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SYNONYMIES OF INDIAN OCEAN EELS, WITH THE  
DESCRIPTION OF *GYMNOTHORAX ENIGMATICUS*,  
A MORAY PREVIOUSLY KNOWN AS *G. RUPPELI*

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**ABSTRACT:** The common, banded Indo-Pacific morays called *Gymnothorax petelli* (Bleeker, 1856) and *G. ruppeli* (McClelland, 1845) by recent authors are recognized as *G. rueppelliae* (McClelland, 1845) and *G. enigmaticus* n.sp., respectively. They are separable on the basis of coloration, vertebrae, and morphology and have different geographic ranges. *G. signifier* Bliss, 1883, is placed in the synonymy of *G. rueppelliae*, along with *Muraena umbrofasciata* Rüppell, 1852; *M. interrupta* Kaup, 1856; *Sideria chlevastes* Jordan and Gilbert, 1883; *G. leucacme* Jenkins, 1904; and *G. waialuae* Snyder, 1904. The moray *Uropterygius xanthopterus* Bleeker, 1859, is recognized as distinct from *U. marmoratus* (Lacépède, 1803), and *U. alboguttatus* Smith, 1962, is synonymous with it. *Ophichthus retifer* Fowler, 1935, from Durban, South Africa, is a synonym of *O. erabo* (Jordan and Snyder, 1901), an ophichthid also known from Hawaii, Japan, and Taiwan.

INTRODUCTION

In preparation for the publication of the eel section of the revised *Sea Fishes of Southern Africa* (McCosker and Castle, ms), we assign several poorly known taxa to synonymy and provide a description for a common, conspicuously banded Indo-Pacific moray, *Gymnothorax ruppeli* of earlier authors, which lacks a holotype and scientific name.

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. Vertebral counts (which include the hypural) were taken from radiographs. Materials used in this study are housed at the following institutions: Academy of Natural Sciences of Philadelphia (ANSP); Bernice P. Bishop Museum (BPBM); British Museum of Natural History (BMNH); California Academy of Sciences (CAS); U.S. National Museum of Natural History (USNM); Museum of Comparative Zoology, Harvard University (MCZ); J. L. B. Smith Institute of Ichthyology, Rhodes University (RUSI); Natur-Museum Senckenberg (SMF); and the Scripps Institution of Oceanography (SIO). Paratypes of the new species will also be deposited at the



