

**A New Species of Indo-Pacific Moray Eel  
(Anguilliformes: Muraenidae) From Indonesia**

**John E. McCosker<sup>1</sup> and John E. Randall<sup>2</sup>**

<sup>1</sup> *California Academy of Sciences, 55 Music Concourse Drive, San Francisco, California 94118-4599, USA; Email: jmccosker@calacademy.org;* <sup>2</sup> *Bernice P. Bishop Museum, Honolulu, Hawaii 96817-2704, USA; Email: jackr@hawaii.rr.com.*

***Gymnothorax davidsmithi* species novum, subfamily Muraeninae, is described from a specimen collected in 3-4 m from Flores, Indonesia. It is distinguished from its congeners by having 4-64-156 vertebrae, mostly uniserial dentition, and by its coloration of a tan body and tail overlain in the head region by numerous white spots and markings.**

KEYWORDS: Muraenidae, *Gymnothorax* new species, Indonesia

While diving in shallow water in Flores, Indonesia, the junior author collected a number of new marine fish species that had not been seen in similar habitats in a variety of better-sampled Indo-Pacific locations. This location and its habitat are apparently quite different than similar shallow water habitats and it is likely that more intensive collective in this area will uncover additional unknown species. This new species of moray eel is known from a single individual; however, it is distinctive enough in many characteristics that we herein describe it and take particular pleasure in doing so by naming it after our friend and colleague David G. Smith.

**MATERIALS AND METHODS**

Measurements are straight-line, made 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 or dividers for all other measurements and recorded to the nearest 0.1 mm. Proportions are expressed in terms of total length (TL), measured from the snout tip to the end of the tail, or head length (HL). Body length is head plus trunk length. 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; body depth is measured at the gill opening and at the anus and does not include the fins; body width is measured immediately behind the gill openings and above the anus; snout length is measured from the snout tip to the anterior margin of the eye; upper-jaw length is measured from the snout tip to the external inner angle of the mouth. Head pore terminology follows that of Böhlke et al. (1989). Vertebral counts (which include the hypural) were obtained from radiographs as described by Böhlke (1982); the mean vertebral formula (MVF) is expressed as the mean value for predorsal/preanal/total counts. Tooth counts are approximate and include sockets of missing teeth. Institutional abbreviations follow Leviton et al. (1985).

## TAXONOMY

*Gymnothorax davidsmithi* McCosker and Randall, sp. nov.

Smith's moray

Figures 1-3.

**MATERIAL EXAMINED.**— HOLOTYPE: BPBM 34099, 299 mm TL, sex undetermined; Indonesia, Flores, east of Maumere Bay, inshore of wreck of Japanese warship; collected using rotenone in 3-4 m over dark silty sand with some *Halophylla* by J.E. Randall and R.M. Pyle on 17 September 1988.

**DIAGNOSIS.**— An elongate, slender brown moray with white spots on head and anterior throat region; anal fin with a pale margin; anus before midbody, preanal length 2.15 in TL; depth at gill opening 33 in TL; head 10.7 in TL; middle of orbit above middle of jaw; jaws moderate, not recurved; teeth conical, mostly uniserial, jaw teeth numerous and closely spaced; coloration uniform tan overlain with white spots and markings on throat, forehead, cheeks, nape and anterior branchial basket; MVF 4-64-156.

**MEASUREMENTS (IN MM) AND COUNTS OF THE HOLOTYPE.**— Total length 299; head length 27.9; preanal length 139; snout to dorsal-fin origin 21.2; depth at gill opening ~9.0; depth at anus ~8.0; width at gill opening ~5.7; width at anus ~5.0; length upper jaw 10.0; length lower jaw 9.9; snout length 4.9; eye diameter 3.0; fleshy interorbital width 3.0; gill-opening length 1.2. Predorsal vertebrae 4, preanal vertebrae 64, total vertebrae 156.

**DESCRIPTION.**— An elongate (Fig. 1) slender moray, depth at gill opening 33, depth at anus 37 in TL; anus before midbody, preanal length 2.15 in TL. Head moderate, 10.7 in TL; snout 5.7 in HL; jaws moderately elongate, closing completely; lower jaw slightly inferior; upper jaw 2.8 in HL. Eye moderate in size, its diameter 9 in HL, its center above middle of jaw. Interorbital space as wide as orbit. Anterior nostril in a short, anteriorly directed tube, nearly reaching tip of snout; posterior nostril a round opening above and within anterior quarter of eye, its margin smooth. Dorsal-fin origin above and anterior to first branchial pore, equidistant between gill opening and rictus. Skin above origin of dorsal fin flabby, loose. Dorsal fin slightly elevated in anterior half of body. Gill opening a small slit below midside. Predorsal vertebrae 4, preanal vertebrae 64, total vertebrae 156.

