A Review of the Eel Genera *Leptenchelys* and *Muraenichthys*, with the Description of a New Genus, *Schismorhynchus*, and a New Species, *Muraenichthys chilensis*[1]

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ABSTRACT: The echeline genus *Leptenchelys* is recognized as monotypic and differs markedly from *Muraenichthys*. *Schismorhynchus*, genus novum, is erected for *Muraenichthys labialis* Seale. The genus *Muraenichthys* contains 19 known species in the tropical, subtropical, and temperate Indo-Pacific Ocean. *M. chilensis*, a new species showing affinities to southern Australian congeners, is the first known from the New World. The present distribution of *Muraenichthys* and of the closely related genera *Schultzidia* and *Schismorhynchus* is perhaps explained by paleogeography, paleoclimatology, and adult habitat preferences. *Muraenichthys* species may be grouped by differences in posterior nostril condition, dentition, and head pore placement. The following changes in taxonomy are proposed: *Leptenchelys pinnaceps* Schultz = *Callechelys melanotaenia* Bleeker. *Muraenichthys tasmaniensis* McCulloch and *Scolenchelys tasmaniensis smithi* Whitley = *Muraenichthys vermiformis* Peters. *M. ogilbyi* Fowler = *M. macropterus* Bleeker.

THE OPHICHTHID GENERA *Muraenichthys* and *Leptenchelys* currently comprise heterogeneous assemblages of elongate worm-eels, each generically assembled for lack of outstanding characters of specialization. Recent work by various authors has both clarified and confused these complex genera. Schultz and Woods (1949) gave a key to the species of *Muraenichthys* and described two new species. Schultz et al. (1953) later separated *Leptenchelys* from *Muraenichthys* and described a new species, *Leptenchelys pinnaceps*. My examination of the holotype of *L. vermiformis* Myers and Wade, 1941 (USNM 101785), the genotype, has shown it to lack a median ventral snout groove and to possess low, unconstricted gill openings, in the latter character differing markedly from the species of *Muraenichthys*. Examination of the paratype of *Leptenchelys pinnaceps* (USNM 202543) has shown the taxon to be a junior synonym of *Callechelys melanotaenia* Bleeker, 1864. The remaining species previously referred to *Leptenchelys*, *Muraenichthys labialis* Seale, 1917, is similar to species of *Muraenichthys* but differs in its grooved snout and elongate anterior nostrils.

Until now, only tropical, subtropical, and temperate Indo-West Pacific species have properly been referred to *Muraenichthys*. The discovery of an undescribed species collected by the 1965 "Anton Bruun" expeditions in the offshore islands of Chile represents the first record of this speciose genus in the New World. The purposes of this review are: (a) to describe a new genus, *Schismorhyncus*, (b) to provide a key to the identification of the species of *Muraenichthys* and related genera, (c) to describe a new species, *M. chilensis*, (d) to discuss the possible origins and the dispersal of *M. chilensis* or its ancestral species to the New World, and (e) to clarify the species within *Muraenichthys* and to discuss species omitted by or described since Schultz and Woods (1949).

MATERIALS AND METHODS

All measurements are straight-line measurements, made either with a 300-mm ruler with 0.5 mm gradations (for standard length, trunk

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length, and tail length) and recorded to the nearest 0.5 mm, or with dial calipers (for all other measurements) and recorded to the nearest 0.1 mm. Preanal measurement is made from tip of snout to an insect pin inserted into the front of the anal opening. Distances from the anus refer to the anterior margin of the anus. Head length is measured from the snout tip to the posteriormost point of the gill-opening. Mean confidence limits in Tables 1 and 2 and the new species description include the 95 percent confidence limits (2σ) of the population. The cleared and stained paratypes were prepared by the trypsin method of Taylor (1967). Vertebral counts include the hypural and are taken from radiographs or from cleared and stained specimens. Type specimens are presently housed in the Vertebrate Collection, Scripps Institution of Oceanography (SIO). Paratypes will be distributed to the Academy of Natural Sciences of Philadelphia, the British Museum (Natural History), the California Academy of Sciences, the University of California at Los Angeles, and the United States National Museum.