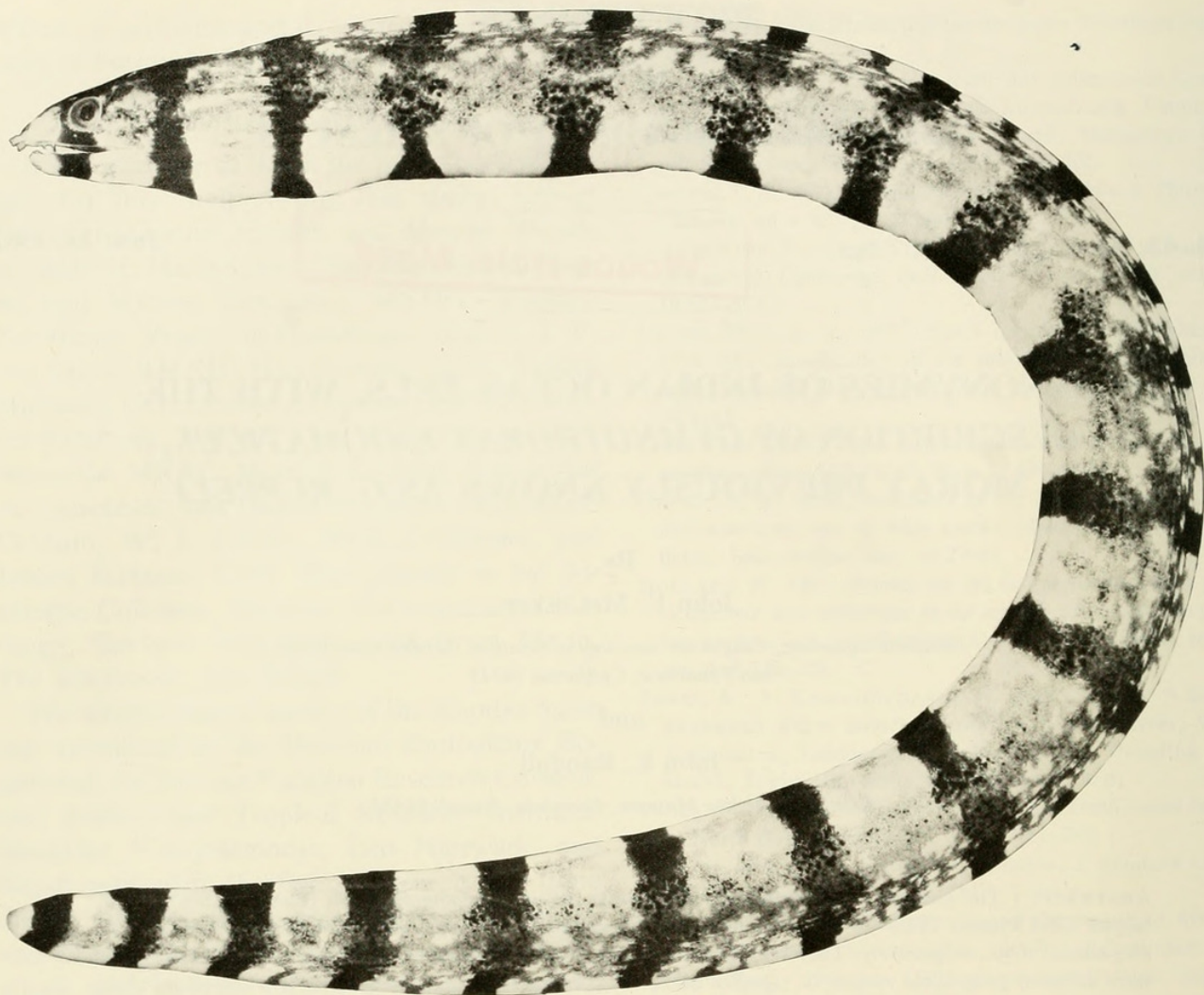


FIGURE 1. Paratype of *Gymnothorax enigmaticus* n.sp., BPBM 9491, 335 mm TL, from Palau.

Museum National d'Histoire Naturelle, Paris (MNHN), the BMNH, and the USNM.

#### FAMILY MURAENIDAE

#### *Gymnothorax enigmaticus*, new species

(Figure 1)

**Holotype.**—CAS 48815, 303.2 mm total length, a male (?) collected with rotenone in a 0–1-m tidal flat, off southern corner Ngatchab Beach, Angaur I., Palau, Western Caroline Is., by H. DeWitt, Sumang, and Sengich, 21 Oct. 1957.

**Paratypes.**—Collected in shallow coral reef flats and tide-pools (0–3 m) using rotenone ichthyocides. PALAU: CAS 48823 (8; 51–299 mm), Angaur I., H. DeWitt et al., 22 Oct. 1957. CAS 48817 (293 mm), Auluptagel I., H. Fehlmann et al., 10 Aug. 1955. CAS 48816 (335.5 mm), Ngethil I., Sumang and R. Johanness, 13 July 1959. CAS 48822 (2; 238–257 mm), Aulong I., Sumang, 5 Nov. 1959. CAS 48826 (301.5 mm), Urukthapel I., H. Fehlmann et al., 19 Aug. 1955. BPBM 9491 (335 mm), Malakal Harbor, A. Emery, 21 Apr. 1970. KAPINGAMARINGI: CAS 48818 (163.8 mm), Thokotaman, R. Harry, 12 July 1954. IFALUK ATOLL: CAS 48819 (174 mm), Falarik Islet, R. Harry, 26 Sep. 1953. GUAM: CAS 48820 (214.4 mm), N of Cocos Is., Nangauta and H. Fehlmann, 8 Oct. 1958. ENEWETAK ATOLL:

CAS 42377 (144 mm), Runit I., R. Nolan and L. Taylor, Jr., 23 Feb. 1974. BPBM 8184 (127 mm), Enewetek I., J. Randall, 1 Dec. 1967. BPBM 22339 (2; 219–233 mm), Enjebi I., J. Randall et al., 27 Apr. 1978. BIKINI ATOLL: BPBM 12354 (310 mm), Eman I., V. Brock et al., 18 June 1947. LINE IS.: CAS 48825 (302 mm), Palmyra I., E. Herald et al., 16 Aug. 1951. BPBM 7715 (2; 310–393 mm), Cooper I., J. Randall, 13 Nov. 1968. HONG KONG: CAS 48821 (3; 79–88 mm), Santa Cruz Is., Vanikoro I., R. Bolin, 30 Sep. 1958. INDONESIA: BPBM 20890 (2; 103–383 mm), Bali, Sanur Beach, J. Randall, 18 July 1977. THAILAND: BPBM 22827 (460 mm), Similan I., Ko Miang, J. Randall, 14 Feb. 1979. PHILIPPINES: CAS 48824 (2; 508–518.5 mm), Negros Oriental, D. Empero, 28 July 1958.

