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New record of a rare moray eel, *Enchelycore kamara* Böhlke & Böhlke, 1980 (Anguilliformes: Muraenidae), from the Philippines

Wen-Chien Huang[1,*] and Rodulf Anthony T. Balisco[1,2]

[1]*Department of Oceanography, National Sun Yat-sen University, Kaohsiung, Taiwan*
[2]*College of Fisheries and Natural Sciences, Western Philippines University, Puerto Princesa City, Philippines*

**Corresponding Author: wenchien0208@gmail.com*

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ABSTRACT

A single specimen (957 mm total length) of the rare moray eel *Enchelycore kamara* Böhlke & Böhlke, 1980, was collected from the Puerto Princesa New Public Market, Palawan, Philippines, representing the largest recorded size for the species and its first record in Philippine waters. A brief description, fresh photographs, and a COI sequence were provided for this specimen. The distribution range of *E. kamara* was also updated based on additional specimens, sequences, and underwater photographs obtained from online public sources.

Keywords: DNA barcoding, maximum size, Muraeninae, Pacific Ocean, taxonomy

INTRODUCTION

Muraenidae are one of the most diverse families in the order Anguilliformes, comprising around 230 species across 16 genera in two subfamilies worldwide (Fricke et al. 2025). Located in the Coral Triangle, the Philippines holds remarkable marine biodiversity; nevertheless, moray eels are difficult to detect due to their reclusive habits, leading to ongoing discoveries of undescribed species and new records in this region, with more than 80 species reported (e.g. Huang et al. 2021, 2023a, b, 2024; Cabebe-Barnuevo et al. 2023).

Members of the genus *Enchelycore* Kaup, 1856 are medium- to large-sized piscivorous morays, characterized by long, arched jaws that meet only at the tips, and large fangs that remain visible when the mouth is closed (Smith and Böhlke 2022). Another proposed characteristic is their elongated, tapering jaws, which narrow the anterior part of the head, quantified by the interorbital width (≤ 10% of head length in *Enchelycore* vs. > 10% in most other genera) (Huang et al. 2022b). Currently, 13 *Enchelycore* species are considered valid, with three species distributed in the Atlantic and 10 species occurring in the Indo-Pacific (Smith 2012; Mohapatra et al. 2017). According to FishBase (Froese and Pauly 2024; https://www.fishbase.org/) and Global Biodiversity Information Facility (GBIF; https://www.gbif.org/) records, only two species—*Enchelycore bayeri*

(Schultz, 1953) and *Enchelycore schismatorhynchus* (Bleeker, 1853)—have been reported from Philippine waters to date (Froese and Pauly 2024).

Enchelycore kamara Böhlke & Böhlke, 1980 is a rare moray with only seven voucher specimens reported in the literature, including six from the Line Islands and Palau (type series) and one from the Ryukyu Islands (Böhlke and Böhlke 1980; Shibukawa et al. 2007). A non-specimen-based record was also reported from Guam (Myers 1999), and it is therefore considered a widespread species in the central and western Pacific. It is believed to be a small to medium-sized moray, as the known maximum size of this species is 530 mm, while the remaining known specimens are relatively smaller, ranging from 201.8 to 388 mm (Böhlke and Böhlke 1980; Shibukawa et al. 2007).

During our Palawan ichthyological survey conducted in 2023, a specimen of *E. kamara* was collected from the Puerto Princesa New Public Market. This is a large mature female (957 mm total length), significantly larger than the previous size record, and represents the first confirmed record of this species in Philippine waters. Furthermore, some unpublished records can be attributed to *E. kamara*, including specimens from Mindoro, Cebu, and Bohol, Philippines, housed in the Smithsonian National Museum of Natural History (USNM) collection; GBIF specimen records from Queensland, Australia, and the Admiralty Islands, Papua New Guinea; and an underwater photograph from Raja Ampat, Indonesia, obtained via iNaturalist (https://www.inaturalist.org). This study aims to provide supplementary biological and distributional information on this rare moray.