TAXONOMY

Artificial Key to the Species of *Muraenichthys* and Closely Related Echeline Genera, Modified from Schultz and Woods (1949)

1a. A prominent median toothed groove on ventral side of snout, bordered by dermal folds, extending anteriorly to anterior nostrils; anterior nostrils elongated tubes equal to eye in length ..... **Schismorhynchus labialis** (Seale, 1917)

1b. Ventral side of snout without a prominent median groove bordered by dermal folds; anterior nostrils less than eye in length 2

2a. Teeth absent on vomer, absent or embedded on intermaxillary, those on maxillary and dentary minute or villiform; dorsal-fin origin (DFO) behind anus ..... **Schultzidia** Gosline, 1951 3

2b. Teeth present on intermaxillary, maxillary, dentary, and vomer; DFO either before or behind anus ..... **Muraenichthys** Bleeker, 1853 4

3a. A small median dermal papilla on edge of upper lip between anterior nostrils; body and tail tubular and elongate; greatest depth 45–54 times in total length ..... **Schultzidia retropinnis** (Fowler, 1933)
Synonym: *Muraenichthys malaita* Seale, 1935

3b. No papilla on upper lip; body and tail notably laterally compressed; greatest depth 24–35 times in total length ..... **Schultzidia johnstonensis** (Schultz and Woods, 1949)

4a. DFO above or behind a vertical line through the anus 5

4b. DFO notably before anus 14

5a. DFO 1 head length behind anus; head and trunk slightly longer than tail; posterior nostril outside mouth ..... **Muraenichthys philippinensis** Schultz and Woods, 1949

5b. DFO over anus or nearly so to less than a head length behind anus; head and trunk as long as or shorter than tail; posterior nostril either outside or within mouth 6

6a. Rear margin of eye over rictus of mouth. (DFO from slightly in front of anus to 0.5 head length behind anus; snout bluntly rounded; greatest depth about 24–34 in total length) ..... **M. laticaudata** (Ogilby, 1897)
Probable synonym: *M. godeffroyi* Regan, 1909

6b. Rear margin of eye in advance of rictus of mouth 7

7a. Teeth on maxillary and on dentary in at least two rows or in a narrow to wide band, sometimes becoming one row posteriorly; snout either rounded or acute 8

7b. Teeth on maxillary and on dentary uniserial; those on vomer in one or two rows; snout acute 10

8a. Snout bluntly rounded; greatest depth 20–30 times in total length. (Bases of anterior nostrils a little behind tip of chin; teeth in broad bands on maxillary, dentary, and on vomer; posterior nostril entirely outside of mouth) .... **M. schultzei** Bleeker, 1857
8b. Snout acute; greatest depth 30–50 times in total length 9

9a. Rear margin of eye only slightly in advance of rictus; tip of snout to rictus about 4 times in head; anterior margin of eye closer to rictus than tip of chin; snout moderately pointed; eye 12–15 times in head. (Bases of anterior nostrils opposite tip of chin; teeth on inner row of maxillary and dentary largest; eye diameter about equal to distance from tip of chin to tip of snout) ..... **M. gymnotus** Bleeker, 1864
Synonyms: *M. aoki* Jordan and Snyder, 1901; *M. fowleri* Schultz, 1943; *Sphagebranchus huysmani* Weber, 1913.
9b. Rear margin of eye noticeably in advance of rictus; tip of snout to rictus about 3 times in head; eye a little in front of middle of mouth cleft; snout much pointed; eye 26–27 times in head ..... **M. acutirostris** Weber and deBeaufort, 1916

10a. DFO more than 0.2 head length behind anus 11
10b. DFO less than or equal to 0.2 head length behind anus, or nearly over anus 12

11a. DFO 0.23–0.63 head length behind anus; tail 0.52–0.56 of total length; lower jaw unpigmented, lighter than top of head ..... **M. chilensis,** new species
11b. DFO 0.81–1 head length behind anus; tail 0.56–0.59 of total length; lower jaw darkly pigmented ..... **M. vermiformis** (Peters, 1866)
Probable synonym: *M. tasmaniensis* McCulloch, 1911

12a. DFO about 0.2 head length behind anus ..... **M. iredalei** Whitley, 1927
12b. DFO over anus or nearly so 13

13a. Greatest depth 27–30 times in total length ..... **M. macrostomus** Bleeker, 1864
13b. Greatest depth 40–50 times in total length.....**M. australis** Macleay, 1881
Synonym: *M. oliveri* Waite, 1910

14a. DFO closer to gill-opening than to anus, or nearly equidistant 15
14b. DFO closer to anus than to gill-opening 17

15a. DFO about midway between gill-opening and anus. (Posterior nostril outside mouth) ..... **M. thompsoni** Jordan and Richardson, 1908
Probable synonym: *M. malaboensis* Herre, 1923
15b. DFO about 0.5 head length anterior to point midway between gill-opening and anus ... 16