**DIAGNOSIS.**—A moderate-length species of *Gymnothorax* with anus before midbody; tubular anterior nostrils; uniserial jaw and vomerine teeth; and cream body coloration with 17–21 distinctive brown bands encircling head and body and extending onto fins.

**DESCRIPTION OF HOLOTYPE** (followed parenthetically by mean and range of the condition of holotype and nine paratypes).—Greatest depth



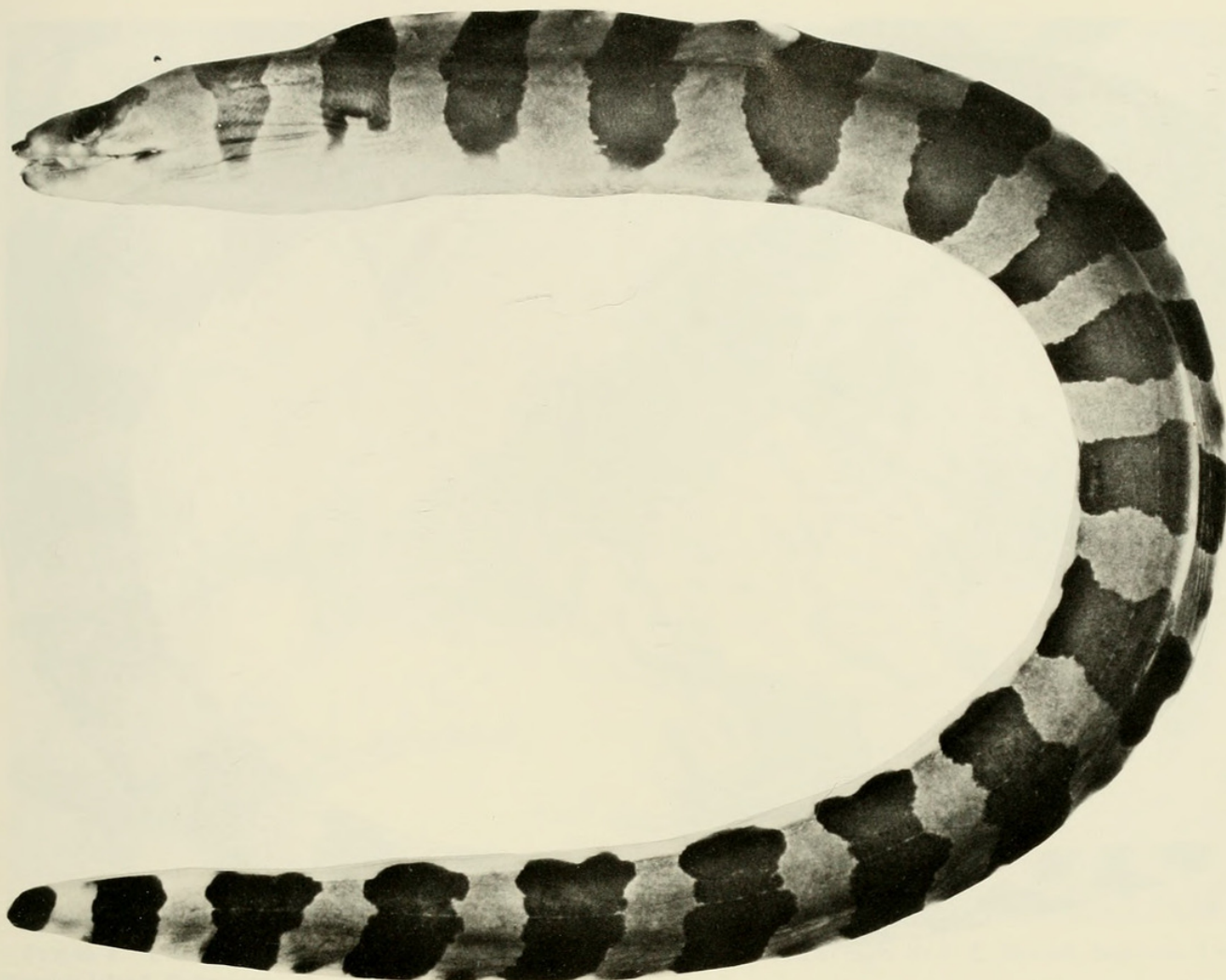


FIGURE 2. *Gymnothorax rueppelliae*, BPBM 18412, 339 mm TL, from Enewetak.

