — Vertebrae 25 + 95 = 120; D 114; A 100; C 9; P 15; pelvic 3; vomerine teeth 9; palatine teeth 10/9; gill rakers 2 + 10; branchiostegal rays 5; pseudobranch filaments 3. Following measurements in percent SL: head length 15.9; head width 6.6; head depth 6.3; pectoral fin length 8.8; predorsal length 17.8; preanal length 34.5; body height 5.9; gill slit length 3.8. Following measurements in percent HL: head width 41.6; head depth 39.5; upper jaw length 39.5; pectoral fin length 55.5; snout length 24.8; eye diameter 24.0; gill slit length 24.2; interorbital width 6.3; interopillary width 18.9; pelvic fin length 10.5; caudal fin length 12.6. Pectoral base/length ratio 35.6.

DESCRIPTION. — Only holotype known. Head elongate, ovoid; profile dorsoventrally depressed, snout tip steeply sloping. Scales absent on head, nape, pectoral fin, base and axil, and on unpaired fins anteriorly. Scales sparse on abdomen, especially anteriorly, not reaching line connecting pectoral bases. Scales also present on body, tail and unpaired fins posteriorly, extending to about 50%–60% of their height. Eye rounded, spectacle thick, excluded from dorsal profile of head. Gill slit extending ventrally to just above lower end of pectoral base—to opposite pectoral ray 13. Opercular flap at upper end of gill slit well-developed, edge rounded; slit extending forward about 80% eye diameter. Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin wedge-shaped, middle and ventral ray tips exerted, more so ventrally; lowermost rays not appreciably thickened.

Mouth subterminal, upper jaw extending to just beyond middle of eye; posterior end of

maxilla deeply imbedded in fleshy pocket. Nostril tube extending well beyond upper lip when pressed forward. Upper lip well-delimited. Labial lobe of lower jaw well-developed, ventral margin of lobe evenly rounded. Oral valve coalesced with sides of palate and not reaching vomer. Jaw teeth conical, sharp; upper jaw with double row anteriorly, lower jaw with three rows anteriorly. Vomerine and palatine teeth relatively large, recurved; some vomerine teeth caniniform.

Cephalic lateralis system with five postorbital pores, arising from frontal, sphenotic, pterotic (two) and lateral extrascapulars (positions 1–5). Two pairs of anterior supraorbital (nasal) pores, one set mesial to nostril tube, the other posteromesially. Seven suborbital pores, six arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just ventral to first postorbital pore (6 + 1). Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle. Interorbital pore single, set just anterior to line through center of pupils. Occipital pores absent. Body lateral line ventral, complete, difficult to trace in this faded specimen, but not steeply sloping on body.

Dorsal fin origin above anterior quarter of pectoral fin, associated with vertebra four, with no supraneurals. Anal fin origin associated with ultimate precaudal vertebra, with four ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fourth preural vertebra; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with haemal spine. Caudal fin with two epural, four upper hypural and three lower hypural rays.

Gill rakers on upper limb small, slender, acute; on lower limb all rakers triangular, but longer dorsally. Pseudobranch filaments long. Pyloric caeca two nubs, but somewhat slender and longer than usual for this genus.

Color in alcohol faded to pinkish brown, fins brownish, transparent. Lining of orobranchial chamber and peritoneum dark brown, probably black in life. Stomach and intestines pale (unpigmented).

The single specimen measures 153 mm TL.

DISTRIBUTION. — Known only from off Peru in 1430–1495 m.

ETYMOLOGY. — From the Greek πέντε (five) and ακτίς (ray, rod) alluding to the species' five branchiostegal rays.

REMARKS. — The specimen's small size, transparent pectoral fin without appreciably thickened lower rays, gill rakers on the lower limb not well-differentiated in shape, and sparse abdominal and unpaired fin squamation indicate a juvenile state of maturity. However, the specimen has a rather large gonad that extends anteriorly in the coelom about 40% of its length. This paradox is probably best considered as precocious sexual development, which has also been observed in the eelpout genus *Gymnelus* (see Anderson, 1982b).

Lycenchelys pequenoi sp. n.
(Fig. 12)

HOLOTYPE. — LACM 44132-1 (female, 190 mm); Peru, W. of Lobos de Tierra; 06°26'S, 80°05'W; beam trawl sta. SNP1-26; 1025 m; 23 Jan. 1974; J. M. Engle, J. Coyer, Peruvian fisheries program.

PARATYPES. — CAS 60243 (1; 153 mm); Peru, off Mollendo; 17°05.0'S, 72°16.9'W; Agassiz dredge; 1000 m; 0647 hrs.; 27 May 1972; E. del Solar. SIO 72-184 (2; 129, 150 mm); Chile, off Arica; 18°40.5'S, 70°36.0'W; otter trawl sta. MV72-II-27; 768–968 m; 1630–1730 hrs.; 7 May 1972; R. L. Wisner.

DIAGNOSIS. — Vertebrae 23–25 + 96–98 = 119–122; suborbital pores 7 + 1; postorbital pores four; occipital and interorbital pores absent; lateral line ventral, complete; dorsal fin origin associated with vertebra four; pelvic fin rays two; palatine teeth absent; total gill rakers 10–11.

COUNTS AND MEASUREMENTS. — Values for holotype first, followed by range of paratypes in parentheses: vertebrae 25 + 96 = 121 (23–24 + 96–98 = 119–122); D 114 (113–116); A 99 (99–101); C 10 (9–10); P 16 (14–16); pelvic 2 (2); vomerine teeth 1 (0–1); palatine teeth absent (absent); gill rakers 3 + 8 (2–3 + 8 = 10–11); branchiostegal rays 6 (6); pseudobranch filaments 5 (4–5). Following measurements in percent SL: head length 15.0 (13.4–15.9); head width 5.6 (5.5–6.1); head depth 6.5 (6.0–6.7); pectoral fin length 7.3 (8.2–8.8); predorsal length 16.8 (16.6–17.6); preanal length 34.7 (31.7–34.1); body height 7.0 (5.4–6.1); gill slit

length 6.3 (5.0–5.2). Following measurements in percent HL: head width 37.2 (37.4–41.0); head depth 43.5 (41.4–44.9); upper jaw length 36.1 (37.0–43.3); pectoral fin length 48.4 (51.7–64.6); snout length 26.0 (23.6–29.2); eye diameter 28.1 (23.9–30.3); gill slit length 41.8 (32.0–38.8); interorbital width 6.7 (5.9–6.9); interpupillary width 24.9 (23.9–27.0); pelvic fin length 14.4 (11.2–20.7); caudal fin length 10.5 (9.9–12.6). Pectoral base/length ratio: 52.9 (38.1–42.9).

DESCRIPTION. — Two males and two females, all juveniles, known. Head ovoid; dorsal profile steeply sloping in front of eye in holotype, paratypes with more gradual taper. Scales absent on head, nape, pectoral fin, base and axil, and dorsal fin anteriorly. Scales present on body, abdomen (to just posterior to pectoral base), tail and unpaired fins (extending to about 50%–60% of their height posteriorly in holotype). Eye round in two smaller specimens, more ovoid in larger two, just entering dorsal profile of head. Gill slit extending ventrally to below pectoral base and in advance of pelvic base except in 129 mm SL specimen, in which lower end of slit is opposite pectoral ray 12. Opercular flap at upper end of gill slit angular; slit extending forward less than one-half eye diameter. Pectoral fin origin just below body midline, insertion on abdomen; posterior margin of fin evenly rounded, ray tips exerted, more so ventrally; ventralmost 7–8 rays thickened.

Mouth subterminal, upper jaw extending to middle of eye (150 mm SL male) or just before it (three others). Nostril tube small, not reaching half way from its base to upper lip when pressed forward. Upper lip well-delimited, fleshy in larger specimens. Labial lobe of lower jaw well-developed except in smallest specimen, enlarged and fleshy in holotype. Oral valve not coalesced with sides of palate, and extending to rictus, but not reaching vomer. Jaw teeth conical, sharp; upper jaw with single row in paratypes, double row anteriorly in holotype; lower jaw with two rows near symphysis in paratypes, 3–4 irregular rows in holotype. Vomer with single tooth in three specimens, none in 150 mm SL specimen (SIO 72–184); palatine teeth absent in all.

Cephalic lateralis system with four postorbital pores, arising from frontal, sphenotic,

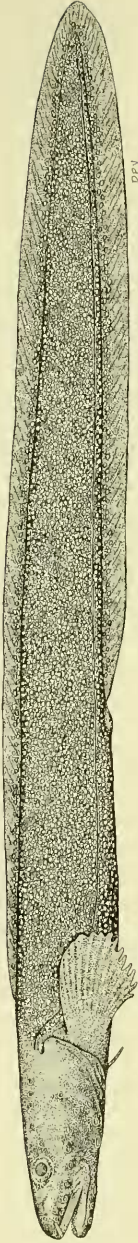


FIGURE 11. *Lycenchebys pentactina* sp. n., ZIN 48392, holotype, 150 mm SL, off Peru.

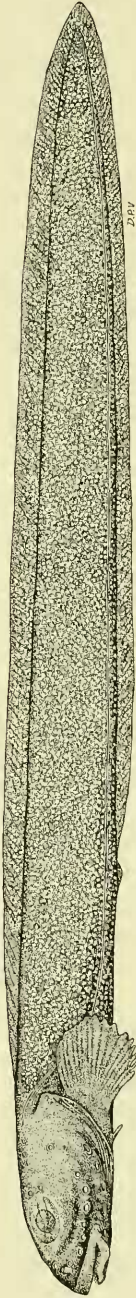


FIGURE 12. *Lycenchebys pequenoii* sp. n., LACM 44132-1, holotype, 190 mm SL, off Peru.

pteroic and lateral extrascapulars (positions 1–4). Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to small nostril tube, the other posteromesially. Eight suborbital pores, seven arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just below first postorbital pore (7 + 1). Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle (no variation). Interorbital and occipital pores absent. Body lateral line ventral, complete, steeply sloping on anterior portion of body.

