

PROCEEDINGS  
OF THE  
CALIFORNIA ACADEMY OF SCIENCES

Marine Biological Laboratory/  
Woods Hole Oceanographic Institution  
Library

DEC 27 1993

December 21, 1993

Woods Hole, MA 02543

Vol. 48, No. 8, pp. 153-169, 10 figs., 3 tables

A REVISION OF THE SNAKE EEL GENUS *MYRICHTHYS*  
(ANGUILLIFORMES: OPHICHTHIDAE) WITH THE  
DESCRIPTION OF A NEW EASTERN PACIFIC SPECIES

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**ABSTRACT:** Species of the tropical snake-eel genus *Myrichthys*, family Ophichthidae, subfamily Ophichthinae, are reviewed. An identification key, synonymies, and diagnoses are provided for two subgenera, *Chlevastes* and *Myrichthys*, and each of the valid species: *breviceps*, *colubrinus*, *maculosus*, *magnificus*, *ocellatus*, *pantostigmus*, *pardalis*, and *tigrinus*. *Myrichthys aspetocheiros* n. sp. is described from deepwater eastern Pacific specimens from Mexico to Panama, and differs from its congeners by its large pectoral fin, coloration, and vertebral condition. Eastern Pacific species previously synonymized with the Indo-Pacific *M. maculosus* are resurrected. The following new synonymies are proposed: *Myrichthys bleekeri* = *M. colubrinus*; *Ophichthus miyamotoi* and *Myrichthys aki* = *M. maculosus*; *Ophichthus quincunciatus* = *M. tigrinus*. The status of all nominal species of *Myrichthys* is described. We propose that *M. colubrinus* is a Batesian mimic of venomous hydrophiid sea snakes and that limited variability in eel coloration at some locations is concordant with snake/eel sympatry. *Myrichthys colubrinus* coloration variability may also be explained by a "sheep in wolf's clothing" mimicry, a phenomenon we report for the first time in a vertebrate.

Received 19 March 1993. Accepted 30 June 1993.

INTRODUCTION

The spotted and banded snake-eels of the genus *Myrichthys* are commonly found along most tropical shores. Their striking patterning, shallow habitus, and tendency to leave the substrate occasionally during daytime makes them perhaps the most recognized of ophichthids. It has long been suggested that their appearance and behavior, which ranges from the general similarity of spotted species (Caldwell and Rubinoff

1983) to the precise mimicry of the banded Indo-Pacific species *M. colubrinus* (Cott 1940), are mistaken by potential predators as that of a venomous sea snake (family Hydrophiidae). In our examination of *M. colubrinus* we have discovered what appears to be two mimetic associations between it and banded hydrophiids, either or both of which may limit the variability in eel coloration. And, as an aside, we note that despite the absence of sea snakes in the tropical Atlantic,



the sight of a vividly colored (albeit spotted, not banded) eel swimming sinusoidally at or near the surface is often cause for the misreporting of hydrophiids.

Although little is known of the ecology of snake eels, we presume from their abundance in rotenone collections that they are not uncommon. We know that they do not create or inhabit permanent burrows, and they are adept at burrowing rapidly into sand either head or tail first. Their diet, based upon gut content examination (Randall 1967; and our data), consists primarily of crustaceans, as one might deduce from their dentition. *Myrichthys* can be seen searching for prey more commonly at night than during the day (Starck and Davis 1966; Hobson 1968; and our observations), and we have observed *M. tigrinus* to be attracted to carrion associated with fishing boats at the Galapagos and Revillagigedo islands.

The species of *Myrichthys* share common features that make them easily recognizable among ophichthines. These include the anterior dorsal fin origin, granular dentition, broad-based and short pectoral fins, and vivid coloration. The genus can be divided into several lineages, including: the banded Indo-Pacific species *colubrinus*, subgenus *Chlevastes*; the four closely related species of the Indo-Pacific “*maculosus* complex”; the two Atlantic morphotypes; and a large-finned, deepwater species from the eastern Pacific that we describe herein.

#### MATERIALS AND METHODS

Measurements are straight-line, made either with a 300 mm ruler with 0.5 mm gradations (for total length, trunk length, and tail length) and recorded to the nearest 0.5 mm, or with dial calipers (all other measurements) and recorded to the nearest 0.1 mm. Body length comprises head and trunk lengths. Head length is measured from the snout tip to the posterodorsal margin of the gill opening; trunk length is taken from the end of the head to mid-anus; maximum body depth does not include the median fins. Mean vertebral formula (MVF) represents the average vertebral number at the location of the dorsal fin origin, mid-anus, and the last vertebral element. Vertebral counts (which include the hypural) are taken from radiographs. A minimum of 10 specimens (except for *M. pardalis*, for which we lack adequate material) of varying sizes of each spe-

cies were measured for morphometric analysis. Material examined is deposited in the following institutions: The Academy of Natural Sciences of Philadelphia (ANSP); the British Museum (Natural History) (BMNH); the Bernice P. Bishop Museum (BPBM); the California Academy of Sciences (CAS and SU); Grice Marine Biological Laboratory (GMBL); Instituto del Mar del Peru (IMARPE); Harvard Museum of Comparative Zoology (MCZ); the Musée Nationale d'Histoire Naturelle, Paris (MNHN); Princeton University (PU); Queensland Museum, Brisbane, Australia (QM); Scripps Institution of Oceanography (SIO); Natur-Museum und Forschungs-Institut Senckenberg (SMF); Tokyo Imperial University, Science College Museum (TIU); Universidad de Costa Rica, San José (UCR); Rosenstiel School of Marine and Atmospheric Science (UMML); the National Museum of Natural History (USNM); University of Washington, Seattle (UW); Universität Hamburg Zoologisches Institut und Museum (ZMH); and the Zoological Museum of the University of Tokyo (ZUMT).

#### Genus *Myrichthys* Girard, 1859

*Myrichthys* Girard 1859:58 (type species: *Myrichthys tigrinus* Girard 1859, by monotypy).

*Chlevastes* Jordan and Snyder 1901:867 (type species: *Muraena colubrina* Boddaert 1781, by original designation).

**DIAGNOSIS.**—Ophichthid eels, subfamily Ophichthinae, tribe Ophichthini (sensu McCosker 1977) with body moderately to very elongate, its depth 25–70 times in total length, compressed posteriorly, shorter than tail. Dorsal fin origin behind nape, well before gill openings. Pectoral fins short and broad-based, less than or slightly longer than their bases. Snout short. Gill openings lateral, inclined anterodorsally, and crescentic. Anterior nostrils tubular and elongate; posterior nostrils open into mouth. Teeth molariform, multiserial. Third preopercular pore absent. Coloration spotted and/or banded.

**ETYMOLOGY.**—From the Greek *myrus* (eel) and *ichthys* (fish), masculine.

**REMARKS.**—In creating the genus *Chlevastes* for the species *Muraena colubrinus*, Jordan and Snyder (1901:867) noted its relationship to *Myrichthys* but considered the foreshortened anal fin ending to be generically distinct. McCosker (1977) examined the osteology of *M. maculosus*, *M. colubrinus*, *M. tigrinus*, and the new species, and found them to fall within the generic limits of



*Myrichthys*. The synapomorphies of *M. colubrinus*, including its coloration, foreshortened anal fin, slender body, and head length are deserving of subgeneric rank, for which the name *Chlevastes* is available.

#### KEY TO THE SPECIES OF *MYRICHTHYS*

- 1a. Body coloration pale, overlain with 25–35 black or brown rings or saddles, separated by white or pale interspaces, encircling or partially encircling the body; anal fin ends well in advance of end of dorsal fin; body very elongate, its depth 50–70 times in total length ..... subgenus *Chlevastes* ..... *M. colubrinus* (Indo-Pacific)
- 1b. Body coloration pale or dark, overlain with round spots that are either dark, pale, or dark diffuse spots with bright centers; anal and dorsal fin end about equally relative to tail tip; body moderately elongate, its depth 25–45 times in total length ..... subgenus *Myrichthys* ..... 2
- 2a. Body coloration of round pale spots on a dark background of brown or green ..... *M. breviceps* (western Atlantic)
- 2b. Body coloration pale, overlain with dark spots or diffuse dark spots with bright centers ..... 3
- 3a. Spots on body diffuse with bright centers (gold in life) ..... 4
- 3b. Spots on body dark and distinct, without pale or bright centers ..... 5
- 4a. Total vertebrae 151–159 ..... *M. pardalis* (eastern Atlantic)
- 4b. Total vertebrae 164–173 ..... *M. ocellatus* (western Atlantic)
- 5a. Pectoral fin reduced, its length less than the width at its base; dorsal fin origin above 1st, 2nd or 3rd vertebra, 1.4–2.0 in head length; total vertebrae 149–197 ..... 6
- 5b. Pectoral fin developed, longer than the width at its base; dorsal fin origin above 6th, 7th or 8th vertebra, 1.1–1.4 in head length; total vertebrae 159–167 ..... *M. aspetocheiros* (eastern Pacific)
- 6a. Total vertebrae 177–197 ..... 7
- 6b. Total vertebrae 149–168 ..... 8
- 7a. Total vertebrae 177–183; spotting on chin and throat of adults smaller than or equal to eye, spotting on flanks round .....

..... *M. magnificus* (Hawaii, Leeward, and Johnston islands)

- 7b. Total vertebrae 180–197; spotting on chin and throat of adults larger than eye, spotting on flanks generally ovoid .....

..... *M. maculosus* (Indo-Pacific)

- 8a. Total vertebrae 149–156 ..... *M. tigrinus* (eastern Pacific)

- 8b. Total vertebrae 158–168 ..... *M. pantostigmus* (Revillagigedo and Cipperton islands)

#### *Myrichthys aspetocheiros*, new species

(Figs. 1, 2; Tables 1, 2)

*Myrichthys* sp. McCosker 1977:16, 78.

**DIAGNOSIS.**—An elongate species of *Myrichthys* with depth 26.9–36.8 times and tail 1.66–1.79 in TL; pectoral fin elongate, longer than snout; numerous large brown spots on head and body; and total vertebrae 159–167, mean 163.2 ( $n = 12$ ).

**COUNTS AND MEASUREMENTS OF HOLOTYPE** (in mm).—Total length 405; head 44.1; trunk 128.9; tail 232; predorsal distance 31.0; pectoral fin length 8.1; pectoral fin base 5.6; body depth 14 at gill openings; body width 11 at gill openings; snout 7.2; tip of snout to rictus of jaw 12.4; eye diameter 3.4; interorbital distance 5.2; gill opening height 5.7; isthmus width 6.5. Vertebral formula 5-60-162. Ten lateral line pores in left branchial region; the remainder small and difficult to discern.