of body 16.8 (19.0; 15.4–22.7) times in total length (TL). Tail longer than body, its length 1.76 (1.76; 1.71–1.82) in TL. Head 7.94 (7.69; 7.19–8.19) and trunk 3.26 (3.30; 3.19–3.55) in TL. Dorsal fin low, its origin ahead of gill openings, arising above fourth vertebra. Snout 6.37 (5.76; 5.29–6.37), upper jaw 3.01 (2.78; 2.65–3.01) times in head length (HL). Eye 9.5 (9.4; 8.3–10.4) in HL and 1.5 (1.63; 1.4–1.9) in snout, closer to rictus than to tip of snout. Fleshy interorbital width 7.8 (8.4; 7.7–9.9) in HL. Gill openings nearly horizontal, their centers slightly below midbody, their length about equal to diameter of eye.

Anterior nostril tubular, elongate, slightly less than eye diameter in length. Posterior nostril a hole above eye, beginning in a line with eye.

Jaws subequal, the mouth closing completely. Teeth in jaws uniserial, stout, pointed and slightly retrorse. Six pairs of intermaxillary canines

form a U-shaped margin around three central canines, the third the largest. Approximately six uniserial, small vomerine teeth. About 12 upper jaw teeth pairs, 18 lower jaw pairs; 3 pairs of depressible canines behind mandibular symphysis.

Number of vertebrae 130 (129.7; 128–131), 50.5 (50.8; 50–51.5) before anal fin. First dorsal pterygiophore arises above fourth vertebra.

Head pores present but not obvious. A single pore anterior and proximal to, and a second pore below base of anterior nostril. Six pores along the mandible, the second through fifth the largest. Four equally spaced pores along upper jaw, the first beneath nostril base, the last beneath rear of eye. A single pore between anterior and posterior nostrils.

Color in isopropyl alcohol cream, overlain with 17–21 distinctive brown bands which completely encircle head and body and extend onto