Dorsal fin origin above pectoral base or slightly behind, associated with vertebra four, with no supraneurals. Anal fin origin associated with ultimate precaudal vertebra, with 3–5 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fourth or fifth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with 1–2 rays articulating with haemal spine. Caudal fin with two epural, four upper hypural and 3–4 lower hypural rays.

Gill rakers on upper limb short, acute; on lower limb longer dorsally, triangular and blunter than those on upper limb, but not much differentiated in shape from one another. Pseudobranch filaments long and slender. Pyloric caeca two small nubs.

Color of paratypes in alcohol faded to pinkish gray; holotype dark brown, head and fins darker, eye blue. Lining of orobranchial chamber and peritoneum dark brown, probably black in life. Stomach pale (unpigmented), duodenum black.

Holotype, largest specimen, measures 193 mm TL.

DISTRIBUTION. — Peru and northern Chile. Depth range: 768–1025 m.

ETYMOLOGY. — Named in honor of Dr. Germán Pequeño Reyes, Instituto de Zoología, Universidad Austral de Chile, Valdivia, in recognition of his many contributions to the ichthyology of the southern hemisphere.

Lycenchelys peruana sp. n.
(Fig. 13)

HOLOTYPE. — LACM 45998-1 (male, 103 mm); Peru, off Trujillo; 07°59'S, 80°37'W;

Anton Bruun sta. 90; 991–1015 m; 14 Oct. 1965; R. J. Menzies.

PARATYPE. — LACM 44134-1 (female, 102 mm); Peru, between Lobos de Tierra and Lobos de Afuera; 06°42.0'S, 80°47.1'W; beam trawl sta. SNP1-23; 1090–1100 m; 0957–1031 hrs.; 22 Jan. 1974; J. M. Engle, J. Coyer, Peruvian fisheries program.

DIAGNOSIS. — Vertebrae 24 + 99–100 = 123–124; suborbital pores 8 + 1; postorbital pores three; occipital pores two; interorbital pore absent; lateral line ventral; dorsal fin origin associated with vertebrae 5–6; pelvic fin rays two; total gill rakers 11 (+).

COUNTS AND MEASUREMENTS. — Values for holotype first, followed by paratype values in parentheses: vertebrae 24 + 99 = 123 (24 + 100 = 124); D 116 (117); A 102 (102); C 10 (10); P 15 (14); pelvic 2 (2); vomerine teeth 4 (3); palatine teeth 2/1 (1/0); gill rakers 2 + 9 (2 + 9); branchiostegal rays 6 (6); pseudobranch filaments 3 (3). Following measurements in percent SL: head length 11.8 (12.0); head width 4.7 (4.7); head depth 4.6 (4.5); pectoral fin length 8.3 (8.4); predorsal length 16.0 (16.5) preanal length 28.5 (28.8); body height 4.4 (4.4); gill slit length 4.4 (4.3). Following measurements in percent HL: head width 39.3 (39.3); head depth 38.5 (37.7); upper jaw length 36.5 (34.4); pectoral fin length 69.7 (70.5); snout length 25.0 (25.4); eye diameter 28.7 (26.2); gill slit length 36.9 (36.1); interorbital width 9.8 (9.8); interpupillary width 25.4 (25.4); pelvic fin length 27.5 (26.2); caudal fin length 16.4 (8.2). Pectoral base/length ratio: 25.3 (27.9).

DESCRIPTION. — Known from two early juveniles, one male (holotype) and one female (paratype). Head elongate, ovoid, nape depressed; dorsal profile evenly declined to steeply sloping snout tip. Scales absent on head, nape, pectoral fin, base, axil and unpaired fins. Scales present on body, abdomen to just posterior to pectoral bases, and tail. Eye ovoid, entering dorsal profile of head. Gill slit extending ventrally to just above lower end of pectoral base—to opposite pectoral ray 11 or 12. Opercular flap at upper end of gill slit angular; slit extending forward about one-third eye diameter. Pectoral fin origin well below body midline, insertion on abdomen; posterior margin of fin wedge-shaped, ventral rays exerted, not appre-

ciably thickened.

Mouth inferior, upper jaw extending to middle of eye (male) or just before (female). Nostril tube minute, not reaching half way from its base to upper lip when pressed forward. Upper lip thin, not well-delimited. Labial lobe of lower jaw poorly developed, ventral margin of lobe parallel to ventral margin of jaw. Oral valve coalesced with sides of palate and not reaching vomer. Jaw teeth conical, sharper in female than in male; upper jaw with single row in both specimens, lower jaw with double row near symphysis; jaw teeth of male enlarged, caniniform, largest four times the size of largest teeth in female. Teeth on palate of male also caniniform; no right palatine teeth in female.

Cephalic lateralis system with three postorbital pores, arising from frontal, pterotic and lateral extrascapulars (positions one, three and four). Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to small nostril tube, the other posteromesially. Nine suborbital pores, eight arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just ventral to first postorbital pore (8 + 1); pore 8 in paratype doubled on left side, with one small pore anterior to main pore at this position. Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle. Interorbital pore absent. Occipital pores two (left and right laterals). Body lateral line ventral, complete, gently declined down abdomen, but irregularly curving.

Dorsal fin origin above anterior third of pectoral fin, associated with vertebrae 5–6, with no supraneurals. Anal fin origin associated with ultimate or penultimate precaudal vertebrae, with 5–6 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fifth preural vertebra; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with haemal spine. Caudal fin with two epural, four upper hypural and four lower hypural rays.

Gill rakers on upper limb small, slender, acute; on lower limb ventralmost rakers short, triangular, others slightly longer and with blunter tips. Pseudobranch filaments long, slender. Pyloric caeca two small nubs.

Color in alcohol greatly faded—in paratype,

areas of head and fins dark brown, eye blue. Lining of orobranchial chamber mesially and peritoneum dark brown, probably black in life. Stomach and intestines pale (unpigmented).

Holotype, largest specimen, measures 105 mm TL.

DISTRIBUTION. — Known only off Peru in 991–1100 m.

ETYMOLOGY. — Named after the species' provenance.

Lycenchelys plicifera Andriashev, 1955

Lycenchelys pliciferus Andriashev, 1955:372, figs. 2, 15, 16 (original description. Type locality: Bering Sea). Quast and Hall, 1972:13. Fedorov, 1976:4–5. Toyoshima, 1985:148, 155.

Lycenchelys birsteini Andriashev, 1958:178, fig. 4. Quast and Hall, 1972:13. Fedorov, 1976:4–5.

Lycenchelys bersteini (lapsus calami): Toyoshima, 1985:131, 146, 148, 155.

Lycenchelys plicifera: Anderson, 1982a:211. Anderson, 1994:113, 117.

DIAGNOSIS. — Vertebrae 28–30 + 92–98 = 122–126; preoperculomandibular pores nine (with eight as a result of incomplete development); suborbital pores 8 + 0–1; first postorbital pore present (sometimes doubled); occipital and interorbital pores absent; lateral line with ventral and mediolateral branches; dorsal fin origin associated with vertebrae 9–11, with 5–6 supraneurals; pelvic fin rays two; total gill rakers 13–16.

COUNTS AND MEASUREMENTS. — Vertebrae 28–30 + 92–98 = 122–126; D 110–115; A 99–102; C 9–10; P 15–16; pelvic 2; vomerine teeth 2–12; palatine teeth 3–7; gill rakers 2 + 11–14 = 13–16; branchiostegal rays 6; pseudobranch filaments 1–2. Following measurements in percent SL: head length 15.0–16.4; head width 5.9–6.2; head depth 4.7–5.1; pectoral fin length 8.5–12.1; predorsal length 22.3–27.0; preanal length 34.6–38.6; body height 4.5–4.8; gill slit length 4.7–5.4. Following measurements in percent HL: head width 36.4–41.0; head depth 29.5–34.1; upper jaw length 29.7–34.5; pectoral fin length 53.0–77.0; snout length 27.1–32.8; eye diameter 14.4–18.2; gill slit length 29.4–35.6; interorbital width 6.6–9.6; interpupillary width 16.5–18.2; pelvic fin length 19.2–23.9; caudal fin length 4.4–18.2. Pectoral base/length ratio 24.4–40.0.

DESCRIPTION. — Based on four known juveniles (only one a male). Head elongate, dorsoventrally depressed, nape with low but distinct hump (most evident in largest specimen); snout tip steeply sloping. Scales absent on head, nape, in strip before dorsal fin, pectoral fin, axil and base, and unpaired fins. Scales present on body, tail, extending forward on abdomen to just behind vertical through pectoral base. Eye ovoid, more so in larger specimens, not entering dorsal profile of head. Gill slit extending ventrally to below pectoral base, almost reaching pelvic fins. Opercular flap at upper end of gill slit well-developed, slit extending forward about one eye diameter. Pectoral fin origin at or just below body midline, insertion on abdomen; posterior margin of fin wedge-shaped, ray tips exerted, middle and ventralmost deeply so; ventralmost 6–7 rays thickened.

Mouth inferior, upper jaw extending to middle of eye or just before it in smallest specimen. Nostril tube small, not reaching upper lip when pressed forward. Upper lip well-delimited, adnate to snout tip. Labial lobe of lower jaw moderate, generally hidden when mouth closed. Oral valve coalesced with sides of palate and not reaching vomer. Jaw teeth conical, sharp, sparse in these juveniles; upper jaw with single row of teeth except in largest specimen which has short, second row anteriorly; lower jaw with two rows near symphysis in all. Vomerine teeth relatively numerous (12) in largest specimen (2–7 in others).