Head pores (Fig. 2) typical of *Gymnothorax* but reduced in number, most are discernable; supraorbital 1+2; infraorbital 4; mandibular 5; 2 minute branchial pores above and anterior to gill opening.

Teeth (Fig. 3) conical, recurved. Jaw teeth mostly uniserial. An anterior rosette of 5 evenly spaced teeth at snout tip, followed by 3 large fangs, flanked by 2 premaxillary teeth, a gap,



Figure 1. Holotype of *Gymnothorax davidsmithi* sp. nov., BPBM 34099, 299 mm TL. Photographed by J.E. Randall soon after its capture.

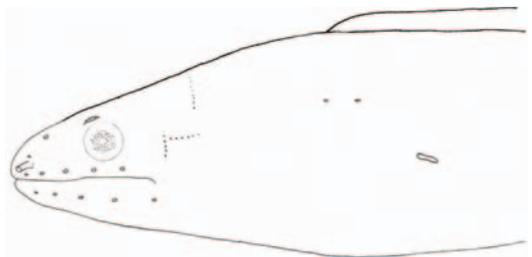


FIGURE 2. Head of holotype of *Gymnothorax davidsmithi* sp. nov., BPBM 34099, 299 mm TL.

and 7 small uniserial vomerine teeth. Maxillary teeth uniserial, with 2 longer teeth medial to a linear row of 15 (left) and 16 (right) smaller, closely set teeth. Mandible with 4 largest teeth along each side of gap, followed by 16-17 strictly uniserial smaller closely spaced teeth.

Body coloration in (ethyl alcohol) (Fig. 1) tan to brown, slightly darker dorsally, overlain on throat, forehead, cheeks, nape, and anterior branchial basket with an irregular patchwork of white spots and markings, becoming uniform tan from mid-throat to tail-tip. Suborbital and mandibular pores within large white spots. Anterior nostrils pale laterally, slightly pigmented medially. Anal opening pale. Anal fin brown, its margin pale. Dorsal fin brown like body. Inside of mouth and peritoneum have a fine brown speckling.

**SIZE.**— Known only from the holotype, 299 mm TL.

**ETYMOLOGY.**— We are pleased to name this in honor of David G. Smith, in recognition of his contributions to the understanding of anguilliform fishes.

**DISTRIBUTION.**— Known only from east of Maumere Bay, Flores, Indonesia, 3-4 m depth.

**REMARKS.**— As currently recognized, *Gymnothorax* comprises more than 100 species and is by far the most speciose of muraenid genera. Several subgenera are recognized (Böhlke et al. 1989); however, the new species cannot easily be placed within any of them. It differs from all known *Gymnothorax* in a combination of characters including its having 4-64-156 vertebrae and mostly uniserial dentition, and in its coloration of a tan body and tail overlain in the head region by numerous white spots and markings.

Vertebral numbers and location relative to the dorsal-fin origin and anal-fin origin are reliable characters for species identification. Using the comprehensive catalogues of Böhlke and Smith (2002), Smith and Böhlke (2006), and Böhlke et al. (1989), the new species is similar to (but does not overlap with) the vertebral formulae of: the deepwater Atlantic species *G. madaerensis* (Johnson, 1862) (MVF 6-68-153), the southwestern Pacific species *G. intesi* (Fourmanoir and Rivaton, 1979) (MVF 5-68-155), and the western Atlantic species *G. kolpos* Böhlke and Böhlke (1980) (MVF 6-63-164). It differs from all of the above-mentioned species in its coloration and dentition.

The new species is similar in general coloration and dentition to the Australian species *G. cephalospilus* Böhlke and McCosker (2001); however, it has more vertebrae (4-64-156 vs. 6-64-145) and the spotting of *G. cephalospilus* extends well beyond the head region. It is also similar in appearance to the western Indian Ocean species *G. punctatus* Bloch and Schneider (1801), but it has more vertebrae (4-64-156 vs. 5-54-134) and the spotting of *G. punctatus* continues onto its body and tail.