**DESCRIPTION.**—Body elongate, depth at gill openings 26.9–36.8 in TL. Head and trunk 2.27–2.51 and head 8.5–11.1 in TL. Snout rounded, conical when viewed from above. Lower jaw included, its tip reaches base of anterior nostrils. Eye large, 2.9–4.2 in upper jaw, its center well behind midpoint of upper jaw. Anterior nostrils tubular, less than twice in eye, with a small lappet extending from each side. Posterior nostrils in upper lip, not visible externally, beginning before eye and ending beneath middle of pupil. Upper lip papillate, particularly between anterior and posterior nostrils. A broad fleshy chevron divides snout between anterior nostrils (Fig. 2). Dorsal fin origin on head, well in advance of gill opening, 1.11–1.36 in HL. Pectoral fin well-developed for a *Myrichthys*, longer than its base, equal to or longer than snout.

Head pores barely visible, but typically *Myrichthys*-like (cf. McCosker, 1977:78). Preoper-



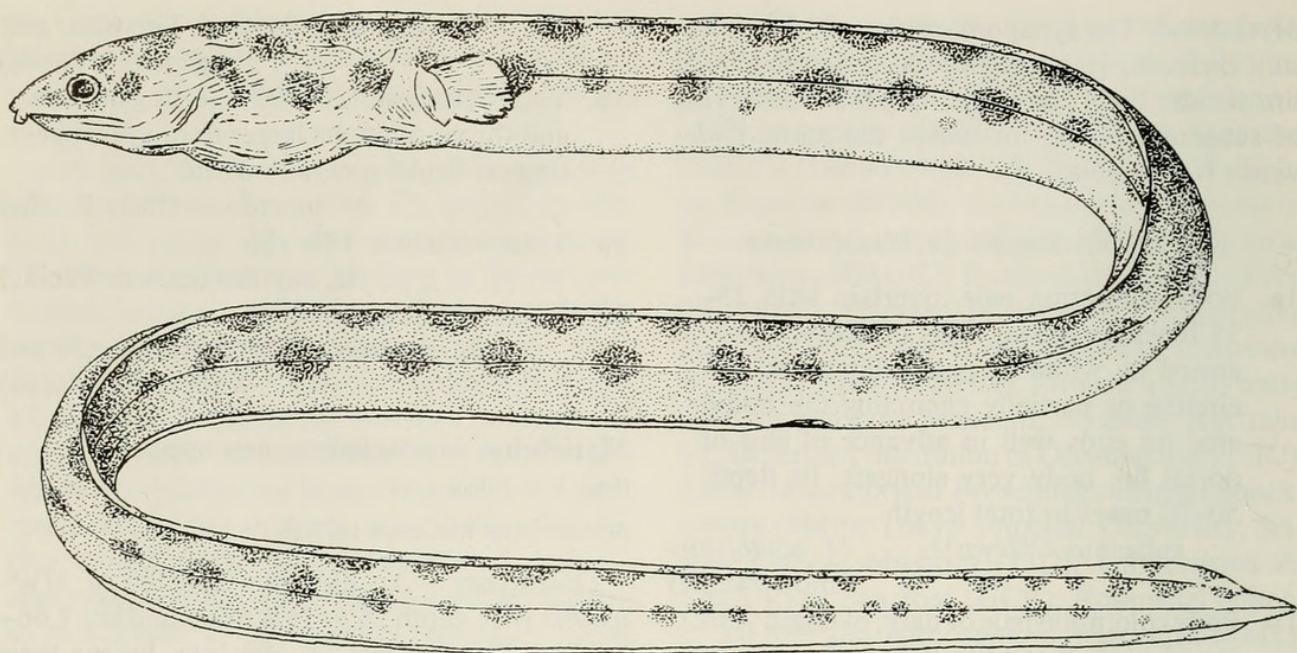


FIGURE 1. Holotype of *Myrichthys aspetocheiros* n. sp., SIO 65-166, 405 mm.

cular, temporal, suborbital, postorbital, and other series present. Single median interorbital and temporal pores. Two preopercular pores. Four mandibular pores. Lateral line pores present, but difficult to ascertain.

Teeth granular, small and fixed (Fig. 2), irregularly biserial in jaws and on vomer. A small intermaxillary chevron anteriorly, followed by a gap.

Color in isopropyl alcohol tan dorsally, paler ventrally, overlain with two irregular rows of large brown spots, one along lateral line and the other flanking the dorsal fin. Median fins mostly unpigmented, with occasional smudges or spots. Smaller spots on chin and snout. Throat, pectoral fin, and tail tip unpigmented. Eyes blue.

SIZE.—The largest specimen we examined is 513 mm long.

ETYMOLOGY.—From the Greek *aspetos* (unspeakably great) and *cheiros* (hand), treated as a noun in apposition.

RANGE.—Mexico to the Gulf of Panama, trawled over sand bottoms between 8 and 64 m depth.

REMARKS.—The new species differs from its congeners on the basis of its large pectoral fin and posterior dorsal fin origin. It is most closely related to the dark-spotted Indo-Pacific species, and differs from them in its spot size and distribution and in its vertebral number. All specimens were captured by benthic trawls; most oth-

er *Myrichthys* are captured using ichthyocides or are netted at the surface. We presume that unlike its congeners, the new species inhabits uniform, rock-free deeper-water habitats of sand and mud.

MATERIAL EXAMINED.—HOLOTYPE: SIO 65-166, 405 mm, MEXICO—Gulf of Tehuantepec: 16°03.6'N, 95°19'W, otter trawled over a sand bottom in 24 fms by T. Matsui and C. W. Jerde on 7 June 1965.

PARATYPES.—MEXICO—SIO 65-166, 311.6 mm, collected with the holotype. SIO 73-229, 210 mm, **Islas Tres Marias**: NE of Maria Madre, 45 fms, 30 Mar. 1973. COSTA RICA.—SIO 73-298, 304 mm, SSW of Pta. Judas, 09°27.3'N, 84°30.1'W, 17 fms. CAS 33299 (originally GMBL 73-162), 513 mm, 09°49.5'N, 84°48.8'W, 30 fms. SIO 73-296, 304.5 mm, **Gulf of Nicoya**: 09°37'N, 84°50'W, 47 fms, 22 Apr. 1973. UCR 4-8, 226.2 mm, **Gulf of Papagayo**: N of Nicoya Peninsula, 64 m. PANAMA.—SIO 64-357, 483.9 mm, off Viejo Panama, 4 fms. SIO 64-371, 386 mm (cleared and stained), **Viejo Panama**: 28 Jan. 1960. UMML 26901, 3 (319-325 mm), 08°54.5'N, 79°11'W. UMML 26710, 295.5 mm, 08°40.5'N, 79°30.7'W. USNM 323889 (formerly UMML 29145), 279 mm, 08°26'N, 79°43'W. ANSP 169606 (formerly UMML 29146), 335 mm, 08°18'06"N, 80°00'30"W, **Bay of Panama**: otter trawled in 18.3 m on 1 May 1967.

### *Myrichthys breviceps* (Richardson)

(Fig. 3, Table 2)

*Ophisurus breviceps* Richardson 1844:99 (locality unknown, holotype BMNH uncatalogued).

*Muraena acuminata* Gronow in Gray 1854: 21 ("in insula Divi Eustachii in America," holotype unknown).

*Pisodonophis guttulatus* Kaup 1856a:49 (Martinique, syntypes MNHN B.2693, B.2694).

*Pisodonophis coronata* Kaup 1860:14 (St. Thomas, holotype ZMH 391).



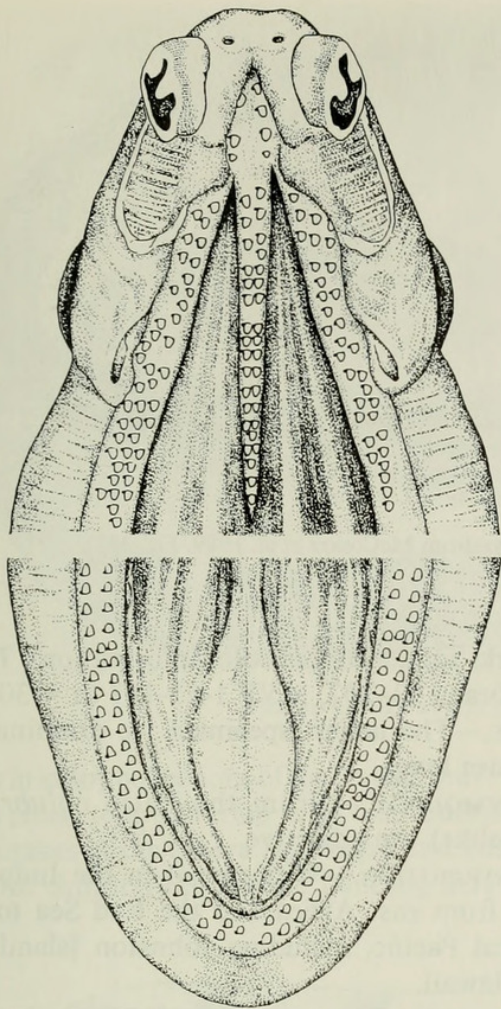


FIGURE 2. Dentition of the holotype of *Myrichthys aspetocheiros* n. sp., SIO 65-166, 405 mm.

*Ophisurus longus* Poey 1867:254 (Cuba, holotype MCZ 9155).  
*Ophichthys pisavarius* Poey 1880:253 (Cuba, holotype unknown).  
*Leptocephalus undulatus* Strömmann 1896:27 (29°N, 72°W, a leptocephalus, holotype unknown).

**DIAGNOSIS.**—Body moderately elongate, its depth 33–40 in TL. Head and trunk 2.4–2.6 and head 11.6–13.3 in TL. Snout rounded, 4.5–6.2 in HL. Dorsal fin origin 1.4–1.6 in HL. Pectoral fin length less than its base, 12.6–20 in HL, about 3 in snout. Body and trunk with two to four rows of pale round spots overlaying brown or green background; numerous smaller spots on snout, cheek, and nape; a pair of spots in advance of dorsal fin origin. Total vertebrae 165–175, MVF 3-62-170 (n = 25).  
**DISTRIBUTION.**—An insular species, known from Bermuda, the Bahamas, the Florida Keys, throughout the West Indies and offshore islands south to Brazil. Collected over sand and turtle

TABLE 1. Proportions (in thousandths) and vertebral counts of the holotype and 10 paratypes of *Myrichthys aspetocheiros*. (TL = total length; HL = head length.)