Cephalic lateralis system with 1–2 pores opening at position one (frontal bone); when pore doubled (on at least one side in three specimens), smaller pore one-half to one-quarter the size of main pore. Two pairs of anterior supra-orbital (nasal) pores, one set anteromesial to small nostril tube, the other posteromesially. Eight suborbital pores arising from ventral ramus of bone chain under eye and none from ascending ramus except holotype with single (ninth) pore just below doubled first postorbital pore on right side; no ninth suborbital pore on left side as illustrated by Andriashev (1955, fig. 16). Eight or nine preoperculo-mandibular pores, four arising from dentary, 1–2 from angulo-articular, and three from preopercle; two angulo-articular pores in types of *L. pliciferus* (complete septum between them), but types of *L. birsteini* with one enlarged pore with incom-

plete septa set in common pocket, better developed in paratype. Interorbital and occipital pores absent. Body lateral line with mediolateral and ventral branches, the former originating about three eye diameters dorsoposterior to upper end of pectoral base, the latter originating above upper end of gill slit, steeply bowing in pectoral axil and coursing to tail tip just above anal fin base (Andriashev, 1955, fig. 15).

Dorsal fin origin externally obscured by low rudiment of fin fold; from radiograph, origin above posterior third of pectoral fin and associated with vertebrae 9–11, with 5–6 supraneurals. Anal fin origin associated with ultimate to antepenultimate precaudal vertebrae, with 3–5 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with third or fourth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with haemal spine. Caudal fin with two epural, four upper hypural and 3–4 lower hypural rays.

Gill rakers on upper limb small, acute; on lower limb only ventralmost 5–7 acute, dorsalmost with blunt tips. Pseudobranch filaments short, few (only one in largest specimen). Pyloric caeca two low nubbins, poorly delimited in types of *L. pliciferus*.

Color in alcohol uniformly dark brown (types of *L. birsteini* quite faded), head and fins darker. Andriashev (1955:373) reported live coloration as monotone violet-gray, with head and paired fins bluish-black and vertical fins transparent though darker than body. Stomach, intestine, lining of orobranchial chamber and peritoneum coal black, abdomen blue, anus ringed in white, ventral plicae white (but not clear in faded holotype of *L. birsteini*).

Maximum length unknown, largest juvenile measured 190 mm TL.

DISTRIBUTION. — Aleutian Basin and adjacent Kuril-Kamchatka Trench. Depth range: 3820–4070 m.

REMARKS. — Andriashev (1955) named this species to note the white, abdominal skin fold (plica), which is conspicuous (and readily observed in the 140 mm SL paratype of *Lycenchelys birsteini*, ZIN 34669b). The ventral plica, although not always white, has also been observed in *L. callista*, *L. jordani*, *L. pearcyi*, *L. porifer*, *L. rassi*, and *L. vitiazii*. Andriashev

(1955) reported the vertebral counts of *L. plicifera* as 28–29 + 96–97. I find 28 + 96–98. Andriashev (1958) also erred in stating the types of *L. birsteini* have seven free supra-neurals (interneurals); there are actually 5–6.

MATERIAL EXAMINED. — ZIN 32961 (holotype, male, 125 mm); Bering Sea, NW of Mednyi (Copper) Isl.; *Vityaz* sta. 972; 3820–3830 m; 2340–0620 hrs.; 3–4 Oct. 1951. ZIN 32961a (paratype, female, 105 mm); same collection as holotype. ZIN 34669 (holotype of *L. birsteini*, female, 188 mm); Kuril-Kamchatka Trench off Paramushiro Isl.; *Vityaz* sta. 2209; 3960–4070 m; 23–24 Jun. 1953. ZIN 34669a (paratype of *L. birsteini*, female, 141 mm); same collection as holotype.

Lycenchelys porifer (Gilbert, 1890)
(Fig. 14)

Lycodes porifer Gilbert, 1890:104 (original description. Type locality: Gulf of California).

Lycodes anguis Garman, 1899:133, pl. 30, fig. 1. Jordan et al., 1930:475.

Lycodes serpens Garman, 1899:134. Jordan et al., 1930:475.

Lycenchelys porifer: Jordan et al., 1930:476. Andriashev, 1955:351. Peden, 1973:117. Anderson, 1982a:211. Anderson, 1994:66, 117.

DIAGNOSIS. — Vertebrae 22–26 + 88–96 = 113–120; suborbital pores 6–8 + 0–1 = 6–9; postorbital pores 3–5; occipital and interorbital pores absent; lateral line mediolateral and ventral, complete; dorsal fin origin associated with vertebrae 5–7; total gill rakers 10–15.

COUNTS AND MEASUREMENTS. — Vertebrae 22–26 + 88–96 = 113–120; D 104–111; A 92–100; C 9–10; P 15–17; pelvic 3; vomerine teeth 3–15; palatine teeth 2–12; gill rakers 2–3 + 8–13 = 10–15; branchiostegal rays 6; pseudo-branch filaments 4–6. Following measurements in percent SL: head length 17.2–20.2; head width 6.2–8.8; head depth 6.0–8.2; pectoral fin length 9.0–13.2; predorsal length 21.3–23.9; preanal length 33.2–37.5; body height 4.3–7.0; gill slit length 5.8–7.3. Following measurements in percent HL: head width 33.1–47.9; head depth 31.7–42.8; upper jaw length 31.3–49.0; pectoral fin length 44.9–70.5; snout length 23.5–28.4; eye diameter 15.4–24.1; gill slit length 30.9–38.6; interorbital width 4.9–8.4; interpupillary width 15.5–21.7; pelvic fin length

13.7–20.7; caudal fin length 5.6–12.8. Pectoral base/length ratio: 22.5–44.4.

DESCRIPTION. — Based on 46 known adults and juveniles. Head elongate, dorsoventrally depressed at all sizes, gently declined from nape to snout tip. Head length not detectably longer in males than in females in present sample. Scales absent on head, nape, pectoral fin and base, and in pectoral axil. Scales present on body, abdomen to line between pectoral bases (adults), tail, and on unpaired fins extending to 60%–75% of their height in larger specimens; no scales on fins in smallest juveniles. Eye ovoid, not entering dorsal profile of head. Gill slit extending ventrally to just below lower end of pectoral base. Opercular flap at upper end of gill slit well-developed, angular; slit extending forward about one-third to one-half eye diameter. Pectoral fin origin below body midline, insertion on abdomen; posterior margin of fin evenly rounded, ray tips exerted, more so ventrally; ventralmost 6–7 rays thickened.

Mouth subterminal, upper jaw extending to anterior quarter of eye (females and juveniles of both sexes) or its posterior quarter (large males); upper jaw length 41.2%–49.0% HL (\bar{x} = 42.4) in 18 adult males, 31.3%–38.6% HL (\bar{x} = 34.9) in 14 adult females. Nostril tube small, not reaching half way from its base to upper lip when pressed forward. Upper lip well-delimited. Labial lobe of lower jaw generally hidden when mouth closed, fleshy, but ventral margin nearly parallel with ventral margin of jaw. Oral valve not coalesced with sides of palate, and extending to, or nearly to, rictus, but not reaching vomer. Jaw teeth small, conical, sharp; upper jaw with double row in adults of both sexes, lower jaw with 2–3 irregular rows (juveniles and subadults) to six rows in largest males. Vomerine teeth relatively numerous, in two broad bands in larger specimens; teeth on palate larger in males than in females.

Cephalic lateralis system with usually three postorbital pores, arising from frontal, posterior border of pterotic and between lateral extrascapulars (positions one, three and four). In five specimens pore two (from sphenotic) present, and in one of these pore five present, arising from posterior end of second lateral extrascapular. Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to small nostril tube, the other posteromesially. Usually

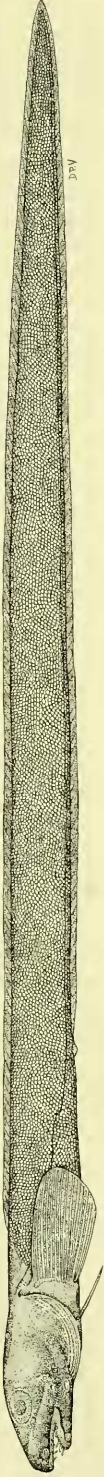


FIGURE 13. *Lycenchelys peruana* sp. n., LACM 45998-1, holotype, 103 mm SL, off Trujillo, Peru. Pectoral fin reconstructed after paratype.



FIGURE 14. *Lycenchelys porifer* (Gilbert, 1890), SIO 68-82, 267 mm SL, Gulf of California.

seven suborbital pores, all arising from ventral ramus of bone chain under eye (7 + 0); suborbital pore variation uncommon: three specimens with pores 7 + 0 on one side, 8 + 0 on the other, one specimen with 8 + 0 pores on both sides, and one specimen with pores 7 + 0 on one side, 8 + 1 on the other. Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular, and three from preopercle (no variation). Interorbital and occipital pores absent. Body lateral line double; mediolateral branch commencing just anterior to pectoral fin margin in axil, ventral branch commencing above upper end of gill slit, coursing down abdomen without steep bow, then running just above anal fin base; both branches reaching tip of tail.

Dorsal fin origin above anterior third to middle of pectoral fin, associated with vertebrae 5–7, usually six, with no supraneurals. Anal fin origin associated with ultimate, penultimate or antepenultimate precaudal vertebrae, with 2–6 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fourth preural vertebra; pterygiophore of last anal ray associated with second preural vertebra, with 1–2 rays articulating with haemal spine. Caudal fin with 1–2, usually two, epural rays, 4–5 upper hypural rays and 3–4 lower hypural rays.

Gill rakers on upper limb and lowermost on lower limb short, triangular, with acute tips; uppermost rakers on lower limb longer, tips blunt. Pseudobranch filaments long, slender, usually 5–6. Pyloric caeca two small nubs.

Color in alcohol dark brown or faded to pinkish brown, head and fins darker. Most recently collected specimens with abdomen and eyes blue, anus ringed in white. Lining of orobranchial chamber and peritoneum black (or dark brown in older material). Dorsal surface of stomach and duodenum densely covered with melanophores.