METHODS

A fresh specimen was collected from the Puerto Princesa New Public Market, Palawan, Philippines. It was immediately photographed, and a piece of muscle tissue was obtained from a small incision on the belly near the anus and preserved in 95% ethanol. The sex was determined by dissection and direct observation of the gonad type. The specimen was then fixed in 10% formalin. After fixation in 10% formalin, it was soaked in 20%, 40%, and 60% ETOH, before it has been transferred to 70% ethanol for long-term preservation. This specimen was transported to Taiwan for further examination and was deposited in the Department of Oceanography, National Sun Yat-sen University, Kaohsiung (DOS).

Morphometrics were recorded as percentages of head length (HL) or total length (TL) following the definitions in Böhlke et al. (1989). The vertebral formula was given as the number of pre-dorsal fin, pre-anal fin, and total vertebrae, counted from radiographs following the definitions in Böhlke (1982). Teeth and head pores were examined under a stereomicroscope using the terminology in Smith et al. (2019).

A partial fragment (680 bp) of the cytochrome *c* oxidase subunit I (COI) gene was amplified from extracted genomic DNA via polymerase chain reaction (PCR) using the primers FishF2 (5'-TCG ACT AAT CAT AAA GAT ATC GGC AC-3') and FishR2 (5'-ACT TCA GGG TGA CCG AAG AAT CAG AA-3') (Ward et al. 2005). The PCR thermal cycling conditions were as described in Huang et al. (2021). The PCR products were Sanger-sequenced from both ends and were assembled in Molecular Evolutionary Genetics Analysis (MEGA) version 12 (Kumar et al. 2024). The assembled sequence was then submitted to GenBank (https://www.ncbi.nlm.nih.gov/genbank/).

Additional sequences of *Enchelycore* species were obtained from BOLD Systems (Ratnasingham et al. 2024; https://boldsystems.org/) and GenBank to construct a maximum likelihood (ML) tree in MEGA, using the best-fitting Tamura-Nei + Γ + I substitution model and a bootstrap analysis with 1,000 iterations (Felsenstein 1985; Tamura and Nei 1993). Two morays from the subfamily Uropterygiinae—*Uropterygius mactanensis* Huang, Balisco, Evacitas & Liao, 2023 and *Uropterygius hades* Huang, Hibino, Balisco & Liao, 2024—were used as outgroups in the ML analysis, as the two subfamilies of Muraenidae (Muraeninae and Uropterygiinae) have been shown to be genetically reciprocally monophyletic in previous studies (e.g. Reece et al. 2010; Tang and Fielitz 2013). The genetic distance was also calculated using the Kimura 2-Parameter (K2P) model (Kimura 1980) in MEGA.

RESULTS

Enchelycore kamara Böhlke & Böhlke, 1980

(Figures 1–4, Table 1)

Enchelycore kamara Böhlke & Böhlke, 1980: 173 (Tongareva Atoll, Line Islands). Holotype, USNM 221161.

Material Examined

One specimen: DOS 09957, 957 mm TL, mature female, purchased from Puerto Princesa New Public Market, Palawan, Philippines, 07 November 2023, collected by W.C. Huang and R.A. Balisco, with GenBank COI accession number PV257807.

Figure 1. *Enchelycore kamara*, DOS 09957, 957 mm total length, Palawan, Philippines, fresh coloration.

Figure 2. *Enchelycore kamara* (indicated by arrow), DOS 09957, 957 mm total length, Palawan, Philippines, fresh coloration. Photo taken at the Puerto Princesa New Public Market, sold alongside *Gymnothorax javanicus* (Bleeker, 1859).

Brief Description of DOS 09957

Proportions were measured as percentage of TL: tail length 50.3; preanal length 49.7; trunk length 34.6; head length 15.2; predorsal length 17.3; body depth at gill opening 6.9; body depth at anus 6.0. Proportions were measured as percentage of HL: predorsal length 114.5; length of upper jaw 37.8; length of lower jaw 38.4; interorbital width 7.7; snout length 14.1; eye diameter 7.8. Vertebral counts were pre-dorsal fin vertebrae 15; pre-anal fin vertebrae 63; total vertebrae 138 (Table 1).

