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Malaysia's First Record of the Elusive Scaleless Spiny Waspfish *Ablabys gymnothorax* Chungthanawong & Motomura 2018 (Perciformes, Synanceiidae, Tetraroginae)

(Rekod Pertama Malaysia untuk Ikan Depu Berduri Tanpa Sisik Jarang Dijumpai *Ablabys gymnothorax* Chungthanawong & Motomura 2018 (Perciformes, Synanceiidae, Tetraroginae))

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ABSTRACT

We document the first record of the Scaleless Spiny Waspfish, *Ablabys gymnothorax* Chungthanawong & Motomura 2018 (Perciformes, Synanceiidae, Tetraroginae), from the east coast of Peninsular Malaysia. This species was previously documented in Japan, Taiwan, and Vietnam. Two specimens were collected with one was trawled from the South China Sea Exclusive Economic Zone (EEZ) during a bottom trawl survey and the other was collected at Kuantan fish landing port, Pahang. These findings not only document the first country record but also suggest *A. gymnothorax* manifests a broader geographic distribution across the Indo-Pacific than previously recognized. Diagnostic characters are provided for both documented individuals, alongside detailed morphometric and meristic data.

Keywords: Distribution; marine fish; new record; range extension; South China Sea

ABSTRAK

Kami mendokumenkan rekod pertama bagi Ikan Depu Berduri Tanpa Sisik, *Ablabys gymnothorax* Chungthanawong & Motomura 2018 (Perciformes, Synanceiidae, Tetraroginae) dari pantai timur Semenanjung Malaysia. Spesies ini sebelumnya didokumenkan di Jepun, Taiwan dan Vietnam. Dua spesimen telah diperoleh dengan satu dipukat dari Zon Ekonomi Eksklusif Laut China Selatan (ZEE) semasa peninjauan pukat tunda dasar dan satu lagi diperoleh di pelabuhan pendaratan ikan yang terletak di Kuantan, Pahang. Penemuan ini bukan sahaja mencatatkan rekod negara pertama tetapi juga menunjukkan *A. gymnothorax* mempunyai taburan geografi yang lebih luas di seluruh Indo-Pasifik berbanding rekod taburan terdahulu. Ciri diagnostik untuk kedua-dua individu yang didokumenkan diberikan bersama dengan data morfometrik dan meristik yang terperinci.

Kata kunci: Ikan marin; Laut China Selatan; pelunjuran julat; rekod baharu; taburan

Introduction

The Exclusive Economic Zone (EEZ) along the east coast of Peninsular Malaysia occupies nearly 5% of the South China Sea area (Nadira, Mustapha & Ghaffar 2019). As part of the species-rich Coral Triangle situated between the Indian and Pacific Oceans, this region constitutes a hotspot of marine biodiversity (Allen 2008), being home to over 3000 fish species across more than 250 families

(Allen et al. 2000; Froese & Pauly 2023). The tropical climate, extensive coral reefs, and diverse habitats ranging from the mangroves to deep-sea trenches support immense ichthyofaunal diversity in this area. Despite its significance, the waters remain relatively understudied, with regular documentation of new records and range expansions (Chong, Lee & Lau 2010; Mat Jaafar et al. 2012; Mat Piah et al. 2023).

One such group known to inhabit these tropical waters is the waspfish subfamily Tetraroginae (Chungthanawong & Motomura 2021). Comprising 17 genera and 44 valid species (Fricke, Eschmeyer & Fong 2024), this group includes the poorly studied genus *Ablabys* containing small, benthic fishes. These fishes are characterized by their venomous spines and unique morphological adaptations, such as the ability to mimic inanimate objects like dead leaf to avoid predation (Poss 1986; Varghese 2013). Despite their intriguing biology, the taxonomy and distribution of many tetrarogine species remain poorly understood, particularly in the Indo-Pacific region.

The genus *Ablabys* comprises five recognized species with distributions primarily concentrated in the Indo-West Pacific and western Indian Ocean (Chungthanawong & Motomura 2021). Two species were recently described: *Ablabys pauciporus* from Australia's Great Barrier Reef and *Ablabys gymnothorax* from Japan, Taiwan and Vietnam (Chungthanawong & Motomura 2018). These scaleless fishes are known to inhabit coral reefs and rocky areas, often camouflaging themselves among the substrate (Varghese 2013). While their ecology and behavior remain largely unexplored, their unique morphology and cryptic nature have garnered interest among ichthyologists and marine biologists. However, information on waspfishes in Malaysian waters is limited. Here, we document the first record of *Ablabys gymnothorax* from Peninsular Malaysia's east coast, signifying a considerable range extension for this obscure species in the South China Sea's biodiversity hotspot.