This species reaches 270 mm TL. One ripening female, LACM 44736-1, 225 mm SL, had ova 2.4–2.6 mm in diameter.

DISTRIBUTION. — Gulf of California and off Peru. Depth range: 1567–1875 m.

REMARKS. — The paratype of *L. serpens* Garman is now completely destroyed. Lectotype designation for *Lycodes anguis* Garman

given below.

MATERIAL EXAMINED. — Gulf of California, Guaymas Basin: LACM 38031-1 (3; 110–129 mm); 27°35.2'N, 111°03.5'W; *Velero IV* sta. 14852; 1692–1738 m; 1715–0100 hrs.; 16–17 Nov. 1970. SIO 68-82 (20; 74–267 mm); 27°23.0'N, 111°19.5'N; *Thomas Washington* sta. MV 68-I-49; 1792–1875 m; 2153–0408 hrs.; 15–16 Jan. 1968; C. L. Hubbs and party. SIO 70-247 (1; 252 mm); 27°22.5'N, 111°20.9'W; *Thomas Washington* otter trawl sta.; 1810 m; 14 June 1970; R. McConnaughey. SIO 70-248 (3; 222–248 mm); 27°22.4'N, 111°20.5'W; *Thomas Washington* otter trawl sta.; 1810 m; 14 June 1970; R. McConnaughey. LACM 43736-1 (3; 178–225 mm); 27°19.5'N, 111°43.0'W; *Velero IV* sta. 11815; 1674 m; 28 Nov. 1967. SIO 70-249 (10; 128–257 mm); 27°11.5'N, 111°31.8'W; *Thomas Washington* otter trawl sta. 4; 1829–1875 m; 1505–2121 hrs.; 15 June 1970; R. McConnaughey. USNM 44384 (holotype, 258 mm); 27°09.0'N, 111°42.0'W; *Albatross* sta. 3009; 1567 m; 20 Mar. 1889; U. S. Fish Commission. MCZ 28686 (holotype of *Lycodes serpens* Garman, male, ca. 255 mm) and MCZ 117364 (paratype, indet. sex and length); 27°03.7'N, 110°53.7'W; *Albatross* sta. 3436; 1655 m; 22 Apr. 1891. MCZ 115068 (lectotype of *Lycodes anguis* Garman, herein designated, 225+ mm); 26°48'N, 110°45'W; *Albatross* sta. 3435; 1571 m; 22 Apr. 1891. MCZ 28687 (two paralectotypes of *Lycodes anguis* Garman, ca. 165–185 mm); same collection as lectotype. MCZ 28688 (one paralectotype of *Lycodes anguis* Garman, 210 mm); same data as MCZ 28686. Peru: off Trujillo: LACM 45709-1 (1; 154 mm); 08°26'S, 80°37'W; *Anton Bruun* sta. 650E; 1829 m; 2355–0923 hrs.; 8–9 June 1966; SEPBO cr. 16.

Lycenchelys rassi Andriashev, 1955
(Fig. 15)

Lycenchelys rassi Andriashev, 1955:359, figs. 2, 5, 6 (original description. Type locality: Sea of Okhotsk). Andriashev, 1958:171, 172. Peden, 1973:115–117, fig. 1B. Fedorov, 1976:4, 5. Toyoshima, 1985:146, 147, 149, 173, 174, figs. 27C, 27D, 28, 31J.

DIAGNOSIS. — Vertebrae 23–25 + 98–105 = 122–129; suborbital pores 7–8 + 1; postorbital

pores 3–4; occipital pores two; interorbital pore present; lateral line ventral, complete; dorsal fin origin associated with vertebra five; pelvic fin rays two; total gill rakers 11–13.

COUNTS AND MEASUREMENTS. — Vertebrae 23–25 + 98–105 = 122=129; D 117(?)–125; A 105–113; C 9; P 14–16; pelvic 2; vomerine teeth 5–8; palatine teeth 6–7; gill rakers 1–2 + 9–11 = 11–13; branchiostegal rays 6; pseudobranch filaments 3–4. Following measurements in percent SL: head length 13.5–16.3; head width 5.3–7.6; head depth 5.8–8.3; pectoral fin length 6.7–8.4; predorsal length 16.2–17.7; preanal length 29.7–32.6; body height 5.5–5.9; gill slit length 4.2–5.8. Following measurements in percent HL: head width 35.9–48.9; head depth 37.3–41.9; upper jaw length 30.0–41.0; pectoral fin length 44.1–58.6; snout length 22.4–29.1; eye diameter 19.2–21.6; gill slit length 28.6–35.9; interorbital width 4.6–6.7; interpupillary width 17.0–21.8; pelvic fin length 12.9–15.1; caudal fin length 4.8–11.2. Pectoral base/length ratio: 41.7–44.3 (in three).

DESCRIPTION. — Known from five adults (both sexes) and one juvenile female. Head elongate, ovoid; dorsal profile dorsoventrally depressed, declined gently from nape to snout tip; snout tip more steeply sloping in juvenile than in adults. Scales absent on head, nape, pectoral fin, base and axil. Scales present on body, abdomen to just posterior to pectoral bases, tail and on unpaired fins to about 60%–80% of their height (even in juvenile), the greatest extent posteriorly. Eye ovoid, entering dorsal profile of head except in largest specimen (HUMZ 77747). Gill slit extending ventrally to lower end of pectoral base or beyond it to opposite pelvic base. No opercular flap at upper end of gill slit, instead, tissue joining opercle to pectoral base forming characteristic “siphon-shaped fold” (Andriashev, 1955), not continued forward. Pectoral fin origin at or just below body midline (adults) or well below it (juvenile), insertion on abdomen; posterior margin of fin evenly rounded, ray tips exerted, more so ventrally, ventralmost 6–7 rays thickened.

Mouth inferior, upper jaw extending to anterior quarter of eye (females) or from its middle to its posterior margin (males). Nostril tube reaching to or overlapping upper lip. Upper lip well-delimited. Labial lobe of lower jaw well-

developed, mostly hidden when mouth is closed. Oral valve coalesced with sides of palate and not reaching vomer. Jaw teeth conical; upper jaw with double row anteriorly in adults, single row in juvenile, lower jaw of largest male with four irregular rows near symphysis; anteriormost teeth in adult males caniniform, about 4–5 times the size of those of females. Vomerine and palatine teeth relatively numerous; vomerine teeth in broad patch in large males.

Cephalic lateralis system with 3–4 postorbital pores, arising from frontal, sphenotic (absent in those with three pores), pterotic and lateral extrascapulars (positions 1–4 or one, three, four); pore three doubled (small, separate pore adjacent to main one on right side in MCZ 34074). Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to nostril tube, the other posteromesially. Usually eight suborbital pores, seven arising from ventral ramus of bone chain under eye and one from ascending ramus behind eye just ventral to first postorbital pore (7 + 1); only one specimen (ZIN 35670) reflecting typical variation in this canal with pores 8 + 1. Eight preoperculo-mandibular pores, four arising from dentary, one from anguloarticular and three from preopercle; anguloarticular pore on right side of holotype doubled. Interorbital pore present, anterior in position (Andriashev, 1955, fig. 6; Toyoshima, 1985, fig. 27). Occipital pores two (left and right laterals). Body lateral line ventral, complete, without steep bow in pectoral axil, gently declining on abdomen to just above anal fin base.

Dorsal fin origin above anterior quarter of pectoral fin, associated with vertebra five, with no supraneurals. Anal fin origin associated with antepenultimate to ultimate precaudal vertebrae, with six ray-bearing pterygiophores (in two) inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fourth or fifth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with haemal spine. Caudal fin with two epural, four upper hypural and three lower hypural rays (in two).

Gill rakers on upper limb short, acute; on lower limb ventralmost rays triangular, uppermost with blunt tips. Andriashev (1955) gives a count of eight lower gill rakers for holotype,

however, there are two undeveloped raker buds at the base of the first arch, giving a count of 2 + 10 for the specimen, more in keeping with counts in other specimens. Pseudobranch filaments long, slender. Pyloric caeca two small nubs, well-delimited.

Color in alcohol (when recently preserved) with head, margins of unpaired fins and branchiostegal membranes black; opercular region and abdomen bluish black; eyes blue (Andriashev, 1955; Toyoshima, 1985). Lining of orobranchial chamber and peritoneum black. Stomach and intestines pale (unpigmented).

This species reaches 232 mm TL (Toyoshima, 1985). Specimens I examined had eaten bivalves and gastropods.

DISTRIBUTION.—Sea of Okhotsk to eastern Bering Sea. Depth range: 1040–1805 m.

REMARKS.—Toyoshima (1985, table 4) gives incorrect counts for gill rakers (0 + 9; there are 1 + 10) and preoperculomandibular pores (3 + 4; there are 8) in HUMZ 77747. He also related his *L. melanostomias* to *L. rassi* on a few characters that are uncorroborated with the present material. *Lycenchelys melanostomias* is readily distinguished from *L. rassi* on the basis of its nine preoperculomandibular pores (not eight as given by Toyoshima, 1985, table 4) vs. eight in *L. rassi*, suborbital pores 7 + 2 (not 10 total as given by Toyoshima) vs. 7 + 1 or 8 + 1 in *L. rassi*, five postorbital pores vs. 3–4 in *L. rassi*, dorsal fin origin associated with vertebra two vs. five in *L. rassi* and black stomach vs. pale stomach in *L. rassi*. See remarks section under *Lycenchelys callista* (above) for comments on the relationships of *L. rassi*.