	Mean	Range
Total length		226–513
Total vertebrae	163.4	159–167
Head length/TL	107	89–125
Trunk length/TL	312	297–333
Tail length/TL	580	559–601
Body depth/TL	33	30–37
Dorsal fin origin/HL	798	736–898
Pectoral fin length/HL	202	160–261
Snout/HL	180	160–202
Upper jaw/HL	278	250–328
Eye/HL	79	70–96
Interorbital width/HL	130	116–151

grass beds at depths to 9 m, usually less than 3 m (McCosker et al. 1989:376).

**SIZE.**—The largest specimen we examined is 783 mm long.

**ETYMOLOGY.**—From the Latin *brev* (short) and *ceps* (head). A noun in the genitive case.

**REMARKS.**—The above diagnosis and synonymy is based on that of McCosker et al. (1989: 374–377). Randall (1967) reported that this species (as *M. acuminatus*) fed mainly on crabs and stomatopods. Thresher (1984) reported large aggregations of what he tentatively identified as *Myrichthys* (which, if correct, would likely be this species) near the surface well off the Atlantic coast of Panama, and suggested that they migrate to deeper waters to spawn. Leiby (1989:827–829) described and illustrated the leptocephalus and glass eel stages of *M. breviceps*.

**MATERIAL EXAMINED.**—A complete listing of the material that we examined is in McCosker et al. (1989:377).

***Myrichthys colubrinus* (Boddaert)**

(Figs. 4–5, Table 2)

- Muraena colubrina* Boddaert 1781:56 (Amboina, type unknown).
- Muraena annulata* Ahl 1789:8 (East Indies, type unknown).
- Muraena fasciata* Ahl 1789:9 (East Indies, type unknown).
- Ophisurus alternans* Quoy and Gaimard 1824:243 (Guam, type unknown).
- Ophisurus fasciatus* var. *latifasciata* Bleeker 1864:64 (Indonesia, type not designated).
- Ophisurus fasciatus* var. *oculata* Bleeker 1864:64 (Indonesia, type not designated).
- Ophisurus fasciatus* var. *semicincta* Bleeker (non *O. semicinctus* Lay and Bennett 1839:66) non *O. semicinctus* Richardson (1844:99), 1864:64 (Indonesia, type not designated).



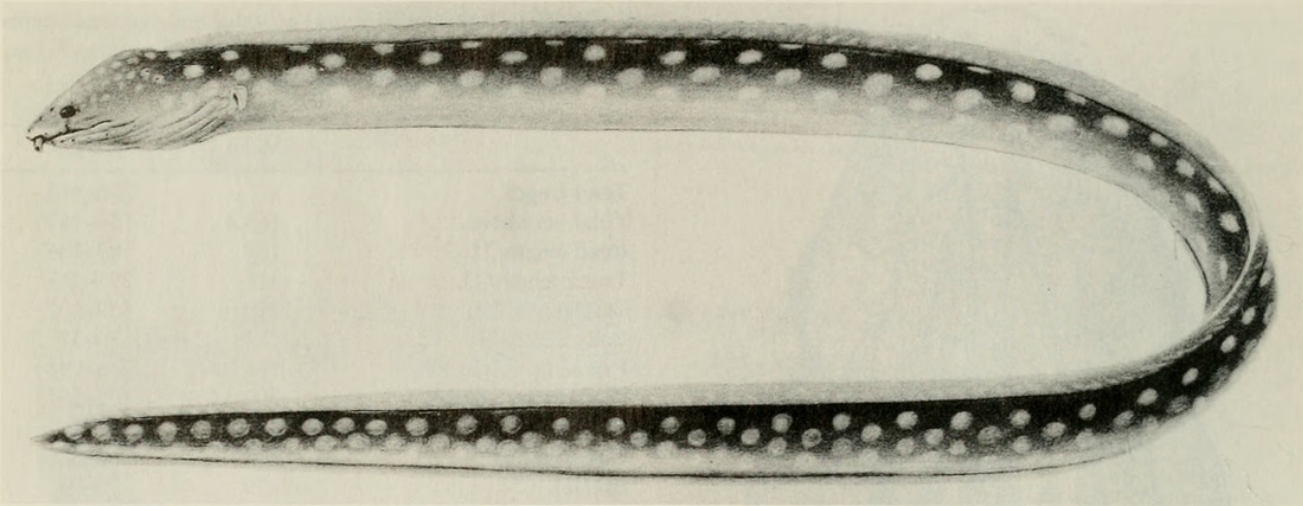


FIGURE 3. *Myrichthys breviceps*, ANSP 98359, 714 mm (from McCosker et al. 1989, Fig. 383).

*Ophichthys elapsoides* Castelnau 1875:47 (Cape York, Australia, type unknown).  
*Ophichthys naja* de Vis 1884:455 (South Sea Islands, syntype QM I. 864).  
*Chlevastes elaps* Fowler 1912:13 (Philippine Islands, holotype ANSP 1001).  
*Myrichthys bleekeri* Gosline 1951:314 (substitute name for *Ophisurus fasciatus* var. *semicincta* Bleeker 1864, preoccupied).

**DIAGNOSIS.**—Body very elongate, its depth 51–68 in TL. Head and trunk 2.0–2.3 and head 17–20 in TL. Snout rounded, 5.5–6.0 in HL. Dorsal fin origin 1.7–2.3 in HL. Anal fin ends well in advance of tail and dorsal fin ending. Pectoral fin length much reduced, about 3–5 in snout. Head, body, and tail coloration pale to cream, encircled (completely or as a saddle) with 25–35 brown or black bands that are equal to or narrower than their pale interspaces; dark bands extend onto dorsal fin; some larger specimens with large spots between bands on trunk and tail (see

remarks for additional color information). Total vertebrae 193–202, MVF 1-85-197 (n = 30).  
**SIZE.**—The largest specimen we examined is 970 mm long.  
**ETYMOLOGY.**—From the Latin *colubrinus* (snakelike). An adjective.

**DISTRIBUTION.**—Widespread in the Indo-Pacific, from east Africa and the Red Sea to the Central Pacific, including Johnston Island but not Hawaii.  
**REMARKS.**—The variety of colorations that this harlequin eel displays has resulted in the description of 10 nominal species and the vexation of all who have studied it. Bleeker (1864) was among the first to recognize the range of banding and spotting patterns and named three varieties to include them. Subsequent taxa were created, synonymized, and often resurrected, resulting in the general acceptance of but one (J. Smith 1962) or as many as three species (Schultz 1943; Schultz et al. 1953), *Myrichthys colubrinus*, *M. elaps*, and *M. bleekeri*. We have examined a large series of specimens that display a broad range of size, geographic origin, and coloration, and have concluded that there is but a single species whose livery is related to size, maturity, and the presence or absence of hydrophiid sea snakes.

In brief, we propose that *Myrichthys colubrinus* is a Batesian mimic of strikingly banded, venomous sea snakes that occupy shallow coral reefs over much, but not all, of the eel’s range. Although sea snakes are eaten by some birds and fishes, there is evidence that they are avoided by many predators (Heatwole 1975, and references therein). We therefore attribute the near unifor-

TABLE 2. Total vertebrae of species of *Myrichthys*. Confidence limits are the limits of the mean.

	n	Mean	Range	95% conf.
<i>M. aspetocheiros</i>	12	163.2	159–167	161.9–164.5
<i>M. breviceps</i>	25	170.2	165–175	170.0–170.4
<i>M. colubrinus</i>	30	197.0	193–202	196.5–197.5
<i>M. maculosus</i>	30	192.1	185–199	191.9–192.4
<i>M. magnificus</i>	23	179.0	177–183	178.9–179.2
<i>M. ocellatus</i>	25	168.1	164–173	167.9–168.3
<i>M. pantostigmus</i>	18	162.2	158–168	161.2–163.2
<i>M. pardalis</i>	5	154.8	151–159	153.1–156.5
<i>M. tigrinus</i>	53	153.3	148–157	152.6–153.9



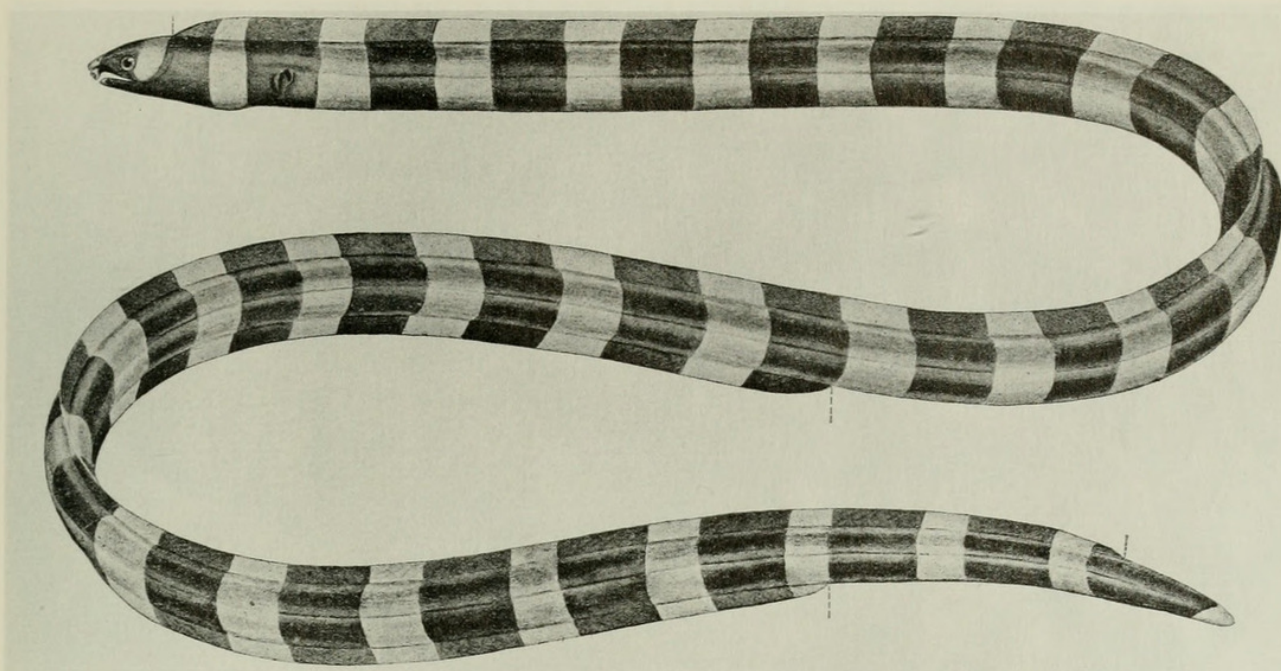


FIGURE 4. *Myrichthys colubrinus*, 555 mm (from Herre 1923, Pl. 4).