MATERIAL AND METHODS

One of the new records of the species described herein was obtained during a scientific survey on board the research vessel MV SEAFDEC 2 on 2 July 2016. The sample was collected using a bottom trawl with a 40 mm cod end mesh net at a depth of 42 m. The trawl sampling lasted for 60 min at a speed of 3.2 knots, covering 3 nautical miles. Upon collection, the specimen was photographed, fixed, and preserved according to the protocols of Motomura et al. (2013). After complete documentation, the specimen was deposited in the ichthyological collection of the South China Sea Repository and Reference Centre at Universiti Malaysia Terengganu, Malaysia (UMTF 10741) for long-term storage and accessibility.

Another specimen was collected at Lembaga Kemajuan Ikan Malaysia (LKIM) landing ports situated at Kuantan on 22 September 2023. By engaging in discussions with fishermen, the specimen was caught using commercial bottom trawlers that operated off the east coast of Peninsular Malaysia at depths ranging from 45 to 55 meters. In Malaysia, the trawl included a 1¼ inches mesh size cod end, and each trawl session lasted approximately three hours with a towing speed of around 3.0 knots (Seah et al. 2011). This specimen was deposited at the Kagoshima University Museum (KAUM-I. 189999) after the Kuantan Ichthyofauna Expedition in 2023, a joint survey under Japan Society for the Promotion of Science (JSPS): Core-to-Core project Collaborative Research and Education Project in Southeast Asia for Sustainable Use of Marine Ecosystems (CREPSUM).

The morphological measurements and identification terminology follow the conventions described by Chungthanawong & Motomura (2018) in their earlier description of the species. The specimen was measured to the nearest 0.1 millimeters (mm) using vernier calipers. The standard length (SL) was expressed in (mm), while other measurements were expressed as a percentage of the (SL). Distribution data for species (Figure 1) were obtained and referred from various sources, including Eschmeyer's Catalog of Fishes (https://www.calacademy.org/scientists/projects/eschmeyers-catalog-of-fishes), the Global Biodiversity Information Facility (https://www.gbif.org/), FishBase (https://www.fishbase.se/), and Malaysian fish identification books.

Genomic DNA was isolated from one of the specimens (UMTF 10741) using the standard phenol-chloroform extraction protocol. DNA purity and concentration were quantified with a microvolume UV spectrophotometer (Quawell Q300, Quawell, CA) and stored at -20°C until further use. A ~650 bp fragment of the mitochondrial COI gene was PCR amplified using universal teleost primers by Ward et al. (2005):

FishF2-5'-TCGACTAATCATAAAGATATCGGCAC-3'

and

FishR2-5'-ACTTCAGGGTGACCGAAGAATCAGAA-3'

Thermal cycling profiles during PCR followed the protocols outlined by Zainal Abidin et al. (2021). To ensure the reliability and accuracy of the PCR results, negative control was included. This negative control consisted of reaction mixture lacking DNA template, which served as a crucial check to detect potential contamination or non-specific amplification. Amplified PCR products were visualized by 2% agarose gel electrophoresis. Successful amplicons were purified, and Sanger sequenced bidirectionally by a commercial

provider (Apical Scientific Sdn. Bhd.) using the ABI PRISM 3730XL automated sequencer and the ABI PRISM BigDye terminator cycle sequencing kit v3.1 (Applied Biosystems, Foster City, CA). The novel COI sequence obtained from the current specimen was submitted to GenBank under accession number OR918666 and to BOLD under the ID DBEEZ056-23 to allow future comparative analyses.

Results and Discussions

New record of scaleless spiny waspfish

Class Actinopterygii; Order Perciformes; Family Synanceiidae; Subfamily Tetraroginae; and Genus *Ablabys* Kaup 1873

Ablabys gymnothorax Chungthanawong & Motomura 2018 (Figure 2; Table 1)

New records. MALAYSIA - **Johor•** off South China Sea; 1°57′5″N, 104°52′5″E; 42 m depth; 2.VII.2016; Mat Jaafar TNA leg.; bottom trawl; GenBank: OR918666; 1 specimen, 72.42 mm SL; UMTF 10741. MALAYSIA - **Pahang•** LKIM Kuantan, Pahang; 3°47′14″N, 103°19′2″E; 22.IX.2023; KAUM Fish Team leg.; bottom trawl; 1 specimen, 60.50 mm SL; KAUM–I. 189999.