16a. Vomerine teeth uniserial ..... **M. devisi** Fowler, 1907
16b. Vomerine teeth biserial, becoming uniserial posteriorly .... **M. macropterus** Bleeker, 1857
Synonyms: *Echidna uniformis* Seale, 1901; *M. ogilbyi* Fowler, 1907; *M. owstoni* Jordan and Snyder, 1901. Probable synonyms: *M. breviceps* Günther, 1876; *M. devisi* Fowler, 1907

17a. Teeth on vomer in a broad flattish patch forward, becoming a row posteriorly; those on maxillary and on dentary in a band; posterior nostril outside mouth 18
17b. Teeth on vomer in one or two rows; teeth on maxillary and on dentary uniserial or biserial; posterior nostril either outside or inside mouth 19

18a. DFO 0.2–0.5 head length before anus ..... **M. hattae** Jordan and Snyder, 1901
18b. DFO 0.7–0.8 head length before anus ..... **M. gymnopterus** (Bleeker, 1853)
Synonym: *M. microstomus* Bleeker, 1864

19a. DFO 0.2–0.5 head length before anus 20
19b. DFO 0.7–1 head length before anus 21

20a. Posterior nostril inside mouth, covered externally by a flap; vomerine teeth uniserial; snout blunt ..... **M. cookei** Fowler, 1928
20b. Posterior nostril entirely outside mouth, an elongate slit beginning at the base of the lip barbel and ending at the corner of the eye; vomerine teeth biserial; snout acute ..... **M. sibogae** Weber and deBeaufort, 1916

21a. Tail 0.62 of total length; head 3.2 in trunk ..... **M. godeffroyi** Regan, 1909
21b. Tail 0.56 of total length; head 3.2–3.3 in trunk ..... **M. xorae** Smith, 1958

Schismorhynchus genus novum

GENOTYPE: *Muraenichthys labialis* Seale, 1917.

DIAGNOSIS: Ophichthid eels, subfamily Echelinae (of Gosline, 1952, p. 133), with teeth on the intermaxillary, maxillary, dentary, and vomer; pectoral and pelvic fins absent; dorsal and anal fins confluent with the caudal, dorsal-fin origin behind gill-openings; gill-opening lateral, a constricted opening no larger than eye; anterior nostrils elongated tubes equal to eye in length; posterior nostril within mouth; a prominent median toothed ventral groove on snout extending forward to or beyond the anterior nostril bases.

ETYMOLOGY: From the Greek σχισμή (schisme), a cleft, and ρύνχός (latinized as rhynchus), nose; neuter in accordance with item 30(a)(3) of the International Code of Zoological Nomenclature.

GENUS *Muraenichthys* Bleeker

Muraenichthys Bleeker, 1853
Genotype, *M. gymnopterus* Bleeker
Scolenchelys Ogilby, 1897
Genotype, *Muraenichthys australis* Macleay
Myropterura Ogilby, 1897
Genotype, *M. laticaudata* Ogilby

DIAGNOSIS: Ophichthid eels, subfamily Echelinae, of the tropical and temperate Indo-Pacific and southeastern Pacific oceans, possessing the following characters: teeth on the intermaxillary, maxillary, dentary, and vomer; pectoral and pelvic fins absent; dorsal and anal fins confluent with the caudal, dorsal-fin origin behind gill-openings; gill-opening lateral, a constricted hole about equal to eye; posterior nostril either labial exteriorly as a slit, or within mouth; ventral groove of snout either lacking or not extending beyond the bases of the anterior nostrils.

Muraenichthys chilensis n. sp.

Figs. 1–5, 6*b*

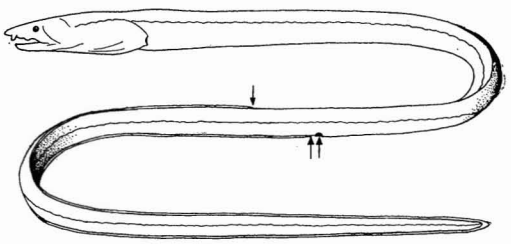

FIG. 1. *Muraenichthys chilensis* n. sp. Holotype, SIO 65-645, 284.0 mm.

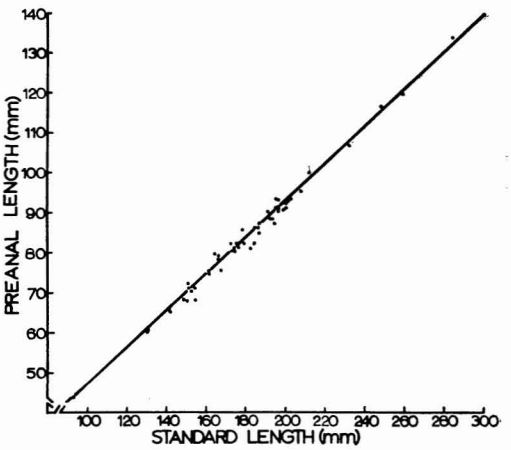

FIG. 2. *Muraenichthys chilensis,* holotype and 51 paratypes. Linear regression of preanal length, $y = 1.4 + .46x$.