MATERIAL EXAMINED.—Sea of Okhotsk: MCZ 34074 (1; 147 mm); 52°53'N, 144°54'E; *Rossinante*, trawl sta.; 1643 m; 10 Aug. 1932; Pacific Far-Eastern Expedition. ZIN 32962 (holotype, male, 192 mm); NE coast of Sakhalin Isl.; *Vityaz* sta. 103; 1500 m; 13 Sept. 1949; P. Schmidt. HUMZ 77747 (1; 228 mm); 44°38'N, 144°23'E; bottom trawl; 1280–1340 m; 24 Sept. 1978. Northwestern Pacific: ZIN 35670 (1; 217 mm); Kronotskii Bay, Kamchatka Penin.; *Vityaz* sta. 3304; 1230–1040 m; 23 May 1955. Bering Sea, No. of Unalaska Isl.: USNM 47587 (2; 202–211 mm); 54°11.5'N, 167°25.0'W; *Albatross* sta. 3607; 1805 m; 18 Aug. 1895.

Lycenchelys ratmanovi Andriashev, 1955
(Fig. 16)

Lycenchelys camchaticus (non Gilbert and Burke, 1912; partim: males only): Andriashev, 1935:115. Andriashev, 1937:341–343, figs. 16, 18.

Lycenchelys ratmanovi Andriashev, 1955:355, figs. 2–4 (original description. Type locality: Avacha Bay, Kamchatka Penin., Russia). Quast and Hall, 1972:13. Fedorov, 1976:4–6. Toyoshima, 1985:166–167.

Lycenchelys longirostris Toyoshima, 1985:166, figs. 22–23.

DIAGNOSIS.—Vertebrae 21–23 + 88–93 = 110–115; suborbital pores 6–7 + 2–3 = 8–10; postorbital pores five; occipital pores 3–4; interorbital pore present; lateral line ventral, complete; dorsal fin origin associated with vertebrae 3–4; total gill rakers 8–11.

COUNTS AND MEASUREMENTS.—Vertebrae 21–23 + 88–93 = 110–115; D 105–110; A 93–97; C 9–10; P 15–18; pelvic 3; vomerine teeth 3–7; palatine teeth 4–9; gill rakers 1–2 + 7–9 = 8–11; branchiostegal rays 6; pseudobranch filaments 3–5. Following measurements in percent SL: head length 13.9–17.0; head width 4.9–8.5; head depth 5.3–7.0; pectoral fin length 7.1–8.1; predorsal length 15.2–18.5; preanal length 30.0–32.4; body height 4.6–5.9; gill slit length 4.7–6.9. Following measurements in percent HL: head width 34.9–50.8; head depth 37.7–42.1; upper jaw length 33.9–44.1; pectoral fin length 34.6–52.3; snout length 19.0–26.9; eye diameter 20.1–25.0; gill slit length 31.9–40.8; interorbital width 6.6–8.9; interpupillary width 17.4–22.0; pelvic fin length 18.4–27.8; caudal fin length 5.2–16.4. Pectoral base/length ratio: 35.2–48.0.

DESCRIPTION.—Based on 14 known specimens of both sexes, none fully mature; no small juveniles. Head elongate, ovoid; dorsal profile gently declined from nape to steeply sloping snout tip. Scales absent on head, nape, pectoral fin and base, and in pectoral axil. Scales present on body, abdomen to line between pectoral bases (or just before it in smaller specimens), tail and on unpaired fins extending to about 50%–60% of their height in large specimens, the greatest extent posteriorly; no scales on unpaired fins anteriorly in smaller specimens. Eye ovoid, not entering dorsal profile of head. Gill slit extending ventrally to just below lower end

of pectoral base. Opercular flap at upper end of gill slit angular; slit extending forward about one-quarter to one-third eye diameter. Pectoral fin origin at body midline or just below it, insertion on abdomen; posterior margin of fins evenly rounded, ray tips exerted, more so posteriorly; ventralmost 5–6 rays thickened. Pectoral fin rays usually 16–17 (15 on one side in one specimen, 18 in two).

Mouth subterminal, upper jaw extending to just posterior to middle of eye (adult males; Andriashev, 1955, fig. 3) or its anterior quarter (juveniles and females; fig. 16; Toyoshima, 1985, fig. 22). Nostril tube not reaching upper lip when pressed forward. Upper lip well-delimited. Labial lobe of lower jaw well-developed, ventral margin of lobe deep, crescentic. Oral valve coalesced with sides of palate, nearly extending to rictus, but not reaching vomer. Jaw teeth conical, sharp; upper jaw with single row in juveniles, double row in both sexes in larger specimens, lower jaw with 3–4 rows near symphysis in largest, outermost enlarged. Vomerine and palatine teeth relatively numerous; vomerine teeth in 3 irregular bands in large specimens.

Cephalic lateralis system with five postorbital pores, arising from frontal, sphenotic, two from pterotic and lateral extrascapulars (positions 1–5). Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to nostril tube, the other posteromesially. Usually nine suborbital pores, six arising from ventral ramus of bone chain under eye and three from ascending ramus behind eye (6 + 3); suborbital pore variation slight, three fish with pores 6 + 3/6 + 2, and two with pores 6 + 3/7 + 3. Preoperculo-mandibular pores 8–9, four arising from dentary, one or two from anguloarticular and three from preopercle; when two anguloarticular pores, main one doubled and septum between pores complete, but new pore position not created (counted as one pore by Fedorov, 1976). Interorbital pore present, set just behind line through anterior margin of eyes. Occipital pores usually four; two specimens with two lateral and a single median pore. Body lateral line ventral, complete, steeply bowed anteriorly in pectoral axil (Fig. 16; Andriashev, 1955, figs. 2–3).

Dorsal fin origin above anterior quarter of pectoral fin, associated with vertebrae 3–4, with

no supraneurals. Anal fin origin associated with antepenultimate through ultimate precaudal vertebrae, with 4–7 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with third through fifth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with 1–2 rays articulating with haemal spine. Caudal fin with 1–2 epural, four upper hypural and 3–4 lower hypural rays.

Gill rakers on both limbs reduced: few, blunt, very short (almost vestigial; Andriashev, 1955, fig. 4); maximum of nine on lower limb. Pseudobranch filaments long, slender. Pyloric caeca two small nubs.

Color in alcohol of recently preserved material dark brown or bluish brown, head and fins darker; margin of unpaired fins with dark (black) streak. Toyoshima (1985) notes coloration of types of his *L. longirostris* after very recent preservation. Andriashev (1955) gives in vivo color notes, noting *L. ratmanovi* (males at least) has a bright greenish-blue spot on the pectoral fin (see accounts above on *L. callista*, *L. camchatica* and *L. crotalinus*). Lining of orobranchial chamber and peritoneum black. Abdomen and eyes blue. Stomach and intestines pale (unpigmented).

Largest specimen (immature) measured 190 mm TL (Fedorov, 1976). I found bivalves in the guts of a few specimens.

DISTRIBUTION.—Northern Kuril Islands to eastern Aleutian Islands. Depth range: 620–1120 m.

REMARKS.—This species was originally confused as the males of *Lycenchelys camchaticus* (Andriashev, 1935, 1937) but later shown to be quite distinct (Andriashev, 1955). In his original description Dr. Andriashev incorrectly gave the catalogue number ZIN 30012 for the two types (see below) and a pectoral fin ray count of 18–19 (both specimens have 18). Toyoshima (1985, table 3) made a number of errors in reporting on the two types of his *L. longirostris*, corrected here: pectoral rays of holotype 16/17, paratype 17/17; vertebrae of holotype 23 + 90, paratype 23 + 92; gill rakers of holotype 1 + 9; preopercular pores (PRP) of both three. Morphometric differences stated to separate these two specimens from *L. ratmanovi* are lessened by using snout tip to

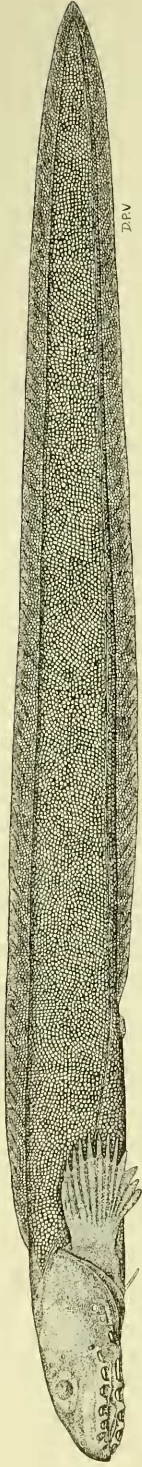


FIGURE 15. *Lycenchelys rassi* Andriashev, 1955, MCZ 34074, 147 mm SL, Sea of Okhotsk.

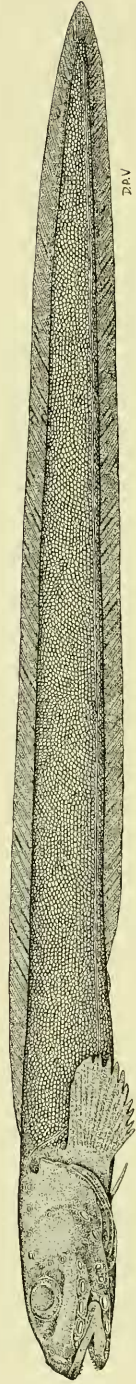


FIGURE 16. *Lycenchelys ratmanovi* Andriashev, 1955, USNM 221249, 135 mm SL, Bering Sea.

gill slit tip as a measure of head length (and not including upper lip). This especially affects snout length (hence the new name), which I re-calculated as: *L. longirostris* types, 19.3%–24.1% HL; other *L. ratmanovi*: 19.0%–26.9% HL.