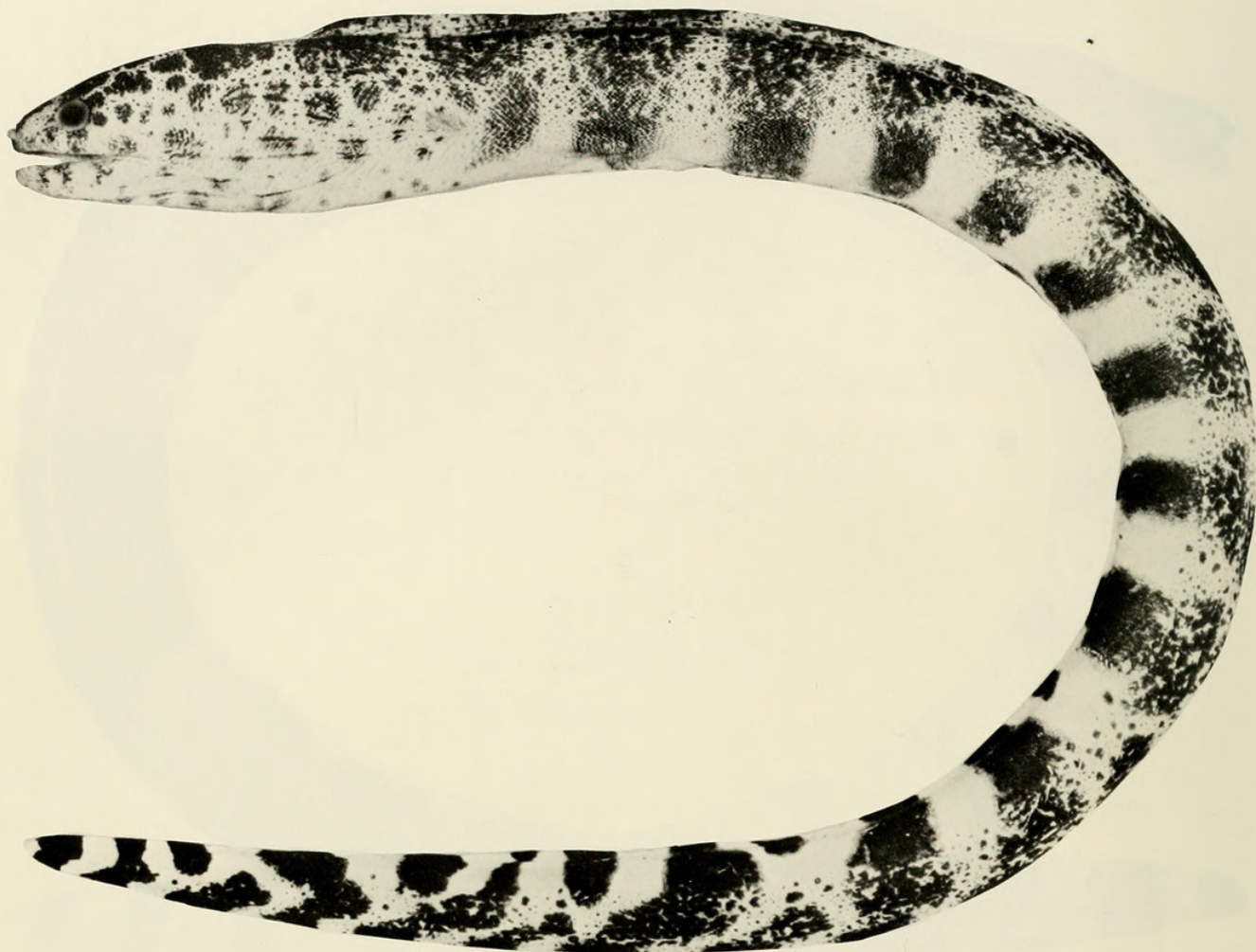


FIGURE 3. *Gymnothorax reticularis*, BPBM 18734, 492 mm TL, from Hong Kong.

median fins. The light interspacing of large individuals becomes mottled. The first brown band begins mid-snout, ends at the hind margin of the eye, and is continuous with lower jaw. The second begins at the rictus. Tail tip and anterior nostrils not dark, like body coloration. Bleeker's *Atlas* (1864: pls. 177 and 183, as *G. reticularis*) contains excellent illustrations showing juvenile and adult colorations.

**DISTRIBUTION.**—On the basis of our specimens, field records, and valid literature records, the new species is known to range widely within the central and western Pacific (excluding Hawaii and Australia) and Indian oceans to Aldabra and the Seychelles. Red Sea records (Günther 1910; Fowler 1956) are based on Klunzinger's (1871) misidentification of specimens of *G. rueppelliae*.

**ETYMOLOGY.**—Named *enigmaticus*, from the Latin *aenigma*, in the light of the nomenclatural confusion surrounding this species.

**REMARKS.**—Some recent authors have divid-

ed *Gymnothorax* into *Lycodontis* for those morays without serrated lateral jaw teeth, and *Gymnothorax* for those with serrated lateral jaw teeth. We conservatively recognize only *Gymnothorax* because species intermediate in this condition exist.

Two common Indo-Pacific species of *Gymnothorax* share a distinctive brown banding. These were treated by most recent authors as *G. petelli* (Bleeker, 1856) and *G. rupelli* (McClelland, 1845).<sup>\*</sup> On examining the holotypes, the junior author (Randall 1973) discovered that they were both the *G. "petelli"* form. Thus, *G. petelli* was placed in the synonymy of *G. rueppelliae*, and the species described herein lacked a name. Following Schultz (*in* Schultz et al. 1953), Randall (1973) suggested that *G. reticu-*

<sup>\*</sup> McClelland's species was named *Dalophis Rüppelliae*, properly *rueppelliae* (*fide* McCosker and Rosenblatt 1975), but has been variously and improperly emended to *rupelli*, *rupeli*, *ruppelli*, and *ruppellii*.





FIGURE 4. Underwater photograph of adult *Gymnothorax enigmaticus* taken at night by J. E. Randall, depth ca. 1 m, Sumilon Island, Philippines.

*laris* Bloch, 1795, was the next available name, but McCosker and Rosenblatt (1975) pointed out that it is a valid and different species. We have subsequently examined the 395-mm holotype (SMF 151) of *Dalophis Rüppelliae* and compared it to other Indo-Pacific specimens of the “*petelli*” form. It is in excellent condition and clearly conspecific. It has 135 vertebrae, with 50 preanal and 4 before the first dorsal pterygiophore.

Dr. Wolfgang Klausewitz has brought our attention to *Muraena umbrofasciata* Rüppell, 1852, an obscure species which has not been reported since its description. On the basis of McClelland’s type-specimen of *Dalophis Rüppelliae* and two specimens from India (SMF 2870, SMF 7346) received by Rüppell in 1845 from M. Boissena, Rüppell (1852:33) described *M. umbrofasciata*, which we herein recognize as a synonym of *Gymnothorax rueppelliae*.