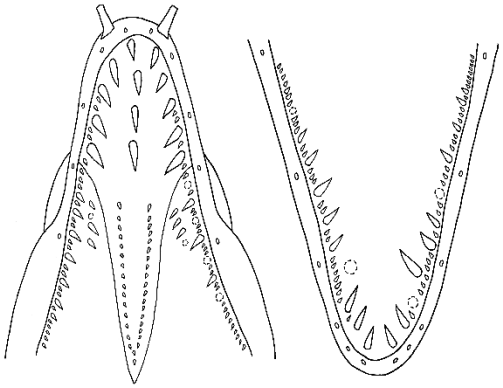

Figure 3. Dentition of *Enchelycore kamara*, DOS 09957, 957 mm total length. Upper jaw (left) and lower jaw (right). Dotted circles represent the sockets of missing teeth.

Figure 4. Dentition of *Enchelycore kamara*, DOS 09957, 957 mm total length, showing the arrangement and various sizes of teeth.

Body was moderately elongate and robust (Figures 1 and 2). The anus was located at mid-length of body. The dorsal fin was moderately high, originating slightly posterior to the gill opening. The anal fin was low, its origin immediately behind anus. Jaws were subequal, narrow, tapering, highly arched, and not completely closed; teeth were always visible. The snout was long and somewhat pointed. Eyes were moderate in size, positioned above mid-length of upper jaw, with a narrow interorbital space. The anterior nostril was slender and tubular; posterior nostril was oval with a slightly raised rim, positioned above and slightly posterior to anterior margin of eye. There were three supraorbital pores, four infraorbital pores, six preoperculo-mandibular pores, and two branchial pores.

Table 1. Morphometric measurements, teeth, and vertebral counts of *Enchelycore kamara*. Abbreviations: HL, head length; TL, total length. [a] count based on the dentition illustration in Shibukawai et al. (2007); [b] count based on the dentition illustration of the holotype in Böhlke and Böhlke (1980); [c] based on data from Smith (2012).

Source	This study	Shibukawai et al. (2007)	Böhlke and Böhlke (1980)
	DOS 09957	NSMT-P 75543	Types (ANSP, CAS, USNM)
	n = 1	n = 1	n = 6
TL (mm)	957	201.8	204–530
% TL			
Tail length	50.3	51.9	50–53
Preanal length	49.7	48.1	47–50
Trunk length	34.6	32.6	-
Head length	15.2	15.5	14–15
Predorsal length	17.3	16.0	16–19
Body depth at gill opening	6.9	5.5	5–6
Body depth at anus	6.0	5.9	4–5
% HL			
Predorsal length	114.5	103.2	-
Length of upper jaw	37.8	40.9	37–40
Length of lower jaw	38.4	40.9	-
Snout length	14.1	14.9	14–16
Interorbital width	7.7	-	8–10
Eye diameter	7.8	10.2	9–10
Teeth			
Intermaxillary-peripheral	5	4–5[a]	5[b]
Intermaxillary-median	3	3[a]	3[b]
Maxillary-outer	25–29	18–20	19–26
Maxillary-inner	4	4	4–5[b]
Vomerine	35	ca. 24	11–19 + 3–7
Dentary	37–39	31	27–34
Vertebrae			
Pre-dorsal fin	15	13	14–16
Pre-anal fin	63	60	60–64[c]
Total	138	137	138–143

Dentition (Figures 3 and 4). Tooth size varied, and edges were not serrated. Intermaxillary teeth were arranged in three rows, all long, triangular canines of similar size; five peripheral teeth were present on each side, with some tiny teeth in spaces between larger teeth; three depressible median teeth were observed. Maxillary teeth were biserial anteriorly and uniserial posteriorly; the outer row consisted of seven larger and 18–22 smaller teeth arranged alternately, with larger teeth decreasing in size posteriorly while smaller teeth remained the same size; the inner row had four pointed teeth, not significantly larger than those in the outer row. Vomerine teeth numbered 35 small conical teeth, mostly biserial, narrowing into a single row at the posterior end. Dentary teeth were mostly in uniserial arrangement, with three significantly larger canines anteriorly, followed by another long canine in the inner row flanked by six–seven small teeth, the remaining teeth were similar to the maxillary teeth, with larger and smaller teeth arranged alternately; totaling 37–39 dentary teeth on each side.