MATERIAL EXAMINED.—Fedorov (1976) lists six ZIN lots not listed below and only cursorily examined by me during a 1987 visit to St. Petersburg, Northwestern Pacific: ZIN 46223 (1); off Shiashkotan Isl., Kuril Isls.; 48°38'N, 154°28'E; bottom trawl sta.; 880 m; 10 Sept. 1981; V. N. Tupokogov. ZIN 32957 (holotype, 185 mm) and 32957a (paratype, 182 mm); Avacha Bay, Kamchatka Penin.; 52°40.8'N, 151°13.0'E; *Dal'nevostochnik*, bottom dredge; 800–1000 m; 15 July 1932; Pacific Far-Eastern Expedition. ZIN 46222 (2; 170–185 mm); off Cape Olyutorsk; 59°23'N, 170°10'E; bottom trawl; 620–700 m; 15 Aug. 1982; B. A. Sheiko. ZIN 46221 (1); SW of Cape Navarin; 61°21'N, 176°24'E; bottom trawl; 1090–1120 m; 31 July 1982; B. A. Sheiko. Northeastern Pacific: HUMZ 81914 (holotype of *Lycenchelys longirostris* Toyoshima, female, 140 mm); Zhemchug Canyon; 58°33.2'N, 175°05.3'W; *Yakushi Maru* #21 bottom trawl; 895–910 m; 22 June 1979. HUMZ 83948 (paratype of *Lycenchelys longirostris* Toyoshima, male, 152 mm); vic. of Zhemchug Canyon; 58°14.4'N, 175°28.2'W; *Yakushi Maru* #21 bottom trawl; 681–818 m; 24 June 1979. USNM 221250 (1; 130 mm); Zhemchug Canyon; 58°20.4'N, 175°02.3'W; *Yakushi Maru* #21 sta. 124; 731–740 m; 24 June 1979; D. M. Cohen, T. Iwamoto, M. Yabe. USNM 221249 (1; 135 mm); W. of Pribiloff Isls.; 56°58.1'N, 173°50.8'W; *Yakushi Maru* otter trawl sta.; 720 m; 5 July 1979; D. M. Cohen and party. ZIN 40539 (1; 167 mm); off Unalaska Isl.; 54°19.4'N, 167°51.6'W; *Ekvator* sta. B-1-3-1000; 1000 m; 24 June 1969.

Lycenchelys rosea Toyoshima, 1985

Lycenchelys roseus Toyoshima, 1985:152, figs. 10–11.

DIAGNOSIS.—Vertebrae 28 + 108–109 = 136–137; suborbital pores 7 + 1; postorbital pores four; occipital pores absent; interorbital pore present; lateral line absent; dorsal fin or-

igin associated with vertebra two; color uniformly red; total gill rakers 10–11.

COUNTS AND MEASUREMENTS.—Vertebrae 28 + 108–109 = 136–137; D 133; A 117; C 10–11; P 14–15; pelvic 3; vomerine teeth 6; palatine teeth 13–14; gill rakers 2 + 8–9; branchiostegal rays 6; pseudobranch filaments 3–4. Following measurements in percent SL: head length 11.2–13.0; head width 3.9–4.0; head depth 4.6–5.4; pectoral fin length 6.4–7.1; predorsal length 11.4–13.1; preanal length 27.0–28.1; body height 5.4–6.0; gill slit length 3.2–3.7. Following measurements in percent HL: head width 31.2–35.2; head depth 41.1–41.6; upper jaw length 33.1–33.8; pectoral fin length 54.4–56.6; snout length 16.2–23.0; eye diameter; 19.3–20.1; gill slit length 28.3–28.9; interorbital width 7.2–7.3; interpupillary width 18.4–20.6; pelvic fin length 13.0–16.9; caudal fin length 9.1–9.8. Pectoral base/length ratio 38.7–41.6.

DESCRIPTION.—Two females known. Head elongate, ovoid; dorsal profile gently convex (holotype with shallow, interorbital concavity) from snout tip to nape. Scales absent on head, nape, pectoral fin, its base, in pectoral axil and anal fin. Scales present on body, abdomen to line between pectoral bases, tail and on dorsal fin posteriorly, extending to about 60% of its height. Eye slightly ovoid, not entering dorsal profile of head. Gill slit extending ventrally to below lower margin of pectoral base. Opercular flap at upper end of gill slit well-developed, angular; slit extending forward about one eye diameter. Pectoral fin origin just below body midline, insertion on abdomen; posterior margin of fin evenly rounded, ray tips exerted slightly, ventralmost six rays thickened.

Mouth subterminal, upper jaw extending to middle of eye. Nostril tube small, not reaching half way from its base to upper lip when pressed forward. Upper lip well-delimited, narrowly adnate to snout tip. Labial lobe of lower jaw moderate, mostly hidden when mouth closed. Oral valve not coalesced with sides of palate and not reaching vomer. Jaw teeth conical, sharp; both jaws with double row anteriorly, single row posteriorly. Vomerine and palatine teeth retrorse, the latter in single row (some teeth missing, but sockets evident).

Cephalic lateralis system with four postorbital pores arising from frontal, anterior and

posterior margins of pterotic and lateral extrascapulars (positions 1–4). Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to nostril tube, the other posteromesially. Eight suborbital pores, seven arising from ventral ramus of bone chain under eye, and one from ascending ramus behind middle of eye just ventral to first postorbital pore (7 + 1). Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle. Interorbital pore in dorsal midline on line connecting anterior margins of eyes. Occipital pores absent. Body lateral line entirely absent, no remnant even on nape.

Dorsal fin origin above pectoral base, associated with second vertebra, with no supraneurals. Anal fin origin associated with antepenultimate precaudal vertebra, with eight ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with fourth preural vertebra; pterygiophore of last anal ray associated with second preural vertebra, with two rays articulating with haemal spine. Caudal fin with two epural, 4–5 upper hypural and four lower hypural rays.

Gill rakers on upper limb small, acute (one at juncture of epibranchial and ceratobranchial); on lower limb, ventralmost 4–5 rays acute, remainder with blunt tips. Pseudobranch filaments long. Pyloric caeca two small nubbins.

Color monotone dull red. Color in alcohol after seven years preservation with reddish areas fading to brown on flanks and tail, fins orange (pectorals darker). Lining of orobranchial chamber and peritoneum dark brown to black. Stomach and intestines pale (unpigmented).

Largest specimen (adult female) measured 238 mm TL.

DISTRIBUTION. — Central Aleutian Islands. Depth range: 358–750 m.

REMARKS. — Toyoshima (1985) gave incorrect vertebral, unpaired-fin ray and gill raker counts in the original description. Re-determined counts are given above.

MATERIAL EXAMINED. — HUMZ 88487 (holotype, female, 235 mm); Aleutian Isls., off Islands of Four Mountains; 52°49.1'N, 171°01.9'W; Japanese fisheries investigations, bottom trawl; 750 m; 17 July 1980. HUMZ

89341 (paratype, female, 195 mm); Aleutian Isls., off Delarof Islands.; 51°49'N, 178°36.1'W; Japanese fisheries, trawl; 358 m; 9 Aug. 1980.

Lycenchelys scaurus (Garman, 1899)
(Fig. 17)

Lycodopsis scaurus Garman, 1899:132, pl. 32, fig. 1 (original description. Type locality: Gulf of Panama). Jordan et al., 1930:474.

Lycenchelys scaurus: Pequeño, 1986:183–188, figs. 1–2. Pequeño, 1989:48. Anderson, 1994:65, 113, 118.

DIAGNOSIS. — Vertebrae 20–22 + 75–89 = 96–110; preoperculomandibular pores nine; suborbital pores 6–8 + 2 = 8–10; postorbital pores 3–5; occipital pores usually three, rarely one, two or absent; interorbital pore absent; lateral line ventral and mediolateral, complete; dorsal fin origin associated with vertebrae 4–5; gill slit extending ventrally anterior to pelvic base; vomerine and palatine teeth absent; pectoral fin rays 18–21; total gill rakers 15–21.

COUNTS AND MEASUREMENTS. — Vertebrae 20–22 + 75–89 = 96–110; D 90–106; A 78–92; C 10–12; P 18–21; pelvic 3; vomerine and palatine teeth absent; gill rakers 1–3 + 14–18 = 15–21; branchiostegal rays 6; pseudobranch filaments 5–7. Following measurements in percent SL: head length 19.5–23.0; head width 9.1–13.5; head depth 9.4–10.9; pectoral fin length 11.7–13.3; predorsal length 22.9–25.4; preanal length 37.0–40.3; body height 7.9–10.1; gill slit length 7.8–10.9. Following measurements in percent HL: head width 41.0–59.4; head depth 42.9–48.4; upper jaw length 38.1–53.0; pectoral fin length 51.6–63.0; snout length 22.4–30.3; eye diameter 16.5–23.9; gill slit length 35.8–49.6; interorbital width 4.8–6.2; interpupillary width 20.7–26.4; pelvic fin length 13.0–18.0; caudal fin length 9.1–16.2. Pectoral base/length ratio: 42.3–51.8.

DESCRIPTION. — Based on 42 known specimens, adults and juveniles of both sexes. Head elongate, ovoid in adults, somewhat triangular in juveniles; dorsal profile gently declined from nape to snout, steeper in juveniles; snout tip steeply sloping. Head longer in adult males than in adult females, head length 20.7%–23.0% SL (\bar{x} = 21.9) in 14 males 157–235 mm SL,

19.5%–21.9% SL (\bar{x} = 20.3) in 14 females 159–262 mm SL. Scales absent on head, nape, pectoral fin and base, and in pectoral axil, except present in axil in largest males just posterior to pectoral base. Scales present on body, abdomen to just posterior to line through pectoral bases in largest specimens, tail and on unpaired fins extending to about 50% of their height posteriorly in juveniles; to 90% in adults; scales absent on dorsal and anal fins anteriorly in juveniles. Eye ovoid, entering dorsal profile except in largest specimens. Gill slit extending ventrally to just in front of pelvic base. Opercular flap at upper end of gill slit well-developed, angular; slit extending forward about one-quarter to one-third eye diameter. Pectoral fin rays relatively numerous (usually 19–20), pectoral origin well below body midline, insertion on abdomen; posterior margin of fin wedge-shaped, ray tips only slightly exerted ventrally; ventralmost 7–10 rays thickened.