mity in many collections of the “*colubrinus*” (Figs. 4–5) phase to the overlap in its distribution with sea snakes of the genera *Hydrophis* and *Laticauda* (M. Smith 1926). Wide banding that com-

pletely encircles the eel is typical of Japanese, Philippine, Palauan, Guamanian, and Indonesian specimens; hydrophiins are similarly distributed (McDowell 1972). Banded *Myrichthys*

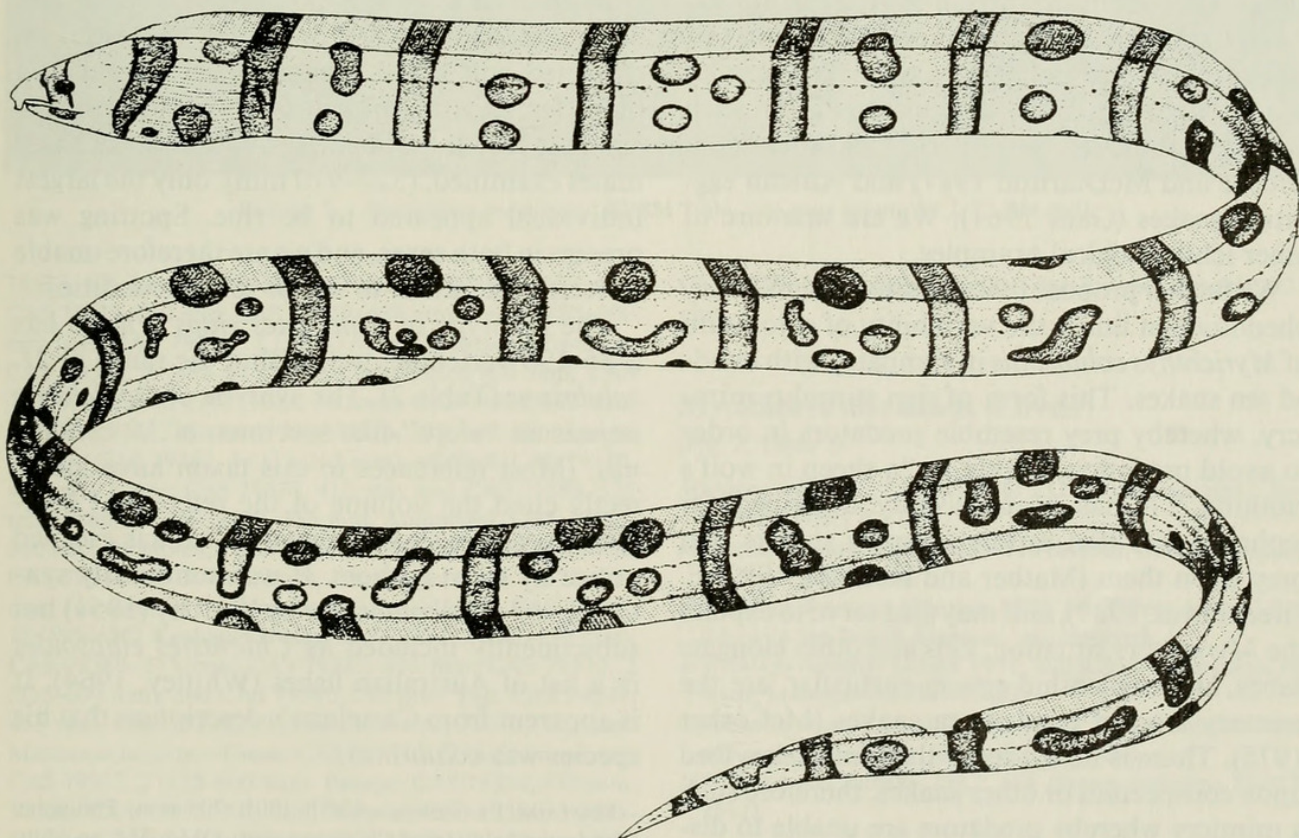


FIGURE 5. *Myrichthys colubrinus*, “*elaps*” coloration, based on the holotype of *Chlevastes elaps*, ANSP 1001, 705 mm (from Fowler 1912, Fig. 3).



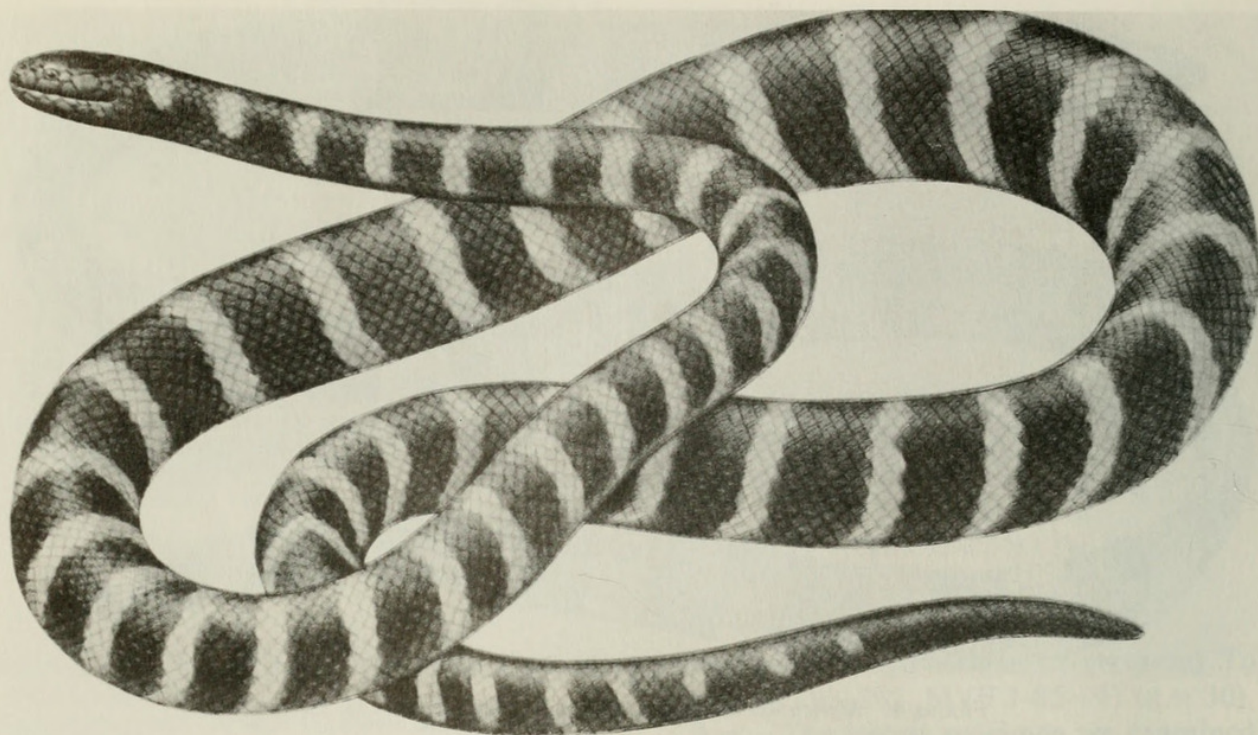


FIGURE 6. Adult banded sea snake, *Hydrophis melanocephalus*, length unstated (from Halstead 1970, Pl. XXI, Fig. 3).

extralimital to the distribution of banded sea snakes (e.g., Polynesia and the Red Sea) are more variable in coloration and often demonstrate the “bleekeri” condition wherein the dark bands are much narrower and do not meet ventrally. Concordance in color pattern by sympatric mimics and models has been demonstrated for such Batesian mimics as New World coral snakes (H. Greene and McDiarmid 1981) and African egg-eating snakes (Gans 1961). We are unaware of other ichthyological examples.

We further propose that an additional mimicry phenomenon limits the variability of coloration of *Myrichthys colubrinus* in sympatry with banded sea snakes. This form of sign stimulus mimicry, whereby prey resemble predators in order to avoid predation, is akin to “a sheep in wolf’s clothing.” It has been recently described for tephritid flies that mimic jumping spiders that prey upon them (Mather and Roitberg 1987; E. Greene et al. 1987), and may also serve to explain the *Myrichthys* situation. Eels and other elongate fishes, and ophichthid eels in particular, are the primary food of banded sea snakes (McCosker 1975). There is no evidence that sea snakes feed upon conspecifics or other snakes, therefore such a mimicry whereby predators are unable to discriminate between conspecifics and mimics would benefit *M. colubrinus* and other possible sea snake

mimics (most notably, *Leiuranus semicinctus*, a common ophichthid that is similar in appearance to *M. colubrinus* and many hydrophiids).

In order to test the hypothesis that coloration could be related to sex or sexual condition, we dissected and sexed several *M. colubrinus*. Of nine females examined (497–815 mm), the smallest ripe individual was 600 mm. Of three males examined, (520–970 mm), only the largest individual appeared to be ripe. Spotting was present in both sexes, and we are therefore unable to relate coloration to sex or sexual condition.

The holotype of *Chlevastes elaps* (Fig. 5) has 2-86-198 vertebrae, well within the range of *M. colubrinus* (Table 2). The syntype of *Ophichthys naja* is an “elaps”-like specimen of *M. colubrinus*. (Most references to this taxon have incorrectly cited the volume of the reference.) *Ophichthys elapsoides* Castelnau (1875) has escaped notice by most authors. It was summarily synonymized with *colubrinus* by Whitley (1951) but subsequently included as *Chlevastes elapsoides* in a list of Australian fishes (Whitley, 1964). It is apparent from Castelnau’s description that his species was *colubrinus*.