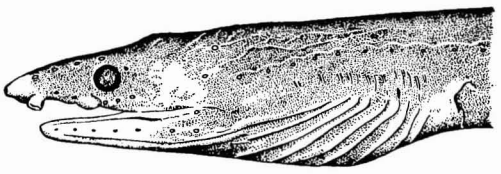

FIG. 3. *Muraenichthys chilensis,* holotype.

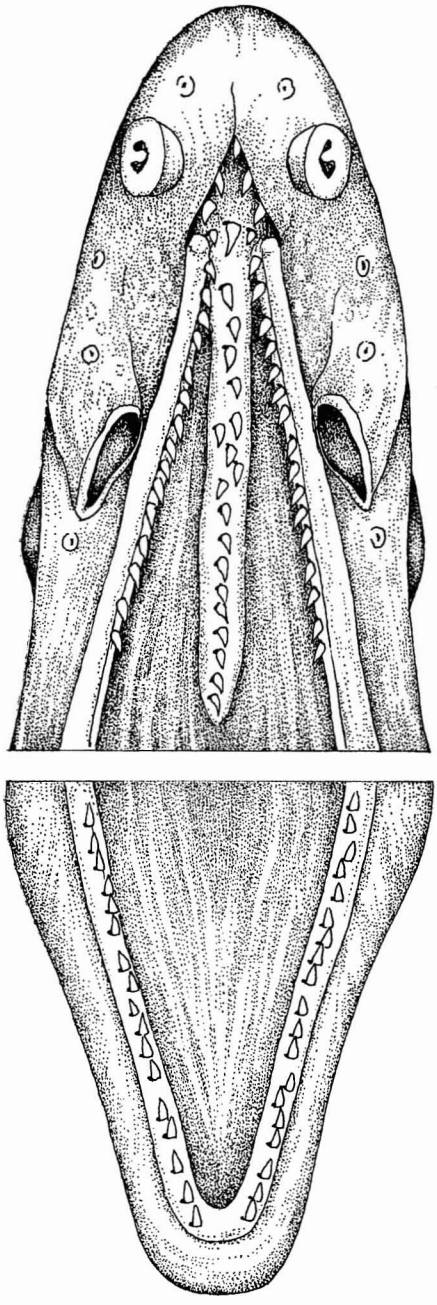

FIG. 4. *Muraenichthys chilensis,* holotype.

DESCRIPTION: Distinctive characters of this species include the proportions and vertebral counts (Table 1). Branchiostegal rays, jugostegalia, and dorsal, anal, and caudal rays were counted from the cleared and stained paratypes.

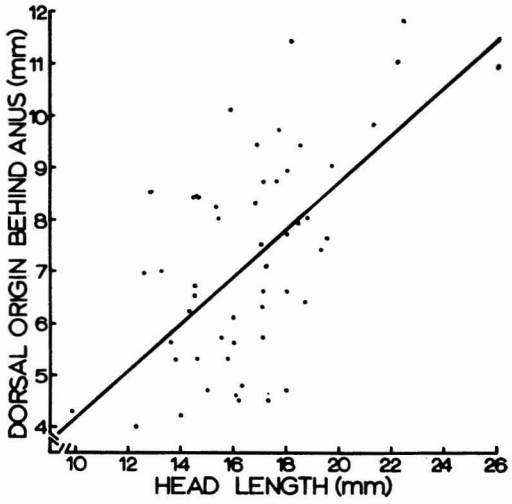

FIG. 5. *Muraenichthys chilensis,* holotype and 51 paratypes. Linear regression of dorsal-fin origin, $y = .44x - .20$.