Coloration (Figures 1 and 2). The ground color was pale yellowish to light brown, covered with numerous small dark-brown spots over the body and fins. Spots were smaller than the eye and were distributed more densely dorsally than ventrally, with the densest spots on the tips of the jaws and tail, forming a darker coloration. The inner skin of the oral cavity was darker than the body, without spots. The mouth corner and gill opening were not significantly darker. The iris was reddish brown. The preserved coloration was similar to that of the fresh specimen, except slightly faded.

Distribution

This species was previously known from the central and western Pacific, including the Line Islands,

Tuamotus, Queensland, Admiralty Islands, Raja Ampat, Palau, Guam, the Ryukyu Islands, and now from the Philippines (Figure 5).

Molecular Analysis

An unidentified Muraenidae sequence (BOLD sequence ID: LIDMA867-11) from Tuamotus, French Polynesia, clustered with DOS 09957 and was identified as *E. kamara*. According to the topology of the ML tree, *E. kamara* was most closely related to *E. schismatorhynchus*, with a 16.9% K2P genetic distance (Figure 6).

DISCUSSION

Most morphological characters of the *E. kamara* specimen from Palawan align with those described by Böhlke and Böhlke (1980) and Shibukawa et al. (2007). However, notable differences were observed, including greater body depths and smaller eyes (Table 1), which may be attributed to allometric growth (Huang et al. 2022a). Its narrow interorbital width (7.7% of HL) also supports the perspective of Huang et al. (2022b) that this measurement can be used as a diagnostic characteristic for the genus *Enchelycore*. Interestingly, significantly more teeth were observed on the outer maxilla, vomerine, and dentary in DOS 09957 than in smaller specimens (Table 1), leading to the hypothesis that larger *E. kamara* individuals possess more teeth. However, this observation contrasts with *E. schismatorhynchus*, in which larger individuals (949 mm TL) have fewer maxillary and dentary teeth and fewer tooth rows than smaller ones (510–642 mm TL) (Huang et al. 2022b). Although sexual dimorphism in the dentition of morays has been reported in many species (e.g. Hatooka 1986; Smith et al. 2008; Huang et al. 2019, 2023a), changes in tooth number with body size have yet to be thoroughly studied. Further investigation is needed.