MATERIAL EXAMINED.—ANSP 1001, 705 mm, Philippine Islands, the holotype of *Chlevastes elaps*. QM I. 864, an adult, South Sea Islands, the syntype of *Ophichthys naja*. NEW GUINEA—CAS 63529, 2 (425–495 mm), Madang. PHILIPPINES—CAS



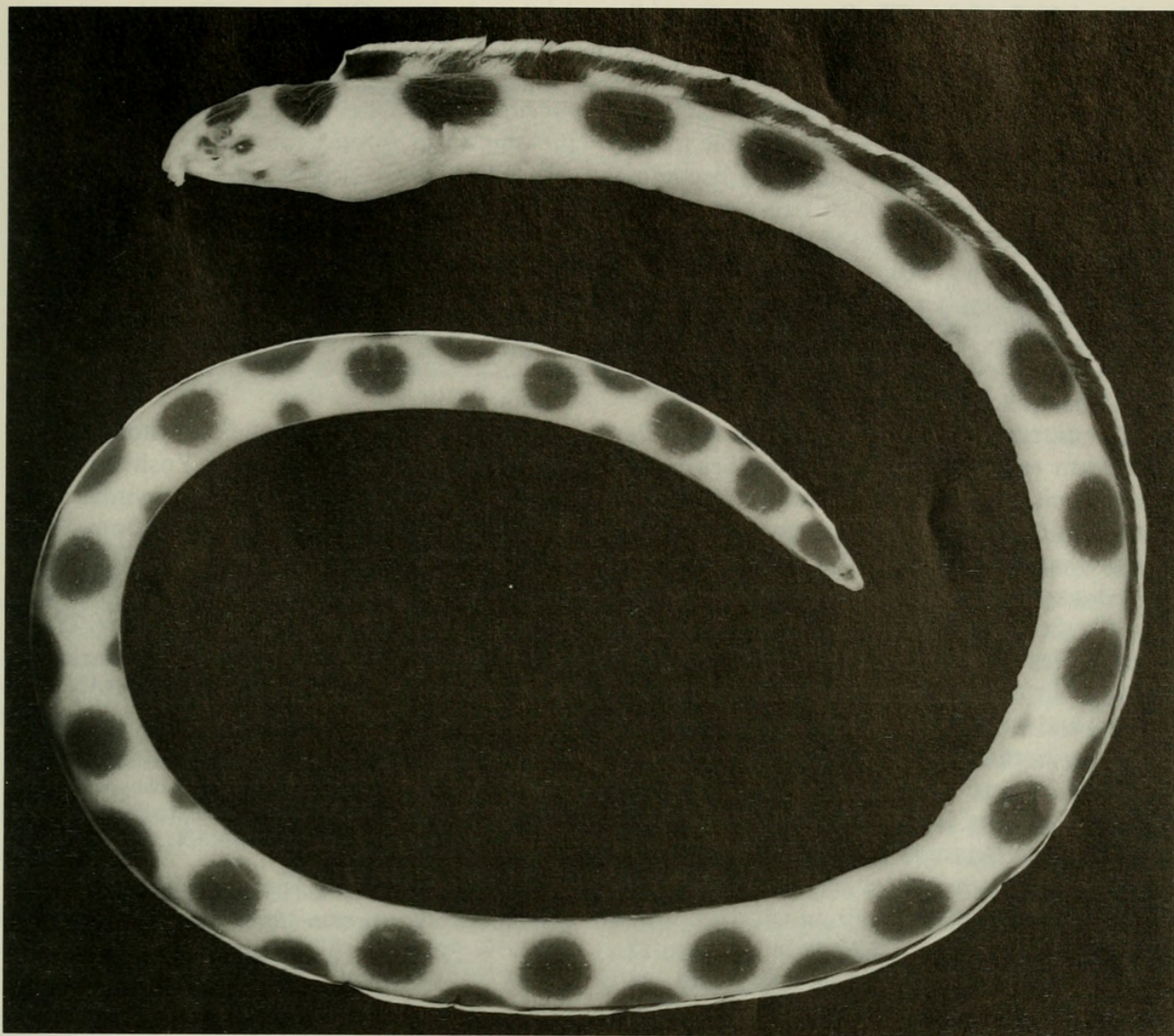


FIGURE 7. *Myrichthys maculosus*, BPBM 7006, 226 mm (photo by J. E. Randall).

79417, 405 mm; CAS 79381, 460 mm; CAS 79384, 525 mm; CAS 79379, 510 mm; CAS 79529, 630 mm; CAS 79383, 300 mm; and CAS 79398, 3 (200–370 mm), Batanes Province. CAS 79394, 3 (665–815 mm); CAS 79365, 800 mm; CAS 79366, 732 mm; CAS 79384, 530 mm; CAS 79368, 642 mm; and CAS 53688 (formerly UW 6525), 575 mm, Dumaguete. PALAU—CAS 79382, 3 (335–365 mm), off Chol. CAS 79380, 480 mm, Koror. CAS 79375, 415 mm; and CAS 79388, 525 mm, Peleliu. CAS 79389, 355 mm, Auluptagel. CAS 79386, 540 mm, Babelthaup. CAS 79377, 2 (240–312 mm), Nardueis. CAS 79364, 4 (497–970 mm), Urukthapel. CAS 79373, 351 mm, Iwayama Bay. CAROLINE ISLANDS—**Ifaluk**: CAS 79392, 12 (195–635). **Kapingamarangi**: CAS 79371, 2 (242–292 mm); CAS 79369, 575 mm; CAS 79385, 425 mm; CAS 79370, 2 (315–600 mm); and CAS 79390, 290 mm. **Yap**: CAS 79378, 455 mm; CAS 79372, 325 mm; and CAS 79376, 390 mm. MARIANAS ISLANDS—**Guam**: CAS 79387, 3 (235–515 mm); and CAS 79367, 2 (435–600 mm). **Ponape**: CAS 79374, 315 mm. **Tahiti**: CAS 79395, 510 mm, Moorea. CAS 79391, 3 (520–690 mm), Taravao. **Palmyra Atoll**: CAS 79313, 488 mm; CAS 79530, 2 (504–640 mm). **Johnston Island**: CAS 33498 (formerly UH 1421), 358 mm; CAS 79397, 2 (335–360 mm); and

CAS 79396, “Sandwich Islands,” locality questionable, 625 mm.

### *Myrichthys maculosus* (Cuvier)

(Fig. 7, Table 2)

*Muraena maculosa* Cuvier 1816: 232 (“European seas,” holotype MNHN B.2730).

*Muraena tigrina* Rüppell 1830: 118 (Mohili, Comoro Islands, holotype SMF 3525).

*Ophichthys dromicus* Günther 1870: 80 (“West Africa,” holotype in the British Museum, unnumbered).

*Myrichthys rupestris* Snyder 1911: 490 (Okinawa, Ryukyu Islands, holotype USNM 74048).

*Ophichthys miyamotoi* Tanaka 1913: 195 (Oshima, south of Kagoshima, Japan, holotype TIU 2923).

*Myrichthys aki* Tanaka 1917: 458 (Japan, holotype ZUMT 7612).

**DIAGNOSIS.**—Body moderately elongate, its depth 33–46 in TL. Head and trunk 2.3–2.45



and head 12.7–15.2 in TL. Snout rounded, 4.7–5.7 in HL. Dorsal fin origin 1.5–2.0 in HL. Pectoral fin length less than its base, 2–3 in snout. Head and body color yellow to tan, overlain with brown to brownish-black spots, variable in size but mostly larger than eye, the spots becoming larger and more numerous in larger specimens (see Remarks below). Total vertebrae 185–199, MVF 1-75-191 ( $n = 30$ ).

**SIZE.**—The largest specimen we examined is 990 mm long.

**ETYMOLOGY.**—From the Latin *maculosus* (spotted). An adjective.

**DISTRIBUTION.**—Widespread in the Indo-Pacific, from east Africa and the Red Sea to the central Pacific, not including Hawaii and the Leeward Islands. Collected over sand, usually in shallow waters, to depths of 20–30 m.

**REMARKS.**—We refer all dark-spotted Indo-west Pacific *Myrichthys* to *M. maculosus*. As in other species of *Myrichthys*, there is considerable variation in the size and number of spots with growth, and we feel that the differences ascribed to certain nominal species can be explained in that way. In particular, *M. aki*, said to be distributed from the Izu Peninsula to Kochi Prefecture, Japan (Masuda et al. 1984), was differentiated from *M. maculosus* in having more spots. Our comparison of large individuals from broad geographic ranges (e.g., CAS 35204, 845 mm TL, from Grande Comore with ZUMT 54,141, 840 mm TL, from Hochijo Island, Japan) demonstrated that spotting differences are ascribable to growth. The spotting of *M. maculosus* may be summarized in the following manner: (1) juveniles ( $< 25$  cm) have a single row of nearly subequal spots above the lateral midline to the base of the dorsal fin, and lack chin, throat or ventral spotting; (2) intermediate individuals (30–50 cm) have larger, equally spaced spots (about equal in size to the snout) along the flanks, centered along the lateral midline, alternating with pairs of spots that meet along the dorsal midline; and (3) large adults ( $> 50$  cm) have 2–3 rows of larger, more ovoid dark spots along the dorsal midline and along the flanks, with 2–3 rows of smaller spots along the ventral surface, the spots extending onto the dorsal fin but not the anal fin, and numerous spots (variable in size) on chin and throat. The smallest specimen we examined (CAS 48460) was 82 mm long and lacked pigmentation entirely.

Blache (1975) reexamined the type of *Oph-*

*ichthys dromicus* Günther (1870) and on the basis of its coloration and vertebral count (192 total, 81 “abdominal”) synonymized it with *M. maculosus*. Blache questioned the purported provenance of *dromicus* and suggested that it was erroneously identified as from “West Africa” rather than “East Africa.” We concur with the long-recognized synonymy of *Muraena tigrina* Rüppell (1830); the type (SMF 3525) has 194 total vertebrae, 2 predorsal, and 75 preanal. The type specimen of *M. maculosus* has 197 total vertebrae, 3 predorsal (E. B. Böhlke, in litt. 29 March 1979).

We propose the following new synonymies of this species: With advice from Yoshiaki Tom-inaga (in litt. 6 June 1978), we synonymize *Ophichthys miyamotoi* Tanaka (1913) from Japan with *M. maculosus*. As mentioned above, we consider *Myrichthys aki* Tanaka (1917) to also be a junior synonym; the type of *M. aki* (ZUMT 7612) has 196 total vertebrae, 1–2 predorsal.

**MATERIAL EXAMINED.**—MNHN B. 2730, 260 mm, “European Seas,” the holotype of *Muraena maculosa*. BMNH unnumbered, 730 mm, “West Africa,” the holotype of *Ophichthys dromicus*. ZUMT 7612, 990 mm, radiograph of the holotype of *Myrichthys aki*. USNM 74048, 415 mm, Okinawa, holotype of *Myrichthys rupestris*.