Body elongate, moderately laterally compressed, particularly in the posterior fourth of the tail; depth in holotype behind the gill-openings 39 times in total length. Head of the holotype 11 times in total length. Preanal length 2.2 times in standard length, the changes of this measurement with increasing size closely following the linear equation $y = 1.4 + .46\,x$ (Fig. 2). Vertebrae in holotype, 149, 62 before anus. Snout laterally acute, dorsally broader; a short median ventral groove extending from a line across anterior edge of anterior nostrils to midpoint of snout. Anterior nostril ventral, tubular, and slightly shorter than eye width; lateral rim with a flap. Posterior nostril a large opening entirely inside upper lip, before anterior margin of the eye, opening inward, appearing externally as a flap. Lower jaw included, its tip in line with the posterior edge of the tubular nostrils. Eye less than twice in bony interorbital. Rictus of jaw slightly behind posterior margin of eye. Tongue adnate. Branchiostegal rays seven. Jugostegalia 25 on each side, broadly overlapping along ventral midline. Head with a noticeable protuberance above posterior edge of parietals.

Head pores large, lying within unpigmented spots (Fig. 3). Supraorbital series of pores comprising one on underside of snout, three evenly spaced dorsolaterally on snout, and one

TABLE 1

PROPORTIONS OF *Muraenichthys chilensis* N. SP.

MEASUREMENT	HOLOTYPE	HOLOTYPE AND 10 PARATYPES* (mean and 95% c. l.)	
Standard length (SL)	(284.0 mm)		
Head/SL	.092 (26.0 mm)	.092	.090–.097
Trunk/SL	.376 (107.0 mm)	.372	.367–.377
Body/SL	.468 (133.0 mm)	.465	.461–.469
Tail/SL	.532 (151.0 mm)	.535	.531–.539
Dorsal origin/ Head length (HL)	.419 (10.9 mm)	.406	.363–.446
Snout/HL	.196 (5.1 mm)	.198	.186–.211
Jaw length/HL	.296 (7.7 mm)	.325	.300–.350
Eye/HL	.058 (1.5 mm)	.068	.060–.075
Interorbital/HL	.100 (2.6 mm)	.112	.103–.122
Depth at gill opening/HL	.276 (7.2 mm)	.257	.244–.270
Vertebrae†	149	150.9	149.4–152.5

* SIO 65-645 and SIO 65-659.
† SIO 65-645, holotype and 11 paratypes.

above eye. A postorbital pore behind rear margin of eye. A median interorbital pore. Two pores laterally between nostrils. Three pores laterally beneath eye, the third beneath postorbital pore. Five pores laterally along lower jaw. Three pores over the preopercle, forming an angle of about 90°. Five equally spaced pores across the nape, of which the ventrolateral pore on each side is the first in the lateral-line series. The holotype has 142 left lateral-line pores, the last 0.177 head length from the tail tip.

Gill-opening a vertical slit beneath the tenth lateral-line pore, its length about equal to eye diameter. Isthmus of the holotype is 3 times the gill-opening length.

Jaw teeth of the type (Fig. 4) slender, sharp, conical, and of a similar size. None is extremely elongate, although the anterior vomerine teeth are slightly larger than the jaw teeth. The intermaxillary teeth (anterior patch of premaxilloethmovomerine of Böhlke, 1968) are five in number, forming an inverted V. The anteriormost vomerine tooth is large, flanked by a pair of smaller teeth, followed by an irregular single row of 18 vomerine teeth. Maxillary teeth uniserial, beginning behind first vomerine tooth; 16 on left side and 15 on right side in type, the last ones in line with the seventeenth vomerine tooth. Teeth on lower jaw uniserial, 19 left and 17 right in type; definitely separated at front.

Dorsal origin of holotype 0.419 head length behind line from anus. Mean distance from dorsal origin to a vertical from anus 2.3 times in the head length in holotype and 51 paratypes, following the least-squares derived linear equation $y = 0.44\ x - 0.20$ (Fig. 5). Dorsal and anal fins confluent with caudal, mostly low and within a groove, but elevated slightly beginning about one head length from caudal tip. Fin rays in dorsal 274, anal 261, caudal $4 + 3$.

Color in alcohol: Background color uniform tan, slightly darker on upper half due to small, closely spaced punctations. Snout tip lighter before second supraorbital pore and anterior nostril base. Lower jaw lighter to anterior preopercular pore. A light patch over operculum. Eye dark blue.

ETYMOLOGY: Named *chilensis,* from Chile, indicating the offshore islands from which this species was taken—the first species of the genus known from the New World.

MATERIAL EXAMINED: Holotype: SIO 65-645, 284.0 mm standard length, from off Chile, NW side of Isla Juan Fernández, S of Pta. Suroeste, 33°37′15″ S, 78°55′05″ W, 13 Dec. 1965. Collected over a creviced rock slope with rubble and small rocks by Wayne J. Baldwin and party,

using Chemfish collector and SCUBA, at a depth of 20–25 m, bottom temperature 15°C.