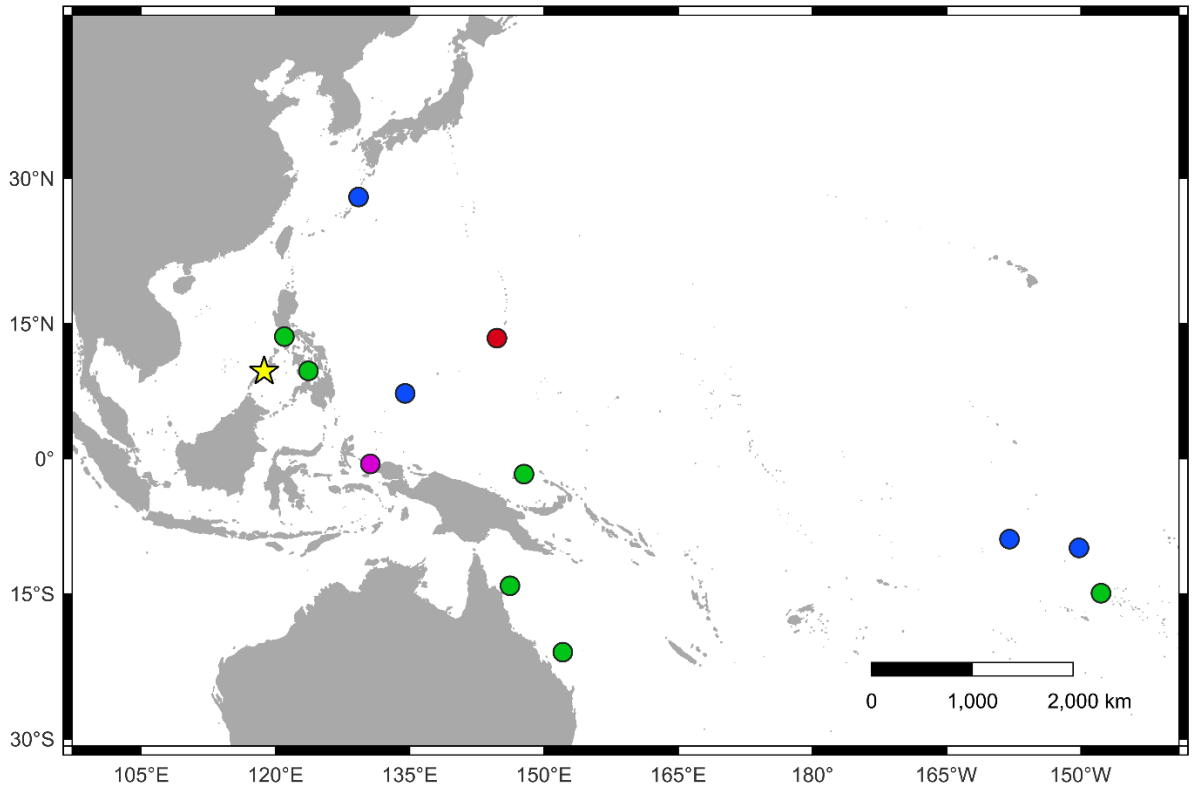

Figure 5. Distribution of *Enchelycore kamara*. Colors represent different sources: yellow star, this study; blue dot, literature with voucher specimens; green dot, unpublished specimens or sequences; red dot, non-specimen-based literature record; pink dot, iNaturalist record.