**JAPAN**—ZUMT 19,148, 930 mm; and ZUMT 54,141, 840 mm, Hochijo Id. **PHILIPPINES**—CAS 30491, 167 mm, Luzon. CAS 79302, 483 mm, S. of Dumaguete. CAS 79335, 365 mm, Batanes Province. **PALAU**—CAS 79311, 249 mm; and CAS 79309, 435 mm, Urukthapel Id. CAS 79331, 331 mm, Auluptagel. CAS 79313, 225 mm; and CAS 79306, 435 mm, Babelthap Id. CAS 79303, 396 mm; and CAS 79305, 410 mm, Angaur Id. CAS 79329, 109 mm, Iwayama Bay. CAS 79328, 165 mm, Nardueis Id. CAS 79330, 310 mm, Peleliu. CAS 79319, 345 mm, Kayangel Id. CAS 79318, 370 mm, Urukthapel Id. **CAROLINE ISLANDS**—**Yap**: CAS 79308, 349 mm, Gagel Id. **Ifaluk**: CAS 79301, 3(182–334 mm); GVF 53-32, 247 mm; CAS 79315, 252 mm; CAS 79320, 2(222–233 mm); CAS 79324, 130 mm; CAS 79326, 200 mm; and CAS 79317, 365 mm. **Kapingamarangi**: CAS 79323, 3(145–285 mm); and CAS 79321, 360 mm. **MARIANAS ISLANDS**—**Guam**: CAS 79300, 6(180–460 mm); CAS 79312, 191 mm; CAS 79310, 325 mm; and CAS 79316, 280 mm. **Saipan**: CAS 79307, 205 mm. **American Samoa**: CAS 38564, 185 mm, Tutuila. **Marcus Island**: BPBM 7006, 226 mm. **PITCAIRN ISLANDS**—**Oeno Atoll**: BPBM 16456, 500 mm. **Palmyra Island**: CAS 79322, 4(110–285 mm). **Wake**: CAS 79332, 140 mm. **KIRIBATI**—**Christmas Island**: CAS 79327, 222 mm. **SOUTH CHINA SEA**—**Vietnam**: CAS 79304, 290 mm, 10°29'15"N, 108°57'30"E. **Santa Cruz Islands**: SU 66887, 310 mm, Vanikolo. **Hong Kong**: SU 66884, 268 mm. **New Caledonia**: SU 19047, 485 mm, Noumea. **Grande Comore Island**: CAS 35204, 845 mm, N. of Moroni. CAS 48460, 82 mm, Itsandra. **RED SEA**: CAS 52099, 105 mm, Dahab.

Vertebral data only.—ANSP 119340, 1, Kenya. ANSP 119342, 3, Kenya. ANSP 109987, 1, Kenya. ANSP 119341,



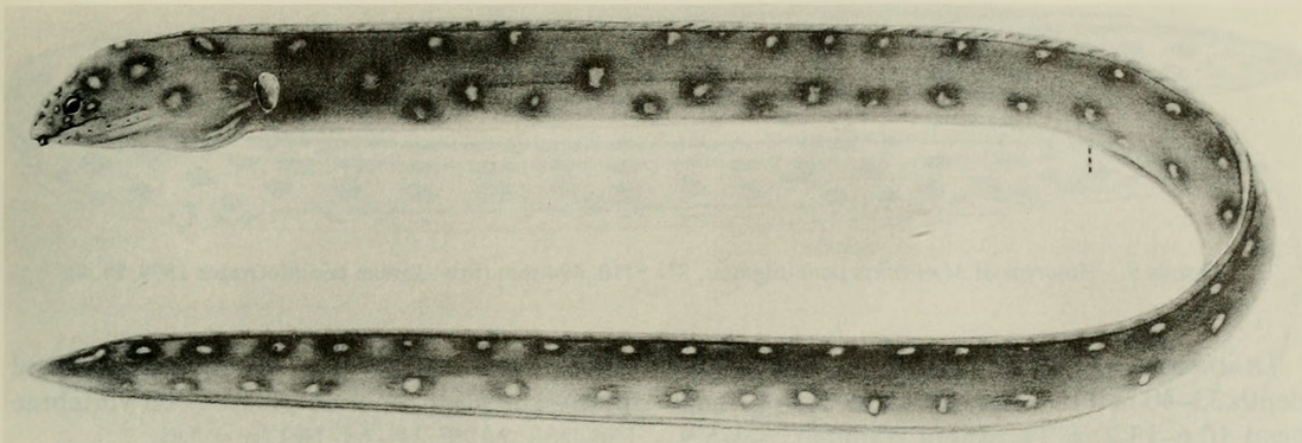


FIGURE 8. *Myrichthys ocellatus*, ANSP 98410, 494 mm (from McCosker et al. 1989, Fig. 387).

1, Aldabra. ANSP 119338, 2, Sri Lanka. ANSP 119339, 2, Sri Lanka. ANSP 90780, 1, Guam. ANSP 119592, 1, Saipan. ANSP 119346, 3, Howland Id. ANSP 109993, 1, Solomon Is. ANSP 119335, 1, Solomon Is. ANSP 119337, 1, Solomon Is.

### *Myrichthys magnificus* (Abbott)

(Table 2)

*Pisodonophis magnifica* Abbott 1861:476 (Hawaiian Islands, holotype ANSP 1013).

*Ophichthus stypurus* Smith and Swain 1882:120 (Johnston's Island, holotype USNM 26817).

**DIAGNOSIS.**—Body moderately elongate, its depth 32–45 in TL. Head and trunk 2.22–2.30 and head 13.1–14.1 in TL. Snout rounded, 4.4–5.2 in HL. Dorsal fin origin 1.5–2.0 in HL. Pectoral fin length less than its base, about 2 in snout. Head and body color yellow to tan, overlain with brown to brownish-black spots, variable in size but about equal to or smaller than eye, the spots becoming more numerous in larger specimens (see Remarks below). Total vertebrae 177–183, MVF 2-76-180 ( $n = 23$ ).

**SIZE.**—The largest specimen we examined is 780 mm long.

**ETYMOLOGY.**—From the Latin *magnificus* (splendid). An adjective.

**DISTRIBUTION.**—A common eel, found in shallow water and occasionally at the surface over sand and coral in the Hawaiian Islands, Johnston Island, the Leeward Islands, and Midway Atoll.

**REMARKS.**—The Hawaiian form of *Myrichthys* has been most recently placed in the synonymy of *M. maculosus* (cf. Gosline 1951; McCosker 1979). We herein resurrect *M. magnificus* on the basis of differences in coloration and vertebral number. Although patterned much like its wide-

spread Indo-Pacific congener, the size and number of spots, particularly as seen on large individuals, is different enough to be recognized. For example, our comparison of a 78 cm specimen from Oahu (CAS 34961) with an 84.5 cm specimen from Grande Comore (CAS 35204) clearly demonstrates that the Hawaiian form has smaller (diameter less than snout length) and rounder (not ovoid) spots on its head and flanks, and fewer and smaller (not larger than the eye) spots on the chin and throat. The holotype and the paratype of *magnifica* each have 2-76-179 vertebrae. The holotype of *Ophichthus stypurus* has two predorsal vertebrae, but was apparently damaged and had healed, thereby disallowing a total vertebral count.

**MATERIAL EXAMINED.**—ANSP 1013, 685 mm, the holotype, from the Sandwich Islands (= Hawaiian Islands), and ANSP 1014, 483 mm, a paratype, collected with the holotype. USNM 26817, 619 mm (tail damaged and healed), the holotype of *Ophichthus stypurus*, from "Johnston's Island." SU 8584, 3 (305–400 mm), Honolulu, Oahu. CAS 34961, 780 mm, Oahu. CAS 79333, 435 mm (tail damaged and regrown), between French Frigate Shoals and Kauai. CAS 79336, 2 (345–440 mm), NW of Laysan Id., Hawaiian Leeward Is. CAS 79334, 480 mm, NW of Maro Reef, Hawaiian Leeward Is. SIO 68-497, 3 (375–390 mm), Midway Id. Vertebral data only: ANSP 87609, 2, Hawaii. ANSP 119347, 3, Hawaii.

### *Myrichthys ocellatus* (Lesueur)

(Fig. 8, Table 2)

*Muraenophis ocellatus* Lesueur 1825:108 (Barbados, neotype ANSP 107304).

*Pisodonophis oculatus* Kaup 1856a:49 (Curaçao, holotype unknown).

*Ophisurus latemaculatus* Poey 1867:252 (Cuba, holotype MCZ 27223).

*Myrichthys keckii* Silvester 1916:214 (Puerto Rico, holotype PU 3082, not extant).



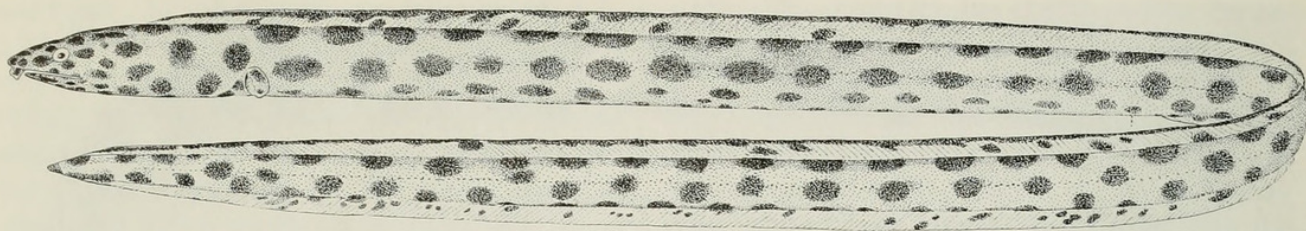


FIGURE 9. Holotype of *Myrichthys pantostigmius*, SU 5710, 494 mm (from Jordan and McGregor 1899, Pl. 4).

**DIAGNOSIS.**—Body moderately elongate, its depth 33–40 in TL. Head and trunk 2.5–2.7 and head 10.6–13.2 in TL. Snout rounded, 5.0–5.9 in HL. Dorsal fin origin 1.5–1.7 in HL. Pectoral fin length less than its base, about  $3\frac{1}{2}$  in snout. Head and body pale, overlain with diffuse dark spots with small bright centers. Total vertebrae 164–173, MVF 2–59–168 ( $n = 24$ ).