PARATYPES: All collected by the same party by the same method at depths from 3–35 m. From Isla San Felix, 26°17'S, 80°05'W: SIO 65-624 (29, 147–202 mm), SIO 65-626 (5, 167–237), SIO 65-628 (6, 144–192), SIO 65-629 (1, 206). From Isla Juan Fernández: SIO 65-634 (58, 103–259), SIO 65-636 (9, 123–186), SIO 65-637 (4, 133–168), SIO 65-638 (11, 154–211), SIO 65-645 (collected with the holotype, 42, 93–258.9; 1, 248 mm, removed for clearing and staining), SIO 65-655 (231, 93–299.5; 1, 276 mm, removed for clearing and staining), SIO 65-657 (28, 87.5–285), SIO 65-659 (18, 127–200).

DISTRIBUTION

Of the 22 species referred to *Muraenichthys* and the closely related genera *Schultzidia* and *Schismorhynchus,* only *Muraenichthys chilensis* is known from the eastern Pacific. Yet they possess a leptocephalus larval stage that would appear to allow planktonic dispersal for 10 to 12 months (Castle, 1965). Their absence from the tropical Atlantic perhaps suggests a post-Tethyan origin of the genus rather than the lack in the Atlantic of a suitable habitat. That the genus developed recently is perhaps further evidenced by the low morphological diversity (four or five major morphological types) exhibited among the 22 species. Of the Indo-West Pacific forms, *Schismorhynchus labialis* ranges farthest to the east, occurring at Easter Island (McCosker and Randall, unpublished data).

The species follow two major distribution patterns: (a) restricted to south temperate regions (e.g., *Muraenichthys australis, M. chilensis, M. vermiformis*), and (b) widespread in tropical and subtropical waters (e.g., *Schismorhynchus labialis. Muraenichthys gymnopterus, M. gymnotus, M. laticaudata, M. macropterus, M. schultzei,* and *Schultzidia johnstonensis*).

Muraenichthys chilensis was probably recently derived from the temperate Australia and New Zealand fauna. The pattern of Indo-West Pacific groups dispersing southward to southern Australia and New Zealand, and the subsequent movement of cold-adapted forms eastward across the cold-temperate South Pacific Ocean to the islands of coastal Chile has been achieved several times. Holthuis and Siversten (1967) found that the decapod crustacean *Jasus frontalis* from the Juan Fernández Islands shows southern Indo-Pacific affinities. They held (p. 1) that "the few littoral Decapoda and Cirripedia confirm the affinity of the fauna of Tristan da Cunha not only to that of other antiboreal oceanic island groups (Juan Fernandez, St. Paul and New Amsterdam, New Zealand), and the antiboreal mainland of Chile, but also the warm-temperate faunae of South Africa, South and Southeast Australia."

Fishes of the centrolophid genus *Seriolella* are similarly distributed in southern Australia and New Zealand, Peru and Chile, Isle St. Paul, and Tristan da Cunha (Haedrich and Horn, unpublished manuscript). Hubbs (1959) found species of the triglid genera *Pterygotrigla* and *Chelidonichthys* of the Juan Fernández and San Felix islands to be similar to or the same as those from New Zealand and Australia. Rosenblatt (1959) has shown similar distributional affinities among tripterygiid species.

This pattern is also found in mesopelagic fishes. Robert K. Johnson (personal communication) found *Bathophilus abarbatus* (previously known only from the southwest Pacific) from the central water mass of Chile. Robert L. Wisner (personal communication) found that several species of the myctophid genus *Diaphus* have a similar distribution. Giles W. Mead (manuscript), in studying the history of South Pacific fishes, finds this same distribution pattern in *Genypterus, Congiopodus,* and members of the Aploactylidae, Scorpaenidae, Antennariidae, and flatfishes. Historically, this route seems plausible in that Pleistocene glaciation was relatively light in South America and Australia. Darlington (1968, p. 212) suggested that "southern South America, Southern Australia, New Zealand, and Antarctica have all apparently been situated south of the tropics continuously since Permo-Carboniferous glaciation," climatically supporting this explanation.

An alternate dispersal hypothesis might employ Easter Island as a stepping-stone for eastward dispersal. This seems rather unlikely in consideration of the opposing current gyre, and is evidenced in the low degree of similarity in

the Juan Fernández and Easter Island faunas. The total eel fauna of the two islands is quite different, with the exception of two moray eels at both localities, *Gymnothorax porphyreus* and *G. panamensis*. Hubbs's (1959) suggestion that fishes use seamounts as stepping-stones in their eastward colonization is probably not applicable to the juvenile and adult forms of this shallow-water eel. Known seamounts and major submarine ridges in the southeastern Pacific have a minimum depth of 170 fathoms (Chase, 1968).