Smith’s (1962:434) suggestion that *Gymnothorax signifer* Bliss, 1883, was a synonym of *G. “rueppelli”* prompted us to examine the ho-

lotype, a 180-mm specimen from Mauritius. Its chin, throat, and anterior trunk bands are discontinuous, and it is clearly a specimen of the “*petelli*” form, *G. rueppelliae*. The holotype of *G. signifer* (MCZ 6147) has 132 vertebrae, 51 preanal; the vertebral range of six specimens of *G. rueppelliae* was 132–135, with a mean of 133.7.

The new species is closely related to *G. rueppelliae* (Fig. 2), and might also be confused with *G. reticularis* (Fig. 3). It differs from *G. rueppelliae* in possessing light, rather than dark, anterior nostrils, in having continuous chin and throat bands, in lacking a black mark at the jaw corner, and in attaining a considerably smaller adult size. It differs from *G. reticularis*, which is heavily spotted in the head and throat regions and lacks the three prominent intermaxillary fangs.

The “*petelli*” form, *G. rueppelliae*, is known from shallow water collections from Hawaii, throughout the Pacific and Indian oceans, and



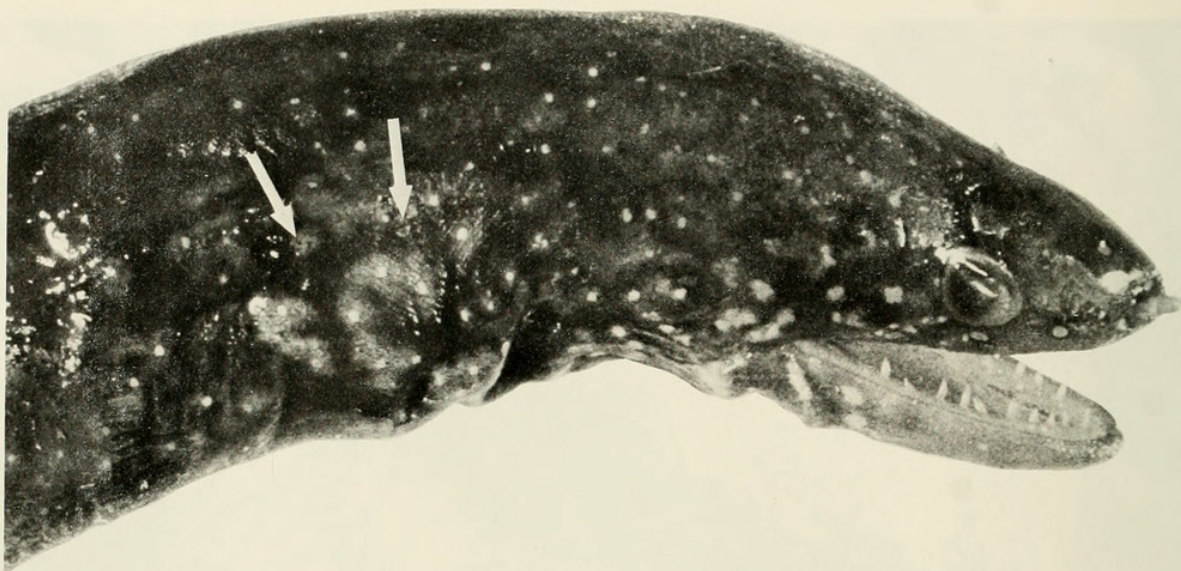


FIGURE 5. *Uropterygius xanthopterus*, CAS 35254, 245 mm TL, from Kapingamaringi, displaying white cephalic punctations. Arrows indicate the location of the anterior lateral line pores.

the Red Sea. Its synonyms also include *Muraena interrupta* Kaup, 1856; *Sideria chlevastes* Jordan and Gilbert, 1883; *Gymnothorax signifer* Bliss, 1883; *G. leucacme* Jenkins, 1904; and *G. waialuae* Snyder, 1904.

Whereas previous literature has suggested that most morays are nocturnal, it now appears that many, and possibly the majority of, moray species are diurnal but rarely observed due to their secretive nature (fide Chave and Randall 1971; Hobson 1974). On the basis of material collected and our observations while diving, we presume that *G. enigmaticus* is a shallow-water, nocturnally active piscivore (Fig. 4). It is noteworthy that *G. rueppelliae* is also a nocturnal predator (Hobson 1974, as *G. petelli*), as is *G. undulatus* (our observations), both of which are also strongly banded species.