Mouth inferior, upper jaw extending from middle of eye to its posterior margin. Upper jaw significantly longer in adult males than in females, 41.8%–53.0% HL (\bar{x} = 48.1) in 12 males 165–214 mm SL, 38.1%–43.8% HL (\bar{x} = 41.5) in 14 females 159–262 mm SL. Nostril tube minute, not reaching half way from its base to upper lip when pressed forward. Upper lip well-delimited. Labial lobe of lower jaw well-developed, generally hidden when mouth is closed, more so in small specimens; ventral margin of lobe deep, crescentic. Oral valve coalesced with sides of palate and not reaching vomer. Jaw teeth conical, sharp; upper jaw with single row except in large males, which have two irregular rows, lower jaw with two rows near symphysis in both sexes; no sexual differences in jaw teeth sizes or numbers. Vomerine and palatine teeth always absent.

Cephalic lateralis system with usually four postorbital pores, arising from frontal, sphenotic, pterotic and lateral extrascapulars (positions 1–4); one specimen with pores in position one, three, four, another with pores 1–5 (two from pterotic) on one side, 1–4 on the other. Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to small nostril tube, the other posteromesially. Usually nine suborbital pores, seven arising from ventral ramus of bone chain under eye and two from ascending ramus behind eye (7 + 2), lowermost of these

posteroventral to eye; suborbital variation rare, one fish with pores 8 + 2/7 + 2 and three with pores 6 + 2/7 + 2. Nine preoperculomandibular pores, four arising from dentary, one from anguloarticular and four from preopercle (no variation). Interorbital pores absent. Usually three occipital pores (two laterals and one median), except in four fish with no pores (but canal present), two with only median pore and two with just lateral pores. Body lateral line with ventral and mediolateral branches, both complete; ventral gently sloping anteriorly on abdomen, mediolateral originating in pectoral axil just anterior to rear margin of fin.

Dorsal fin origin above pectoral base, associated with vertebrae 4–5, usually four, with no supraneurals. Anal fin origin associated with ultimate precaudal vertebrae, with 3–5 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with third through fifth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with 0–2 rays articulating with haemal spine. Caudal fin with two epural, 4–5 upper hypural and 4–5 lower hypural rays.

Gill rakers on upper limb small, lanceolate; all on lower limb with blunt tips, but lowermost more slender; rakers on lower limb relatively numerous (usually 15 or more). Pseudobranch filaments long, usually six in number. Pyloric caeca two small buds.

Color in alcohol faded to dark brown or pale pinkish gray, head and fins darker. Peritoneum and lining of mesial areas of orobranchial chamber dark brown (probably black in life). Stomach and intestines pale (unpigmented).

This species reaches about 305 mm TL (CAS 58149). A ripe female, 262 mm SL, had 53 ova, the largest of which measured 5.3–5.7 mm in diameter. Bivalves, gastropods and ostracods were found in several stomachs.

DISTRIBUTION. — Gulf of Panama to central Chile. Depth range: 200–1060 m.

REMARKS. — *Lycenchelys scaurus* is a relatively primitive species in retaining several important characters in their plesiomorphic state: 1) small, round head pores; 2) long gill slit; 3) high pectoral ray count; 4) high caudal ray count; 5) no sexual differences in dentition; 6) few vertebrae; 7) dorsal fin origin placed anteriorly; 8) high number of lower gill rakers; 9)

high number of pseudobranch filaments. However, it possesses two derived characters that are noteworthy and diagnostic: 1) no vomerine or palatine teeth; 2) preoperculomandibular pores nine (usually found only in lower slope/abyssal species).

MATERIAL EXAMINED. — Gulf of Panama: MCZ 28689 (holotype, female, 179 mm); 07°31.5'N, 79°14.0'W; *Albatross* sta. 3384; 838 m; 8 Mar. 1891; U. S. Fish Commission. Ecuador, Gulf of Guayaquil: LACM 43731-1 (3; 227–262 mm); 03°14.7'S, 80°55.0'W; *Anton Bruun* sta. LK 66–120; 945–960 m; 10 Sept. 1966; L. W. Knapp and party. Peru: LACM 44133-1 (1, 172 mm); SE of Islas Lobos de Afuera; 07°46'S, 80°31'W; beam trawl sta. SNP1-27; 800 m; 1802–1807 hrs.; 23 Jan. 1974; J. M. Engle, J. Coyer, Peruvian fisheries program. CAS 58149 (1; 295+ mm); off Pt. Coles; 17°31.2'S, 72°00.0'W; Agassiz trawl; 1060 m; Jan. 1972; E. del Solar. Chile: MNHNC P.6424 (2; 160–199 mm); off Papudo; 32°31'S, 71°27'W; fisheries trawler; 400 m; 23 Feb. 1979. LACM W66-60-1 (22; 123–214 mm); 18 mi. W. of Valparaiso; bottom trawl; 274 m; 22–23 Dec. 1965; A. Chapman. LACM 11577-2 (6 of 7; 162–197 mm); off Valparaiso; 200–300 m; July 1963. LACM 43718-1 (5; 150–214 mm); off Valparaiso; 33°22'S, 71°54'W; *Anton Bruun* sta. LK 66-16; 260–280 m; 1700–0000 hrs.; 31 July 1966; L. W. Knapp and party. LACM 43725-1 (1; 189 mm); same collection as preceding.

Lycenchelys volki Andriashev, 1955

Lycenchelys volki Andriashev, 1955:369, figs. 2, 13, 14 (original description. Type locality: SW Bering Sea). Quast and Hall, 1972:14. Fedorov, 1976:4, 5. Toyoshima, 1985:146–148, 152. Anderson, 1994:113, 118.

DIAGNOSIS.—Vertebrae 30 + 96 = 126; sub-orbital pores 8 + 0; pore opening in postorbital canal from position one (but pore aberrantly doubled in type); occipital pores absent; inter-orbital pore in midline anterior to eyes; lateral line ventral, incomplete; dorsal fin origin associated with vertebra 11, with seven supra-neurals; pelvic fin rays two; pyloric caeca absent; total gill rakers 16.

COUNTS AND MEASUREMENTS. — Vertebrae

30 + 96 = 126; D 113; A 101; C 10; P 17; pelvic 2; vomerine teeth 10; palatine teeth 8/9; gill rakers 2 + 14; branchiostegal rays 6; pseudobranch filaments 4. Following measurements in percent SL: head length 14.9; head width 7.2; head depth 5.9; pectoral fin length 9.0; predorsal length 23.9; preanal length 36.1; body height 5.5; gill slit length 5.5. Following measurements in percent HL: head width 48.2; head depth 39.7; upper jaw length 38.7; pectoral fin length 60.3; snout length 30.5; eye diameter 14.4/13.4; gill slit length 37.1; interorbital width 6.6; interpupillary width 19.7; pelvic fin length 25.1; caudal fin length 9.8. Pectoral base/length ratio 33.2.

DESCRIPTION. — Only holotype known. Head elongate, ovoid, dorsoventrally depressed; dorsal profile gently convex from snout to nape, tip of snout not steep. Scales absent on head, nape, pectoral fin, base, in pectoral axil, in rudimentary dorsal fin fold and anterior portion of vertical fins. Scales present on body, abdomen to line just posterior to pectoral base, tail and on posterior third of vertical fins extending to about 40%–50% of their height. Eye slightly ovoid, spectacle of right eye somewhat smaller than that of left; eye just excluded from dorsal profile of head. Gill slit extending ventrally well below lower end of pectoral base to line through pelvic base. Opercular flap at upper end of gill slit well-developed, rounded; slit extending forward about 1.5 eye diameters. Pectoral fin origin at body midline, insertion on abdomen; posterior margin of fin wedge-shaped, ray tips exerted, middle and ventral rays more so; ventralmost six rays thickened.

Mouth inferior, upper jaw extending to anterior margin of eye. Nostril tube small, just reaching upper lip when pressed forward. Upper lip well-developed, adnate to snout tip. Labial lobe of lower jaw moderate, mostly hidden when mouth is closed. Oral valve not coalesced with sides of palate and not reaching vomer. Jaw teeth conical, sharp; upper jaw with double row anteriorly (inner row formed of just three teeth), lower jaw with three irregular rows near symphysis. Vomerine teeth relatively numerous, in patch; palatine teeth in single row.

Cephalic lateralis system with two small pores exiting from frontal foramen (position one), an abnormal condition (pore doubling).

Two pairs of anterior supraorbital (nasal) pores, one set anteromesial to nostril tube, the other directly posteriorly. Eight suborbital pores, all arising from ventral ramus of bone chain under eye (8 + 0). Eight preoperculomandibular pores, four arising from dentary, one from anguloarticular and three from preopercle. Interorbital pore set in midline of head one-half eye diameter in front of anterior margin of eye (Andriashev, 1955, fig. 14). Occipital pores absent. Body lateral line ventral, steeply bowing on abdomen in pectoral axil, not detectable beyond region just before anus and absent on tail as well.

Dorsal fin origin above appressed posterior margin of pectoral fin, associated with vertebra 11, with seven supraneurals. Anal fin origin associated with penultimate precaudal vertebra, with four ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal and last anal rays associated with second preural vertebra, with two anal rays articulating with haemal spine. Caudal fin with two epural, four upper hypural and four lower hypural rays.

Gill rakers on upper limb short, acute; on lower limb only ventral half acute, others with blunt tips. Pseudobranch filaments moderately long. Pyloric caeca absent.

Color in alcohol dark chocolate brown, ventral surface of head, pectoral fins, lining of orobranchial chamber and peritoneum black. Length 208 mm TL.

DISTRIBUTION. — Abyssal Bering Sea in 3940 m.