RELATIONSHIPS

Muraenichthys chilensis appears to be closest to the elongate species of *Muraenichthys* described from Australia and Tasmania (*M. australis* and *M. tasmaniensis*) and Ceylon (*M. vermiformis*). *M. australis* is quite similar in having 152 vertebrae (Castle, 1965). In its unpigmented lower jaw and in the position of the dorsal-fin origin, the new species differs from *M. australis* and *M. tasmaniensis*. The latter is known only from the type, and four specimens reported from Rottnest Island by Whitley (1944) and from Devoit and Devon by Scott (1961, 1965). These differ from *M. chilensis* in having the jaw angle extending far behind the eye, the lower jaw darkly pigmented, a shorter preanal distance, and a slightly more posterior dorsal origin (Table 2). Whitley recognized the variation in dorsal position as a growth character (as in Fig. 5), but he described his two western Australian specimens as distinct subspecies on the basis of a shorter snout, a longer gape, and uniserial teeth. (McCulloch [1911] described the type as having uniserial teeth!)

Nelson (1966, p. 397) found, as I have, that the number and pattern of sensory pores in *Muraenichthys* and related genera provide a valuable and very stable taxonomic character, which, he held, is sometimes distinctive enough to permit identification on this basis alone. There is no reduction in head pore number in *M. chilensis*; its pore pattern is nearly identical with that of *M. cookei* (Nelson, 1966, p. 397, fig. 21) and other species. *M. chilensis* exhibits little reduction of the lateral line, another primitive condition.

From all other species of *Muraenichthys*, *M. chilensis* differs in a combination of characters including the position of its dorsal-fin origin, the uniserial dentition, the elongate body, the head pore arrangement, the head pigmentation, and the short groove at the snout base.

TABLE 2

Comparison of *Muraenichthys vermiformis* and Its Junior Synonyms, *M. tasmaniensis* and *Scolenchelys tasmaniensis*, with *Muraenichthys chilensis* n. sp.

Species	Preanal/SL	Dorsal origin/HL
M. vermiformis Peters, 1866		
Holotype	.42	.87
M. tasmaniensis McCulloch, 1911		
Holotype	.42	ca. 1
Devoit specimen (Scott, 1961)	.41	.81
Devon specimen (Scott, 1965)	.44	.93
S. tasmaniensis smithi Whitley, 1944		
Holotype	.45	.87
Paratype	.44	.66
M. chilensis, n. sp.		
Holotype	.468	.419
Holotype and 10 paratypes	.465 (.461–.469)*	.406 (.363–.446)*

* Mean and 95% confidence limits.

The generic distinctions followed here are those of Rosenblatt and McCosker (in this issue). Schultz and Woods (1949) followed broad generic limits for *Muraenichthys*, and suggested, but did not recognize, subgeneric groupings. A more restrictive generic concept reduces their 22 accepted species to 15. Schultz et al. (1953, p. 61) later restricted the genus to include all those echelid eels with teeth on premaxillary, maxillary, dentary, and vomer but without pectoral fins and without the median groove under the snout. He recognized *Leptenchelys* Myers and Wade, 1941, on the basis of the presence of a median groove on the underside of the snout (not mentioned by Myers and Wade in the description of the genotype). Six species referred by Schultz and Woods to *Muraenichthys* are referable to other genera: *M. johnstonensis* and *M. retropinnis* to *Schultzidia*,

Muraenichthys apterus and *M. bicollaris* (originally referred to *Garmanichthys*) to *Chlopsis, Muraenichthys vermiformis* (Myers and Wade) to *Leptenchelys,* and *Muraenichthys labialis* to *Schismorhynchus.* Gosline (1952) referred *Chlopsis bicollaris* to the Chilorhinidae (= Xenocongridae, Böhlke, 1956).