**SIZE.**—The largest specimen we examined is 1080 mm long.

**ETYMOLOGY.**—From the Latin *ocellatus* (spotted as with little eyes). An adjective.

**DISTRIBUTION.**—An insular species, known from Bermuda, the Florida Keys, throughout the West Indies, and south to Brazil. A common species, taken more often than *Myrichthys breviceps* (except in the Florida Keys where it is rare). Found in shallow grass beds and coral reefs, to depths of 7 m.

**REMARKS.**—Data for the diagnosis of this species is based primarily on McCosker et al. (1989: 377–379). Randall (1967) reported that this species (as *M. ocellatus*) fed mainly on crabs, stomatopods, and other crustaceans. Leiby (1989: 829–830) described and illustrated the leptocephalus of *M. ocellatus*.

**MATERIAL EXAMINED.**—A complete listing of the material that we examined is in McCosker et al. (1989:378–379).

### ***Myrichthys pantostigmius* Jordan and McGregor**

(Fig. 9, Table 2)

*Myrichthys pantostigmius* Jordan and McGregor 1899:2802 (type locality Clarion Island, Mexico, holotype SU 5710).

**DIAGNOSIS.**—Body moderately elongate, its depth 32–39 in TL. Head and trunk 2.22–2.45 and head 11.2–13.6 in TL. Snout rounded, 4.7–5.4 in HL. Dorsal fin origin 1.5–1.62 in HL. Pectoral fin length much less than its base, shorter than snout. Head and body tan, overlain with numerous large brown to brownish-black spots along sides and at base of dorsal fin (see Remarks

below); chin and throat with smaller spots; dorsal fin margin white, anal fin plain. Total vertebrae 158–168, MVF 2.5–61–162 ( $n = 18$ ).

**SIZE.**—The largest specimen we examined is 494 mm long.

**ETYMOLOGY.**—From the Greek *pan* (whole, entire) and *stigma* (spot). An adjective.

**DISTRIBUTION.**—Islas Revillagigedos (Mexico) and Clipperton Island. Found in shallow water (to 20 m) among rocks and sand.

**REMARKS.**—The Clipperton and Revillagigedo populations of *Myrichthys* are separable from eastern Pacific *Myrichthys* on the basis of their higher vertebral numbers. They do not appear to differ in morphometry or coloration (largely because of the variability in mainland *M. tigrinus*), however, a comparison of similar-sized individuals suggests that a difference in spot size and number may exist. For example, we compared 48-cm individuals from Clarion (CAS 33509) with those from Sonora, Mexico (CAS 18490) and observed that *M. tigrinus* has more and larger body and tail spots ( $\geq$  snout length) than does *M. pantostigmius* (spots  $\leq$  snout length). We have also observed that the basal body color of *Myrichthys* from Clipperton and the Revillagigedos often has a greenish tinge in formalin and in alcohol; we are unable to ascribe significance to that fact.

**MATERIAL EXAMINED.**—SU 5710, 494 mm, Clarion Island, Revillagigedo Islands, Mexico, the holotype. CAS 33509, 5 (434–489 mm), Clarion Id. SIO 73-64, 412 mm, Socorro Id. W 58-297, 20 (62–274), Clipperton Id.

### ***Myrichthys pardalis* (Valenciennes)**

(Table 2)

*Ophisurus pardalis* Valenciennes 1835: 90 (type locality, Canary Islands, holotype MNHN 2130).

**DIAGNOSIS.**—Body moderately elongate, its depth 33–43.5 in TL. Head and trunk 2.4–2.6 and head 1.1–1.4 in TL. Snout rounded, 4.5–6.0 in HL. Dorsal fin origin 1.5–1.8 in HL. Pectoral



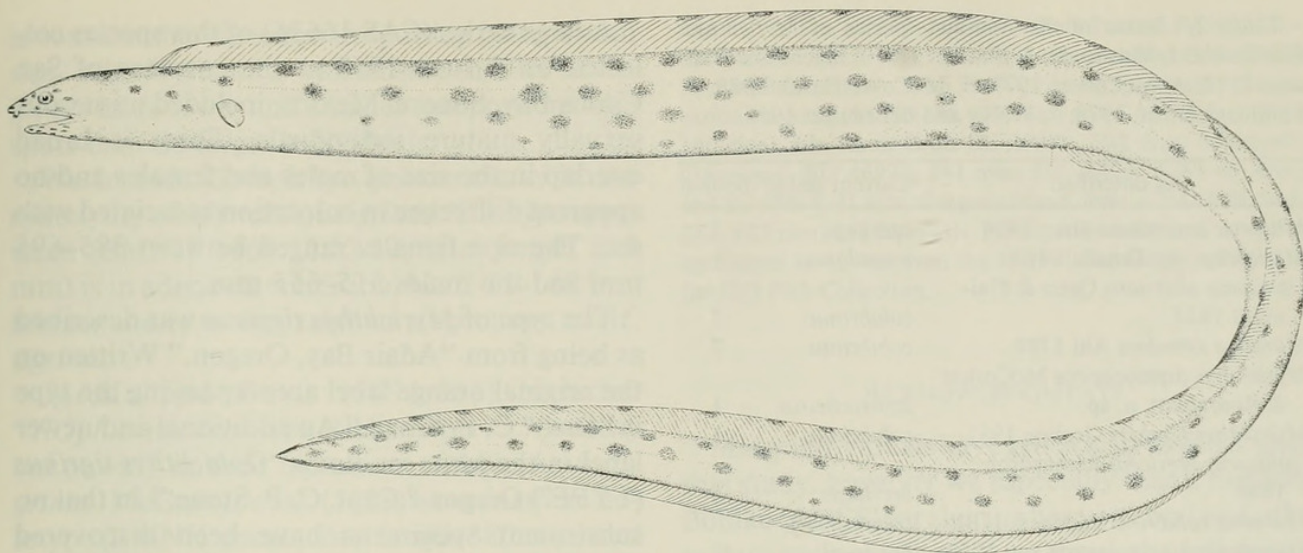


FIGURE 10. *Myrichthys tigrinus*, 617 mm (from Jordan and Evermann 1900, Fig. 166).

fin length shorter than base, about 2 in snout. Head and body yellow-orange, overlain above lateral line with a series of brown spots (23 on the holotype) with bright centers, interspaced beneath lateral line (posterior to the pectoral fin) with smaller, paler spots, also with bright centers. A single brown spot with a pale center above nape. Total vertebrae 151–159, mean = 154.5 ( $n = 5$ ).

SIZE.—The largest specimen described by Blache and Cadenat (1971) is the holotype, 648 mm long.

ETYMOLOGY.—From the Greek *pardalis* (leopard). A noun in apposition.

DISTRIBUTION.—Known from the oceanic islands of the eastern Atlantic, including Sao Tomé, the Cape Verdes, and the Gulf of Guinea.

REMARKS.—The information and data concerning this species are based upon Blache and Cadenat (1971) and McCosker et al. (1989). Blache and Cadenat erred in including *Ophichthys* (*Sphagebranchus*) *guineensis* Osorio (1894) in the synonymy of *pardalis*. It is now recognized as a trans-Atlantic species of *Callechelys* (Blache et al. 1979; McCosker et al. 1989).

MATERIAL EXAMINED.—MNHN 2130, 648 mm, the holotype, from the Canary Islands. BMNH 1935.7.10.1 and BMNH 1937.2.10.2, Cape Verde Islands.

### *Myrichthys tigrinus* Girard

(Fig. 10, Table 2)

*Myrichthys tigrinus* Girard 1859:58 ("Adair Bay, Oregon," most probably from Bahia Adair, Sonora, Mexico, holotype USNM 8810).

*Ophichthys quincunciatus* Günther 1870:83 ("Habitat —?"), holotype BMNH 1864.12.12.32).

*Ophichthys xysturus* Jordan and Gilbert 1882:346 (Mazatlan, Mexico, syntype USNM 28247).

*Callechelys peninsulae* Gilbert 1892:548 (La Paz Bay, Gulf of California, holotype USNM 44297).

DIAGNOSIS.—Body moderately elongate, its depth 26–37 in TL. Head and trunk 2.2–2.5 and head 10.7–12.4 in TL. Snout rounded, 4.9–5.5 in HL. Dorsal fin origin 1.44–1.58 in HL. Pectoral fin length much less than its base, shorter than snout. Head and body tan, overlain with numerous large brown spots along sides and at base of dorsal fin. Total vertebrae 148–157, MVF 3–59–153 ( $n = 53$ ).

SIZE.—The largest specimen we examined is 729 mm long.

ETYMOLOGY.—From the Latin *tigrinus* (like a tiger). An adjective.

DISTRIBUTION.—Baja California to Peru, including the Galapagos Islands. Generally found over sand and rock bottoms from tidepool depths to 60 m.

REMARKS.—The abundance of specimens of this species has convinced us of the variability in its coloration. Like its dark-spotted congeners, larger specimens typically have more and proportionately larger spots. The spots of larger specimens ( $> 50$  cm) reach and may extend onto the dorsal fin base. The dorsal fin margin is white; the anal fin is pale. There are approximately three rows of spots on the flanks, with smaller spots on the chin, throat, and belly. Small specimens ( $< 20$  cm) have dorsal and lateral spotting, but few on the chin and ventral surface.



TABLE 3. Status of the nominal species of *Myrichthys*. Sources are: 1, This study; 2, Blache 1975; 3, Blache and Cad-enat 1971; 4, McCosker 1979; 5, McCosker et al. 1989; 6, Tominaga in litt. 1978; 7, Weber and deBeaufort 1916.