#### ***Uropterygius xanthopterus* Bleeker, 1859**

*Uropterygius xanthopterus* Bleeker, 1859, has had a sketchy taxonomic history. We have located the type-specimen, recognize it as a valid species, and include *U. alboguttatus* Smith, 1962, in its synonymy.

Weber and de Beaufort (1916:397), without comment, included *U. xanthopterus* in the synonymy of *Gymnomuraena marmorata* Lacépède, 1803, a wide-ranging, elongate Indo-Pacific species of *Uropterygius* which possesses a single anterior lateral line pore and lacks white spotting on its head. Schultz (in Schultz et al. 1953:154) and Gosline (1958:226), on the basis

of central Pacific specimens, recognized *U. xanthopterus* as a distinct small species (the largest of 213 specimens from 76 CAS rotenone collections in the Indian and central Pacific oceans which we examined was 345 mm) which possesses two anterior lateral line pores and white cephalic punctations (Fig. 5). Smith (1962:427) again synonymized *U. xanthopterus* with *U. marmoratus* and described *U. alboguttatus* on the basis of Indian Ocean and Schultz's central Pacific specimens. In describing *U. kamar* McCosker and Randall, 1977, we considered *U. alboguttatus* to be a possible synonym of *U. xanthopterus*. One of us (JEM) has subsequently examined the complete type-series of *U. alboguttatus* and was unable to find differences in coloration, meristic features, or morphometry.

The type-specimen of *U. xanthopterus* has not been clearly identified; however, through correspondence with Alwyne Wheeler, we have located the 275-mm specimen in the British Museum (cat. no. 1867.11.28.271) received from Bleeker and labeled "*Muraena xanthopterus*." In that no specimen similar to Bleeker's type exists in the Rijksmuseum (M. Boeseman, in litt.), we presume that this is the type, and the specimen which Bleeker illustrated and described in his *Atlas* (1864:pl. CLXIV, fig. 4). A radiograph of the British Museum specimen clearly indicates that it is not *U. marmoratus*, a species which possesses obvious, large intramuscular bones.