The following species were not considered by Schultz and Woods (1949). *Chilorhinus* (*Muraenichthys*) *vermiformis* Peters, 1866, a generally overlooked species described from Ceylon with proportions similar to *M. chilensis,* presents problems resulting from the terse and unillustrated description of the 95.5-mm holotype. The corner of the mouth is one-half eye length behind the eye, the teeth are uniserial, and the dorsal origin and preanal lengths are those of *M. tasmaniensis* McCulloch, 1911. Because I am unable to differentiate these species on the basis of their descriptions, I feel that *M. tasmaniensis* is a junior synonym of *M. vermiformis.* Fowler (1907) described *M. devisi* from Tasmania and *M. ogilbyi* from Victoria, the former with uniserial and the latter with biserial vomerine teeth. Fowler compared these species to *M. breviceps* Günther, 1876 (considered by Schultz to be a synonym of *M. macropterus* Bleeker, 1857). I have found, from examination of large series of the George Vanderbilt Foundation Indo-Pacific collections, that the vomerine dentition of *M. macropterus* varies considerably. Since these fishes cannot be distinguished on the basis of Fowler's description, *M. ogilbyi* is interpreted as a junior synonym of *M. macropterus.* Fowler's type of *M. devisi* was damaged, but it is probably also referable to *M. macropterus.* Schultz and Woods (1949) did not consider *M. malaita* Seale, 1935, but Schultz (1953) later placed it without comment in the synonymy of *Schultzidia retropinnis.* Examination of the type by Richard H. Rosenblatt has verified this action. On the basis of the absence of intermaxillary and vomerine teeth, Gosline (1951) placed *Muraenichthys retropinnis* and *M. johnstonensis* in the subgenus *Schultzidia,* which Schultz (1953) raised to the generic level. Smith described *Muraenichthys xorae* from tidepool collections in southeast Africa (31°–34° S) (see Smith, 1962). On the basis of wide variation in the position of the dorsal-fin origin in his large collections, Smith placed *M. godeffroyi* Regan, 1909, in the synonymy of *M. laticaudata* Ogilby, 1897. Schultz (1953) found 2 of his 63 specimens of *M. godeffroyi* to have the dorsal arising before the anus. Examination of other characters may verify Smith's opinion.

EVOLUTIONARY TRENDS

Within this heterogeneous complex, several evolutionary trends are evident, on the basis of differences in snout form (from blunt to acute), in body depth (15–50 in total length), in the number and position of the head pores, in the dentition, and in the character of the posterior nostril. Two very distinct nostril types are observed (Fig. 6). The posterior nostril opens either on the outer surface of the lip as an elongate slit with an anterior flap (in *M. gymnopterus, M. hattae, M. macrostomus, M. philippinensis, M. schultzei, M. sibogae,* and *M. thompsoni*), or, as in most ophichthids, within the mouth, covered by an exterior valvular flap (in *M. acutirostris, M. chilensis, M. cookei, M. gymnotus, M. iredalei, M. macrop-*

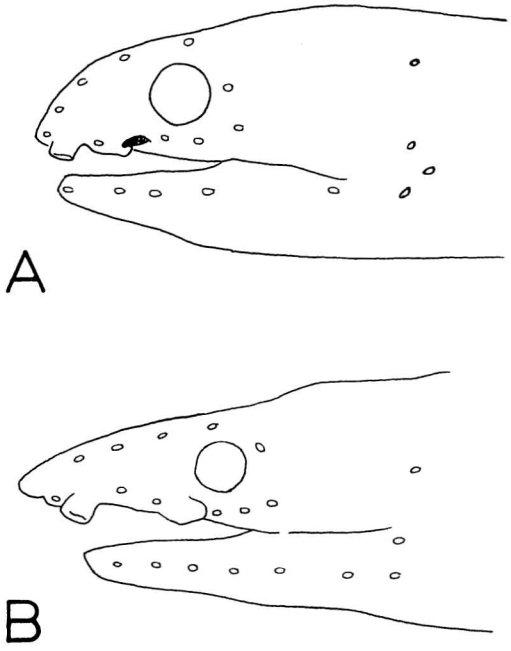

FIG. 6. Posterior nostril position. *A,* Outside of lip, *Muraenichthys gymnopterus* Bleeker. *B,* Within lip, *Muraenichthys chilensis* n. sp.

terus, Schismorhynchus labialis, Schultzidia johnstonensis, and *S. retropinnis*). In discussing the relationship of genera possessing unusual posterior nostrils to related genera with the usual nostril condition, Böhlke (1960, p. 7) interpreted such variation to lie well within familial limits. The dentition of most *Muraenichthys* species varies from uniserial to biserial on the jaws and vomer, yet *M. gymnopterus* (the genotype) and *M. hattae* are specialized in having a teardrop-shaped forward patch of blunt vomerine teeth and banded jaw teeth, a condition approaching that of many congrids and the ophichthid genera *Myrichthys* and *Pisoodonophis. Muraenichthys gymnopterus* is further specialized in having an exterior posterior nostril, a blunt snout, and a deep body (20–25 times in total length). These distinctions within the genus may merit further generic division of *Muraenichthys,* particularly if confirmed by further osteological study.

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