As described	Current status	Source
<i>Muraena acuminata</i> Gray 1854	<i>breviceps</i>	1
<i>Myrichthys aki</i> Tanaka 1917	<i>maculosus</i>	1
<i>Ophisurus alternans</i> Quoy & Gai-mard 1824	<i>colubrinus</i>	7
<i>Muraena annulata</i> Ahl 1789	<i>colubrinus</i>	7
<i>Myrichthys aspetocheiros</i> McCosker & Rosenblatt, n. sp.	<i>aspetocheiros</i>	1
<i>Myrichthys bleekeri</i> Gosline 1951	<i>colubrinus</i>	1
<i>Ophisurus breviceps</i> Richardson 1844	<i>breviceps</i>	5
<i>Muraena colubrina</i> Boddaert 1781	<i>colubrinus</i>	
<i>Pisoodonophis coronata</i> Kaup 1860	<i>breviceps</i>	5
<i>Ophichthys dromicus</i> Günther 1870	<i>maculosus</i>	2
<i>Chlevastes elaps</i> Fowler 1912	<i>colubrinus</i>	7
<i>Ophichthys elapsoides</i> Castelnau 1875	<i>colubrinus</i>	1
<i>Muraena fasciata</i> Ahl 1789	<i>colubrinus</i>	7
<i>Ophisurus fasciatus</i> var. <i>latifasciata</i> Bleeker 1864	<i>colubrinus</i>	1
<i>Ophisurus fasciatus</i> var. <i>oculata</i> Bleeker 1864	<i>colubrinus</i>	1
<i>Ophisurus fasciatus</i> var. <i>semicineta</i> Bleeker 1864	<i>colubrinus</i>	1
<i>Pisodonophis guttulatus</i> Kaup 1856a	<i>breviceps</i>	5
<i>Pisodonophis guttulatus</i> Kaup 1856b	<i>breviceps</i>	5
<i>Myrichthys keckii</i> Silvester 1916	<i>ocellatus</i>	5
<i>Ophisurus latemaculatus</i> Poey 1867	<i>ocellatus</i>	5
<i>Ophisurus longus</i> Poey 1876	<i>breviceps</i>	5
<i>Muraena maculosa</i> Cuvier 1816	<i>maculosus</i>	
<i>Pisodonophis magnifica</i> Abbott 1861	<i>magnificus</i>	1
<i>Ophichthus miyamotoi</i> Tanaka 1913	<i>maculosus</i>	6
<i>Ophichthys naja</i> de Vis 1884	<i>colubrinus</i>	7
<i>Muraenophis ocellatus</i> Lesueur 1825	<i>ocellatus</i>	5
<i>Pisodonophis oculatus</i> Kaup 1856a	<i>ocellatus</i>	5
<i>Pisodonophis oculatus</i> Kaup 1856b	<i>ocellatus</i>	5
<i>Myrichthys pantostigmus</i> Jordan & McGregor 1899	<i>pantostigmus</i>	1
<i>Ophisurus pardalis</i> Valenciennes 1835	<i>pardalis</i>	3
<i>Callechelys peninsulæ</i> Gilbert 1892	<i>tigrinus</i>	1
<i>Ophichthys pisavarius</i> Poey 1880	<i>breviceps</i>	5
<i>Ophichthys quincunciatus</i> Günther 1870	<i>tigrinus</i>	1
<i>Myrichthys rupestris</i> Snyder 1911	<i>maculosus</i>	1
<i>Ophichthus stypurus</i> Smith & Swain 1882	<i>magnificus</i>	1, 4
<i>Muraena tigrina</i> Rüppell 1830	<i>maculosus</i>	1
<i>Leptocephalus undulatus</i> Strömman 1896	<i>breviceps</i>	5
<i>Ophichthys xysturus</i>	<i>tigrinus</i>	1

A large series (CAS 16626) of this species collected on 4 June 1950 at the entrance of San Carlos Bay, Sonora, Mexico, included numerous sexually mature individuals. There is broad overlap in the size of males and females and no apparent difference in coloration associated with sex. The ripe females ranged between 385–695 mm and the males 515–655 mm.

The type of *Myrichthys tigrinus* was described as being from “Adair Bay, Oregon.” Written on the original orange label accompanying the type is “Ore. ? C. P. Stone.” An additional and newer label in the same jar states “*Ophichthys tigrinus* (TYPE?) Oregon ? Capt. C. P. Stone.” In that no subsequent specimens have been discovered north of the lower Baja Peninsula, and there is no Adair Bay in Oregon, we suggest that the specimen more likely came from Bahia Adair, Sonora, Mexico. Harry (1948) cited a specimen (CAS 20236, 508 mm) that “bore no other data than ‘San Francisco Bay, Calif. Presented by a fisherman, June 1931’ ”. We discount that record and suggest that it probably refers to Bahia San Francisco, Baja California. Further evidence that it is from a more tropical locale is provided by its reproductive state; it is a female with well-developed ova.

The existence of *Muraena tigrina* Rüppell (1830), a junior synonym of *Myrichthys maculosus* (Cuvier 1817), creates a potential homonymy with *Myrichthys tigrinus* Girard. On that basis, recent authors (McCosker 1977, 1979; Thomson et al. 1979) have adopted the name *Myrichthys xysturus* (Jordan and Gilbert 1882) for Girard’s species. Subsequently, the late W. I. Follett advised us that such action is unnecessary if the binomen *Myrichthys tigrinus* (Rüppell) had not been used and that *Myrichthys tigrinus* Girard had not been replaced at any time before 1961. We presume that to be the case. Follett therefore suggested that Girard’s binomen is but a potential junior homonym and that it has not been permanently rejected in accordance with Article 59 of the Rules of Zoological Nomenclature.

Storey (1939) provided an extensive treatment of *Myrichthys tigrinus* and its synonymy. As well, she expanded upon Gilbert and Starks’ (1904) observation that larger specimens have more numerous and more granular dentition, and observed, as did Gilbert and Starks (1904) and Meek and Hildebrand (1923) and as we have, that there



is considerable variation in spotting pattern with size. Like *Myrichthys maculosus*, smaller *M. tigrinus* have fewer and smaller (proportionately) spots than do larger individuals.

We include *Ophichthys quincunciatus* in the synonymy of *Myrichthys tigrinus*. The type specimen (BMNH 1864.12.12.32, total length 655 mm) is in adequate condition, has 2-61-148 vertebrae, and is recognizable as a specimen of *M. tigrinus*.

Jordan and Davis (1891:618) included “*Ophisurus breviceps* Richardson . . . (locality unknown)” in their treatment of *Myrichthys tigrinus*. McCosker et al. (1989) examined the holotype (BMNH uncat., total length 880 mm) and recognized it to be the senior synonym of the Atlantic species formerly known as *Myrichthys acuminatus*.

We have examined numerous examples of spotted eastern Pacific *Myrichthys* and have difficulty in separating them, other than by vertebral counts, from their Pacific congener, *M. maculosus*. McCosker (1979:63–64) anguished over this apodal anomaly and was “. . . resigned to recognize these populations at a subspecific level.” After subsequent examination of more than 11,000 vertebral centra, we have concluded that the eastern Pacific populations of *Myrichthys* differ from those of the central and western Pacific and Indian oceans, and may be recognized as *M. tigrinus* and *M. pantostigmus*.

**MATERIAL EXAMINED.**—USNM 8810, 640 mm, a female with eggs, “Adair Bay, Oregon,” the holotype of *Myrichthys tigrinus*. USNM 28247, 291 mm, Mazatlan, a syntype of *Ophichthys xysturus*. USNM 44297, 264 mm, La Paz, Mexico, the holotype of *Callechelys peninsulæ*.

**MEXICO**—CAS 26030, 601 mm; and SU 33922, 575 mm, San Felipe. CAS 79429, 399 mm, Bahía de Los Angeles. CAS 79411, 2 (201–268 mm), Bahía Concepción. CAS 79406, 2 (176–187 mm), Bahía Santa Inez. CAS 79405, 13 (142–265 mm), Pta. Pordeones. CAS 79407, 3 (201–230 mm); and CAS 79404, 75 mm, Pta. de las Cuevas. SU 39792, 325 mm; and CAS 79414, 604.5 mm, Isla Partida. SIO 61–277, 2 (153–161 mm), Isla Espiritu Santo. CAS 20236, 508 mm, “San Francisco Bay,” presumably Bahía San Francisco, Baja California. CAS 79412, 215 mm, Tetas de Cabra. SU 17944, 108 mm, Isla Cerralbo. CAS 79409, 520 mm, La Paz. SIO 65–182, 8 (581–729), Almejas Bay. CAS 20240, 246 mm, Bocachibampo. CAS 79408, 616 mm, Sonora. CAS 794332, 190 mm; CAS 79431, 20 (110–140 mm); and CAS 16626, 29 (185–695 mm), San Carlos. CAS 18490, 2 (240–305 mm); and CAS 79413, 635 mm, Guaymas. SU 3238, 2 (600–682 mm), Mazatlán. SU 19045, 75 mm, Islas Tres Marias, Cleopha Id. NICARAGUA—SU 46974, 435 mm, Cornito. COSTA RICA—SU 46971, 4 (111–147 mm), Uvita Bay. CAS 79401, 146 mm; SU 46402, 123 mm; SU 57312, 69 mm;

and SU 46975, 2 (232–312 mm), Port Parker. PANAMA—SU 46970, 20 (63–406); SU 57314, 86 mm; and CAS 79402, 71 mm, Bahía Honda. CAS 79403, 97 mm, Ft. Amador. GALAPAGOS ISLANDS: CAS 23736, 474 mm; and CAS 3962, 2 (295–380 mm), Isla Santa Cruz. SU 37372, 298 mm, Albemarle. COLOMBIA—SU 46972, 241 mm; SU 46973, 3 (61–86 mm); and SU 68868, 71 mm, Gorgona Island. PERU—IMARPE 54aI: 282, 683 mm, Isla Lobos de Tierra. Also examined were 518 specimens in 81 lots from the Gulf of California, retained in the SIO Fish Collection.

#### ACKNOWLEDGMENTS

Many individuals have generously assisted with this study, however we especially thank Eugenia Böhlke (ANSP) for sharing her vertebral and other data with us. As well, we thank the following: David Catania (CAS) for the preparation of radiographs; Elizabeth Parker for the preparation of Figures 1–2; the late W. I. Follett (CAS) for nomenclatural advice; the Janss Foundation for our participation in the SEARCHER cruises; Ira Rubinoff for aiding us while studying eels in Panama; Susan Jewett for assistance with USNM illustrations; Bruce Halstead for permission to use Figure 6; and Carl J. Ferraris, Jr., for reading an early draft of this manuscript. Numerous curators have allowed us to examine specimens in their care, including: E. Böhlke (ANSP); J. Paxton and D. Hoese (Australian Museum, Sydney); O. Crimmin (BMNH); J. E. Randall (BPBM); W. Eschmeyer and T. Iwamoto (CAS); W. D. Anderson (GMBL); L. Fishelson (Hebrew University); K. Hartel (MCZ); M. Bauchot and J. Blache (MNHN); R. McKay (QM); the late M. M. Smith (Rhodes University); H. J. Walker (SIO); B. W. Walker (UCLA); W. Bussing (UCR); W. A. Gosline (then of UH); C. R. Robins (UMML); the staff of the National Museum (USNM); T. Pietsch, (UW); and Y. Tominaga (ZUMT).

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