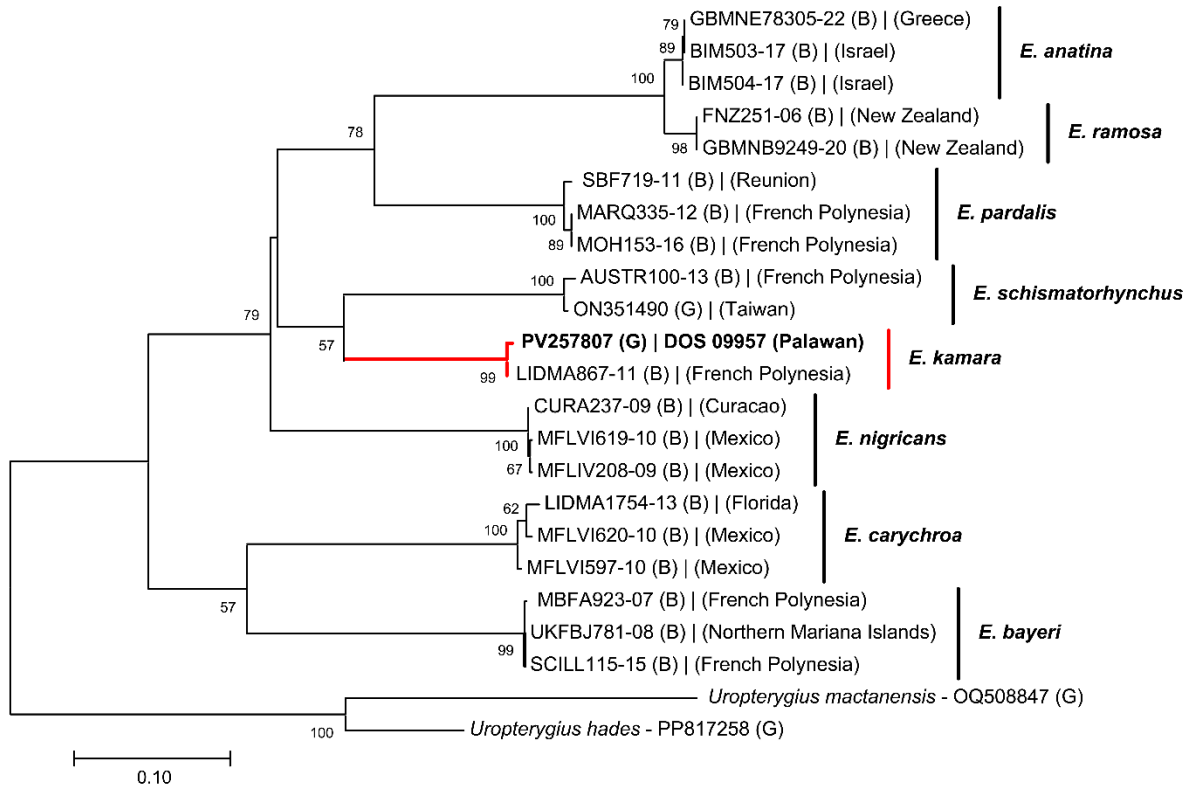

Figure 6. Maximum-likelihood tree of available cytochrome *c* oxidase subunit I sequences (636 bp) for *Enchelycore* species, obtained from BOLD Systems and GenBank. *Uropterygius mactanensis* and *U. hades* of the subfamily Uropterygiinae are used as outgroups. Numerals beside the internal branches represent bootstrap values; values below 50 are not shown. (B) = sequence from BOLD Systems; (G) = sequence from GenBank.

Enchelycore kamara is the only species in the genus that exhibits small dark spots scattered across its pale-yellowish body and fins. Another distinctive characteristic is its posteriorly positioned dorsal fin origin, which originates behind the gill opening, unlike in most other species where the dorsal fin originates above or before the gill opening, except for *Enchelycore propinqua* Mohapatra, Smith, Mohanty, Mishra & Tudu, 2017. Despite these distinguishable characteristics, *E. kamara* is still occasionally misidentified due to the limited information available about the species. For instance, two specimens identified as *Gymnothorax* sp., USNM 435509 from Cebu and USNM 435625 from Bohol, along with fresh photographs and private COI sequences on BOLD Systems, were confirmed as *E. kamara* based on their color patterns and sequence similarities. As a counterexample, a photograph record of *E. kamara* from Guam in a recent study (Figure 3F in Myers et al. 2025) was actually a misidentification of *Gymnothorax fimbriatus* (Bennett, 1832).

Moreover, the species most closely related to *E. kamara* on BOLD Systems is *Gymnothorax minor* (Temminck & Schlegel, 1846), with 87% COI sequence similarity. This is not surprising, as previous studies (e.g. Tang and Fielitz 2013; Smith et al. 2019) have shown that *Enchelycore* is a polyphyletic genus. This may be due to the genetic markers used, which might not accurately reflect deeper phylogenetic relationships among genera within Muraenidae. Alternatively, the genus *Enchelycore* may need to be more precisely redefined, since many of its diagnostic characteristics appear to have evolved multiple times (Smith et al. 2019). For now, the researchers tentatively follow the current classification, which places the species *kamara* within the genus *Enchelycore*. Further studies are needed to clarify their phylogenetic relationships.

This study provides additional information on the rare muraenid *E. kamara*, including fresh photographs, a COI sequence, and updated details on its maximum size and distribution range, all of which are crucial for its accurate identification and management.

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ETHICAL CONSIDERATIONS

Wildlife gratuitous permit (No. 2023-02) and export permit (No. 2023-013) were obtained from the Palawan Council for Sustainable Development Staff (PCSDS) before specimen collection and transport.

DECLARATION OF COMPETING INTEREST

The authors declare that there are no competing interests among the authors.

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REFERENCES

Böhlke EB, McCosker JE and Böhlke JE. 1989. Family Muraenidae. In: Böhlke EB (ed). Fishes of the Western North Atlantic. Memoirs of the Sears Foundation for Marine Research, 1 (part 9). Yale University, New Haven, pp. 104-206. https://doi.org/10.12987/9781933789323-010

Böhlke EB. 1982. Vertebral formulae for type specimens of eels (Pisces: Anguilliformes). Proceedings of the Academy of Natural Sciences of Philadelphia, 134: 31-49.

Böhlke JE and Böhlke EB. 1980. *Enchelycore kamara*: a new moray from the tropical Pacific Ocean. Proceedings of the Academy of Natural Sciences of Philadelphia, 132: 173-175.