MATERIAL EXAMINED. — ZIN 32964 (holotype, male, 205 mm); Aleutian Basin ca. 130 naut. mi. No. of Mednyi (Copper) Isl.; *Vityaz* sta. 618; 3940 m; 25 Sept. 1950.

Taranetzella lyoderma Andriashev, 1952 (Fig. 18)

Taranetzella lyoderma Andriashev, 1952:415–417, text fig. (original description. Type locality: W. Bering Sea). Quast and Hall, 1972:15. Percy et al., 1982:387. Toyoshima, 1985:144–145. Anderson, 1994:90–92, 115, 120, figs. 181–186.

DIAGNOSIS. — Vertebrae 18–20 + 70–78 = 90–97; preoperculomandibular pores nine; suborbital pores 7 + 0; postorbital pores two; oc-

cipital and interorbital pores absent; lateral line absent (or mediolateral?); dorsal fin origin associated with vertebrae 3–4; low, fleshy papillae between suborbital pores; flesh gelatinous; gill slit not reaching ventral end of pectoral base; total gill rakers 14–16.

COUNTS AND MEASUREMENTS. — Vertebrae 18–20 + 70–78 = 90–97; D 88–95; A 75–82; C 10; P 15–16; pelvic 3; vomerine teeth 3–8; palatine teeth 5–20; gill rakers 3 + 11–13; branchiostegal rays 6; pseudobranch filaments 2–4. Following measurements in percent SL: head length 16.1–19.5; head width 6.1–7.4; head depth 7.5–8.9; pectoral fin length 9.3–11.5; predorsal length 16.7–19.6; preanal length 31.6–35.2; body height 5.1–7.6; gill slit length 4.1–5.4. Following measurements in percent HL: head width 36.1–44.7; head depth 43.8–53.5; upper jaw length 35.3–44.7; pectoral fin length 53.9–62.7; snout length 20.3–27.9; eye diameter 15.3–20.5; gill slit length 23.4–30.5; interorbital width 8.4–11.5; interpupillary width 19.5–24.4; pelvic fin length 10.9–18.3; caudal fin length 11.6–25.2. Pectoral base/length ratio 35.8–42.3.

DESCRIPTION. — Based on 18 known specimens, early juveniles through adults of both sexes. Head elongate, somewhat box-shaped in large specimens, deeper than most *Lycenchelys*; no sexual dimorphism in head lengths. Scales present only on tail, extending anteriorly only to about half total length; larger specimens with more extensive squamation; smallest juvenile (61 mm SL) scaleless. Eye ovoid, not entering dorsal profile of head. Gill slit extending ventrally to midheight of pectoral base or slightly below. Opercular lobe at upper end of gill slit small, rounded; slit extending forward about one-quarter eye diameter. Pectoral fin origin below body midline; insertion on abdomen; posterior margin of fin evenly rounded, ray tips exerted, ventralmost 6–7 rays thickened.

Mouth terminal or slightly subterminal, independent of size; upper jaw extending from just before middle of eye to its posterior margin. No dimorphism in jaw lengths. Nostril tube reaching to or overlapping upper lip when pressed forward. Upper lip well-delimited, continuous across snout. Labial lobe of lower jaw weak, ventral margin parallel with jaw line, generally hidden when mouth is closed. Six low, pyramidal papillae under eye between sub-

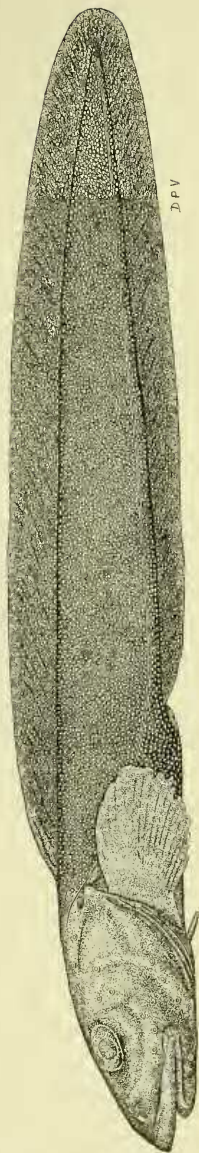


FIGURE 17. *Lycenchelys scaurus* (Garman, 1899), LACM W66-60-1, 212 mm SL, off Valparaiso, Chile.



FIGURE 18. *Tarantetzella lyoderma* Andriashev, 1952, CAS 82143, 158 mm SL, off Oregon.

orbital pores. Oral valve not coalesced with sides of palate, extending to rictus, and just reaching anterior edge of vomer in some smaller specimens. Jaw teeth conical, relatively few; upper jaw with single row in both sexes, lower jaw with 1–2 rows near symphysis depending on size; males with caniniform teeth anteriorly in both jaws. Vomerine teeth in patch in larger specimens; palatine teeth in two irregular rows anteriorly in these.

Cephalic lateralis system with two postorbital pores, arising from frontal and lateral extrascapular (positions one and four). Two pairs of anterior supraorbital (nasal) pores, one set directly mesial to nostril tube, the other posteromesially. Seven suborbital pores, all arising from ventral ramus of bone chain under eye (7 + 0). Nine preoperculo-mandibular pores, four arising from dentary, one from angulo-articular and four from preopercle. Interorbital and occipital pores absent. Body lateral line not present in material from Oregon. Weak, mediolateral line said to be present in holotype (Andriashev, 1952), but no longer evident.

Dorsal fin origin above pectoral base, associated with vertebrae 3–4 (usually three), with no supraneurals. Anal fin origin associated with ultimate or penultimate precaudal vertebrae, with 2–4 ray-bearing pterygiophores inserted anterior to haemal spine of first caudal vertebra. Pterygiophore of last dorsal ray associated with third or fourth preural vertebrae; pterygiophore of last anal ray associated with second preural vertebra, with 1–2 rays articulating with haemal spine. Caudal fin with two epural, four upper hypural and four lower hypural rays.

Gill rakers on upper limb small, acute; on lower limb, ventral half similar, upper half longer, with blunt tips. Pseudobranch filaments short, usually three. Pyloric caeca two small nubs.

Color in alcohol pinkish gray to whitish, all specimens very faded; fins without pigment. Lining of orobranchial cavity, stomach and intestines pale. Peritoneum black.

Largest specimen 165 mm TL (an unripe female).

DISTRIBUTION. — Western Bering Sea, off Oregon and northern Mexico; distribution probably continuous. Depth range: 986–3000 m.

REMARKS. — Andriashev (1952) reports a lateral line to be discernible in the holotype an-

teriorly on the body and to consist of pores. As the body lateral line in zoarcids consists only of superficial neuromasts, and, as other genera with gelatinous flesh lack a lateral line (e.g. *Derepodichthys*, *Dieidolycus*, *Exechodontes*, *Lycodapus*, *Melanostigma*, *Thermarces*; Anderson, 1994), Andriashev's observation requires verification. No trace of a lateral line (remnant neuromasts or nerves) was observed by me in the Oregon material as early as four years after the last one had been preserved (1976). Two other characters given by Andriashev to distinguish *Taranetzella* from *Lycenchelys* are erroneous: 1) the stronger dentition, and 2) the lack of an oral valve. The genus was diagnosed and described by Anderson (1994).

MATERIAL EXAMINED. — Russia: ZIN 32813 (holotype, 100 mm); Olyutorsk Bay, Kamchatka Penin.; *Vityaz* sta. 602; 986 m; 16 Sept. 1950. Washington: CAS 82140 (2; 112–147 mm); off Cape Flattery; 48°18.4'N, 127°00.8'W; *Yaquina* sta. BMT DW2; 2520 m; 2 Sept. 1971. Oregon (Cascadia Abyssal Plain): OS 15215 (1; 72 mm); 45°57.8'N, 125°44.2'W; *Yaquina* sta. BMT-195; 2048 m; 0905–1107 hrs.; 20 Mar. 1970. CAS 82141 (1; 61 mm); 45°43.8'N, 125°26.8'W; *Yaquina* sta. BMT-89; 2200 m; 1257–1400 hrs.; 14 July 1969. CAS 82142 (1; 76 mm); 45°37.5'N, 125°36.4'W; *Yaquina* sta. BMT-90; 2283 m; 2231–0100 hrs.; 14–15 July 1969. CAS 53876 (1, cleared and stained; 98 mm); 45°09.3'N, 125°38.3'W; *Yaquina* sta. BMT-93; 2669 m; 2320–0125 hrs.; 15–16 July 1969. OS 15216 (1; 133 mm); 44°58.5'N, 125°44.3'W; *Yaquina* sta. BMT-188; 2792 m; 1750–1950 hrs.; 17 Mar. 1970. CAS 82144 (2; 110–140 mm); 44°56.1'N, 125°39.8'W; *Yaquina* sta. BMT-187; 2760–2770 m; 1100–1300 hrs.; 17 Mar. 1970. CAS 38921 (1; 142 mm); 44°35.8'N, 125°34.3'W; *Yaquina* sta. BMT-97; 2862 m; 17 July 1969. CAS 82143 (formerly OS 2072) (1; 158 mm); 44°35.6'N, 125°35.2'W; *Yaquina* sta. BMT-186; 2816 m; 2230–0030 hrs.; 16–17 Mar. 1970. CAS 82145 (4; 93–160 mm); 44°05.3'N, 125°23.6'W; *Yaquina* sta. BMT-288; 2940 m; 2053–2308 hrs.; 14 June 1972. CAS 82146 (1; 69 mm); 43°44.0'N, 125°25.0'W; *Yaquina* sta. BMT-294; 3000 m; 1327–1528 hrs.; 17 June 1972. Mexico, off Guadalupe Isl.: SIO 60–48 (1; 122 mm); 29°40.2'N, 117°06.6'W; *S. F. Baird* sta. SOB-

12; 2707–2762 m; 1702–1815 hrs.; 15 Feb. 1960; R. H. Parker and C. M. Yonge.

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