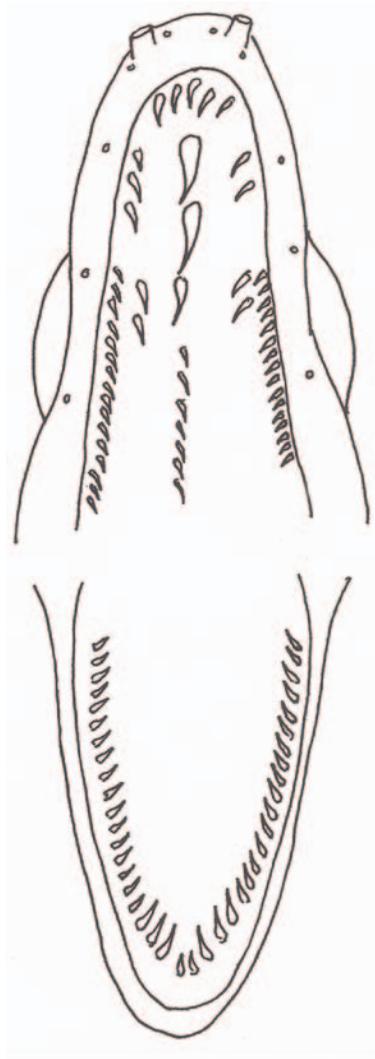


FIGURE 3. Semidiagrammatic illustration of dentition of holotype of *Gymnothorax davidsmithi* sp. nov., BPBM 34099, 299 mm TL.

## ACKNOWLEDGMENTS

We wish to thank the staffs of the Bernice P. Bishop Museum (BPBM) and the California Academy of Sciences (CAS) for advice and assistance with specimens and David Greenfield for reading a draft of this manuscript.

## LITERATURE CITED

- BLOCH, M.E., AND J.G. SCHNEIDER. 1801. *Systema ichthyologiae iconibus CX illustratum*. Berolini, Saxony. 584 pp., 110 pls.
- BÖHLKE, E.B. 1982. Vertebral formulae of type specimens of eels (Pisces: Anguilliformes). *Proceedings of the Academy of Natural Sciences of Philadelphia* 134:31–49.
- BÖHLKE, E.B., AND J.E. MCCOSKER. 2001. The moray eels of Australia and New Zealand, with the description of two new species (Anguilliformes: Muraenidae). *Records of the Australian Museum* 53:71–102.
- BÖHLKE, E.B., J.E. MCCOSKER, AND J.E. BÖHLKE. 1989. Family Muraenidae. Pages 254–412 in E.B. Böhlke, et al., *Fishes of the Western North Atlantic*, Part Nine, Vol. One: Orders Anguilliformes and Saccopharyngiformes. Sears Foundation for Marine Research, Yale University, New Haven, Connecticut, USA.
- BÖHLKE, E.B., AND D.G. SMITH. 2002. Type catalogue of Indo-Pacific Muraenidae. *Proceedings of the Academy of Natural Sciences of Philadelphia* 152:89–172.
- BÖHLKE, J.E., AND E.B. BÖHLKE. 1980. The identity of the moray *Gymnothorax conspersus* Poey, and description of *G. kolpos*, n. sp., from the western Atlantic Ocean. *Proceedings of the Academy of Natural Sciences of Philadelphia* 132:218–227.
- FOURMANOIR, P., AND J. RIVATON. 1979. Poissons de la pente récifale extreme de Nouvelle-Calédonie et des Nouvelles-Hébrides. *Cahiers de l'Indo-Pacifique* 1(4):405–443.
- JOHNSON, J.Y. 1862. Descriptions of some new genera and species of fishes obtained at Madeira. *Proceedings of the Zoological Society of London* 1862:167–180.
- LEVITON, A.E., R.H. GIBBS, JR., E. HEAL, AND C.E. DAWSON. 1985. Standards in herpetology and ichthyology: part I. Standard symbolic codes for institutional resources collections in herpetology and ichthyology. *Copeia* 1985(3):802–832.
- MCCOSKER, J.E., AND J.E. RANDALL. 2007. A new genus and species of mud-dwelling moray eel (Anguilliformes: Muraenidae) from Indonesia. *Proceedings of the California Academy of Sciences*, ser. 4, 58(22):469–476.
- SMITH, D.G., AND E.B. BÖHLKE. 2006. Corrections and additions to the type catalogue of Indo-Pacific Muraenidae. *Proceedings of the Academy of Natural Sciences of Philadelphia* 155:35–39.