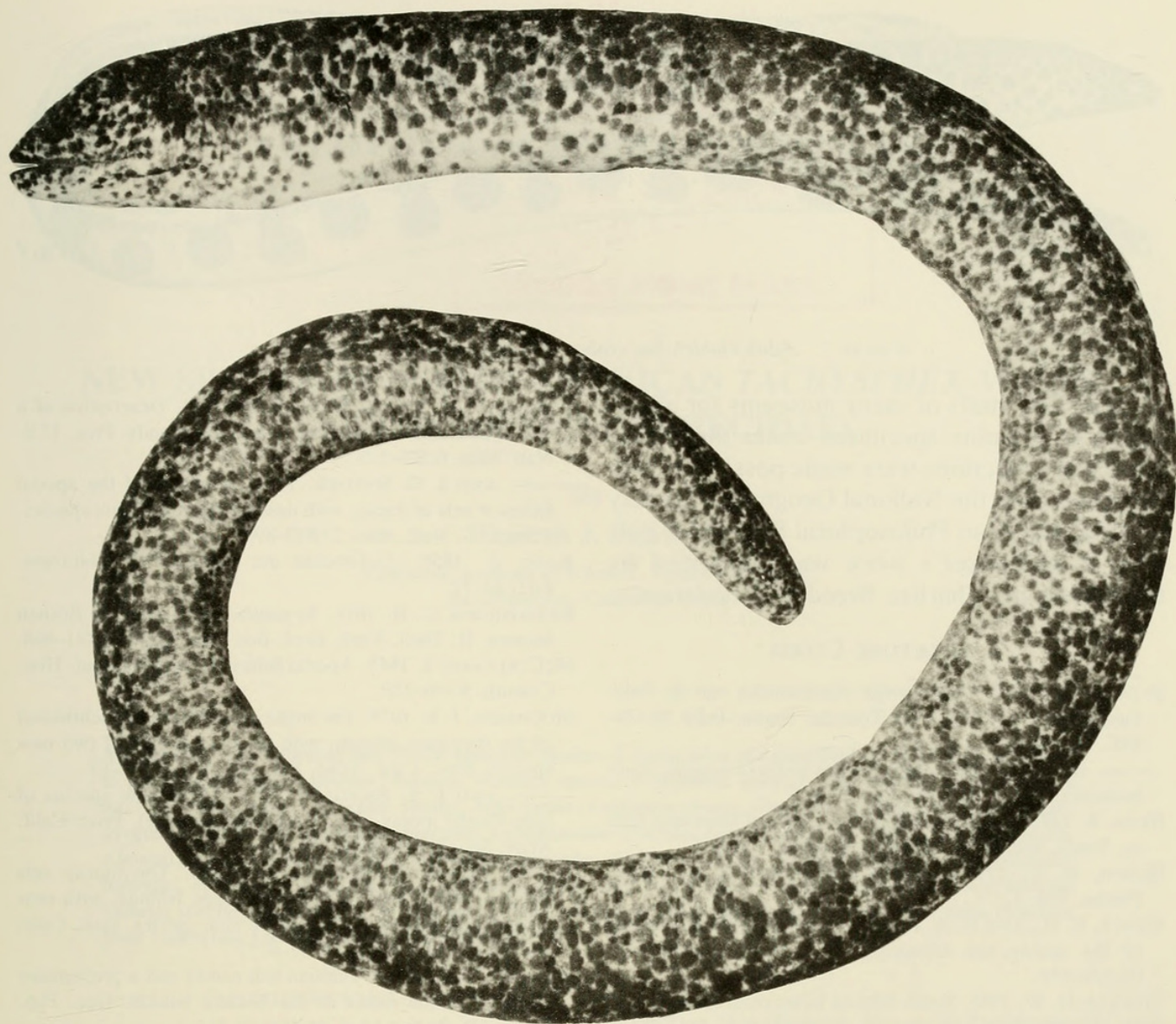


FIGURE 6. *Uropterygius marmoratus*, BPBM 12336, 701 mm, Nuku Hiva, Marquesas.

#### FAMILY OPHICHTHIDAE

##### *Ophichthus retifer* Fowler, 1935

Fowler (1935) described and illustrated *Ophichthus retifer* on the basis of a 718-mm specimen from Durban, Natal. Eugenie Böhlke has kindly examined the holotype (ANSP 63915) for us and compared it with a syntype (ANSP 26224) of *O. erabo* (Jordan and Snyder, 1901) from Japan. They do not significantly differ in coloration or proportions, yet there is a vertebral difference. A radiograph of the holotype of *O. retifer* shows 143 vertebrae, with 73 before the anal opening. McCosker (1979) reported that six specimens of *O. erabo* from Japan, Hawaii, and Taiwan had 152–155 vertebrae ( $\bar{x} = 154$ ). Fowler (1935) suggested that *O. retifer* was “greatly like *Microdonophis fowleri* Jordan and Ever-

mann 1903” (= *O. erabo* fide McCosker 1979) “and its synonym *Ophichthys garretti* Günther 1910” (a valid species). We consider *O. retifer* to be conspecific with *O. erabo*, and account the vertebral difference to clinal variation.

#### ACKNOWLEDGMENTS

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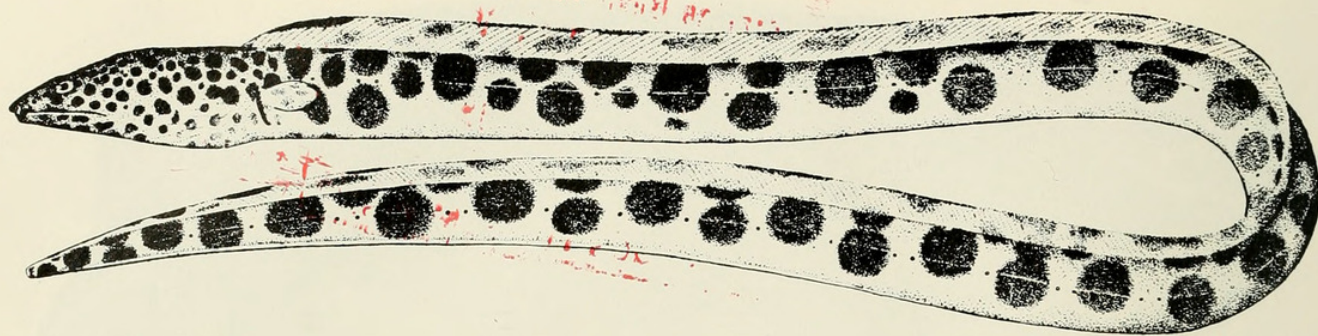


FIGURE 7. Adult *Ophichthus erabo*, from Jordan and Snyder (1901).

curators and staffs of many museums for allowing us to examine specimens under their care. Randall's collections were made possible in part by grants from the National Geographic Society and the American Philosophical Society. A portion of McCosker's work was supported by funds from the Charline Breeden Foundation.

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