Cabebe-Barnuevo RA, Obar EAA, Penuela DFA, Motomura H, Babaran RP and Malay MCD. 2023. Two new records of moray eels representing genera *Gymnothorax* and *Strophidon* (Actinopterygii: Anguilliformes: Muraenidae) from the Philippines. Acta Ichthyologica et Piscatoria, 53: 217-226. https://doi.org/10.3897/aiep.53.108838

Felsenstein J. 1985. Confidence limits on phylogenies: an approach using bootstrap. Evolution, 39: 783-791. https://doi.org/10.2307/2408678

Fricke R, Eschmeyer WN and Fong JD. 2025. Eschmeyer's Catalog of Fishes: Genera/Species by Family/Subfamily. http://researcharchive.calacademy.org/research/ichthyology/catalog/SpeciesByFamily.asp. Accessed on 11 March 2025.

Froese R and Pauly D. (eds). 2024. FishBase. World Wide Web electronic publication. www.fishbase.org. Accessed on 11 March 2025.

GBIF (Global Information Facility). 2025. https://www.gbif.org/. Accessed on 11 March 2025.

GenBank. 2025. GenBank Overview. https://www.ncbi.nlm.nih.gov/genbank/. Accessed on 11 March 2025.

Hatooka K. 1986. Sexual dimorphism found in teeth of three species of moray eels. Japanese Journal of Ichthyology, 32(4): 379-386. https://doi.org/10.11369/jji1950.32.379

Huang WC, Balisco RA, Evacitas FC and Liao TY. 2023a. Description of a new moray eel (Anguilliformes: Muraenidae) from the Philippines, with a preliminary assessment of genetic and morphological variations of the *Uropterygius concolor* species complex. Journal of Fish Biology, 103(3): 593-602. https://doi.org/10.1111/jfb.15472

Huang WC, Chen HM and Liao TY. 2019. Revalidation of a moray eel, *Gymnothorax mucifer* Snyder, 1904 (Teleostei: Anguilliformes: Muraenidae), with a revised distribution. Zootaxa, 4559(1): 151-165. https://doi.org/10.11646/zootaxa.4559.1.6

Huang WC, Chen HM, Tseng YC and Liao TY. 2022a. Assessing phenovariant species pairs of moray eels: Hybridization, introgression, and morphology. Zoologica Scripta, 51(6): 676-694. https://doi.org/10.1111/zsc.12560

Huang WC, Hibino Y, Balisco RA and Liao TY. 2024. Description of a new uniformly brown estuarine moray eel (Anguilliformes, Muraenidae) from the Central Indo-Pacific Ocean. In: Ho HC, Russell B, Hibino Y and Lee MY (eds). Biodiversity and taxonomy of fishes in Taiwan and adjacent waters. ZooKeys, 1220: 15-34. https://doi.org/10.3897/zookeys.1220.129685

Huang WC, Liao TY and Tan HH. 2023b. *Uropterygius cyamommatus*, a new moray eel (Anguilliformes: Muraenidae) from anchialine caves in Christmas Island, Australia, and Panglao Island, the Philippines. Raffles Bulletin of Zoology, 71: 268-278. https://doi.org/10.26107/RBZ-2023-0021

Huang WC, Loh KH and Chen HM. 2022b. *Gymnothorax poikilospilus*, a new moray eel (Teleostei: Anguilliformes: Muraenidae) from Penghu Islands, western Taiwan. Zootaxa, 5189(1): 87-102. https://doi.org/10.11646/zootaxa.5189.1.11

Huang WC, Smith DG, Loh KH and Liao TY. 2021. Two new moray eels of genera *Diaphenchelys* and *Gymnothorax* (Anguilliformes: Muraenidae) from Taiwan and the Philippines. Zoological Studies, 60: 24. https://doi.org/10.6620/ZS.2021.60-24

Kimura M. 1980. A simple method for estimating evolutionary rate of base substitutions through comparative studies of nucleotide sequences. Journal of Molecular Evolution, 16: 111-120. https://doi.org/10.1007/BF01731581

Kumar S, Stecher G, Suleski M, Sanderford M, Sharma S and Tamura K. 2024. MEGA12: Molecular Evolutionary Genetic Analysis version 12 for adaptive and green computing. Molecular Biology and Evolution, 41(12): msae263. https://doi.org/10.1093/molbev/msae263

Mohapatra A, Smith DG, Mohanty SR, Mishra SS and Tudu PC. 2017. *Enchelycore propinqua* sp. nov., a new moray eel (Anguilliformes: Muraenidae: Muraeninae) from the Indian Coast. Zootaxa, 4319(3): 595-599. https://doi.org/10.11646/zootaxa.4319.3.11

Myers RF. 1999. Micronesian reef fishes: a comprehensive guide to the coral reef fishes of Micronesia, 3rd revised and expanded edition. Coral Graphics, Barrigada, Guam, 330pp.

Myers RF, Burdick DR, Mundy BC, Lindfield SJ, Tibbatts B and Donaldson TJ. 2025. New and recent records of fishes from

the Mariana Islands, western Pacific Ocean. Journal of the Ocean Science Foundation, 42: 15-90. https://doi.org/10.5281/zenodo.14750902

Ratnasingham S, Wei C, Chan D, Agda J, Agda J, Ballesteros-Mejia L, Ait Boutou H, El Bastami ZM, Ma E, Manjunath R, et al. 2024. BOLD v4: A Centralized Bioinformatics Platform for DNA-Based Biodiversity Data. In: DeSalle R (ed). DNA barcoding: Methods and protocols. Springer US, New York, pp. 403-441. https://doi.org/10.1007/978-1-0716-3581-0_26

Reece JS, Bowen BW, Smith DG and Larson A. 2010. Molecular phylogenetics of moray eels (Muraenidae) demonstrates multiple origins of a shell-crushing jaw (*Gymnomuraena*, *Echidna*) and multiple colonizations of the Atlantic Ocean. Molecular Phylogenetics and Evolution, 57(2): 829-835. https://doi.org/10.1016/j.ympev.2010.07.013

Shibukawa K, Takata Y and Shinohara G. 2007. First record of a rare moray, *Enchelycore kamara* (Actinopterygii: Anguilliformes: Muraenidae), from Amami-oshima Island, Ryukyu Islands, Japan. Species Diversity, 12(3): 187-192. https://doi.org/10.12782/specdiv.12.187

Smith DG and Böhlke EB. 2022. Muraenidae. In: Heemstra PC, Heemstra E, Ebert DA, Holleman W and Randall JE (eds). Coastal fishes of the western Indian Ocean. Volume 2. South African Institute for Aquatic Biodiversity, Makhanda, pp. 37-79.

Smith DG, Bogorodsky SV, Mal AO and Alpermann TJ. 2019. Review of the moray eels (Anguilliformes: Muraenidae) of the Red Sea, with description of a new species. Zootaxa, 4704(1): 1-87. https://doi.org/10.11646/zootaxa.4704.1.1

Smith DG, Brokovich E and Einbinder S. 2008. *Gymnothorax baranesi*, a new moray eel (Anguilliformes: Muraenidae) from the Red Sea. Zootaxa, 1678(1): 63-68. https://doi.org/10.11646/zootaxa.1678.1.4

Smith DG. 2012. A checklist of the moray eels of the world (Teleostei: Anguilliformes: Muraenidae). Zootaxa, 3474(1): 1-64. https://doi.org/10.11646/zootaxa.3474.1.1

Tamura K and Nei M. 1993. Estimation of the number of nucleotide substitutions in the control region of mitochondrial DNA in humans and chimpanzees. Molecular Biology and Evolution, 10: 512-526. https://doi.org/10.1093/oxfordjournals.molbev.a040023

Tang KL and Fielitz C. 2013. Phylogeny of moray eels (Anguilliformes: Muraenidae), with a revised classification of true eels (Teleostei: Elopomorpha: Anguilliformes). Mitochondrial DNA, 24(1): 55-66. https://doi.org/10.3109/19401736.2012.710226

Ward RD, Zemlak TS, Innes BH, Last PR and Hebert PD. 2005. DNA barcoding Australia's fish species. Philosophical Transactions of the Royal Society of London B: Biological Sciences, 360: 1847-1857. https://doi.org/10.1098/rstb.2005.1716

ROLE OF AUTHORS: *WCH and RATB collected and processed the specimen, with RATB handling the collection and transport permits. WCH photographed, examined, and sequenced the specimen. Both authors contributed to the preparation of the manuscript and approved the final version.*

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