Identification The collected individual exhibits a suite of morphological features congruent with the defining characteristics of *Ablabys gymnothorax* outlined in its original description by Chungthanawong & Motomura (2018). It possesses an elongated, highly compressed body that becomes increasingly laterally flattened posteriorly, with body depth roughly equal to head length. Mouth small and terminal. Minute, embedded cycloid scales sparsely cover the body, extending onto the fin bases, but are absent on the head, thorax and pre-

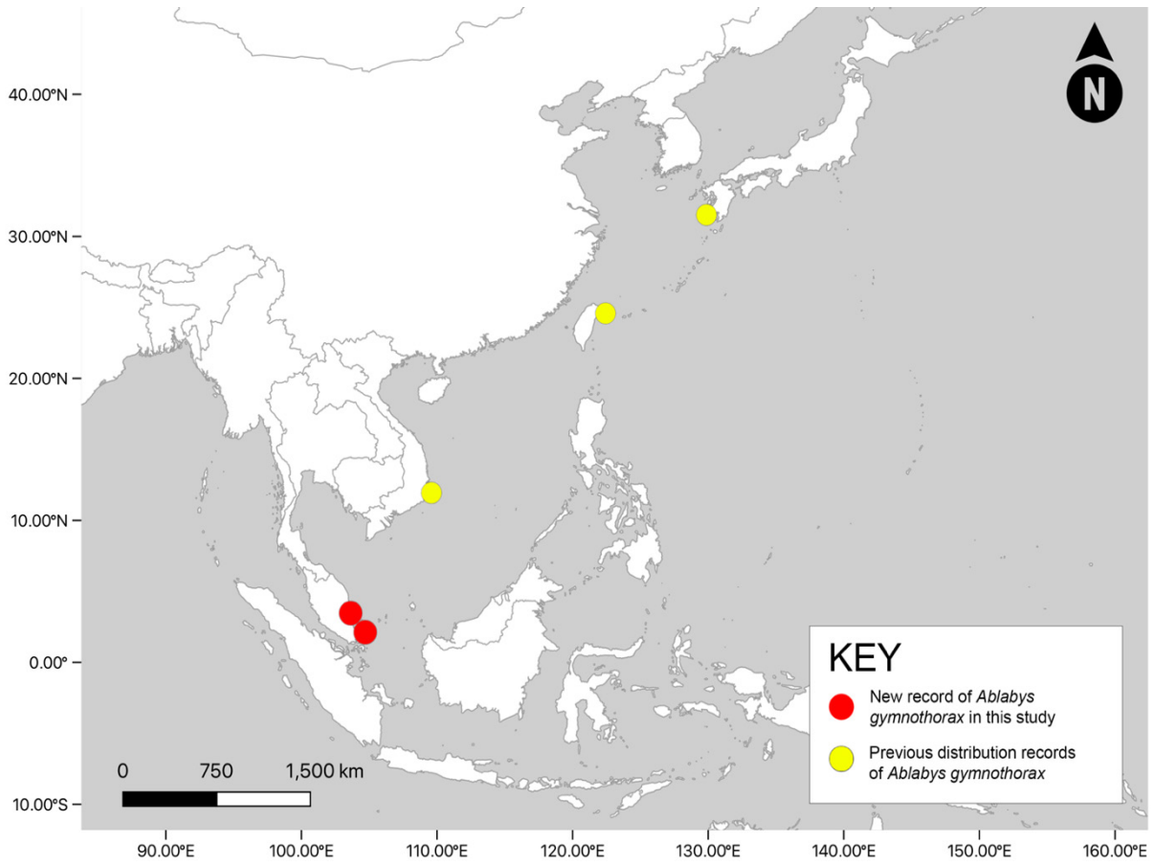

FIGURE 1. Distribution map of *Ablabys gymnothorax*. Yellow dots show the previous records based on Chungthanawong and Motomura (2018). The red dots are the new records presented in this study

dorsal area. The complete, continuous lateral line runs from the supracleithral spine to the caudal peduncle, with one lateral line pore present on the caudal fin near its base, and the pores directed dorsally. First dorsal-fin spine shortest and second spine is the longest. The last dorsal-fin soft ray is connected to the caudal fin. The long anal fin base measures one-third the dorsal-fin base length. The origin of the anal fin aligns with the fourteenth dorsal-fin spine, the first anal spine is shortest, and the second and third anal spines are subequal and shorter than the first soft anal ray. The dorsal surface of the head and body is brown while the ventral surface light brown. A single dark spot on each lateral-line pore. Fins are dark brown with white margins. Full morphometrics and meristic measurements are provided in Table 1.

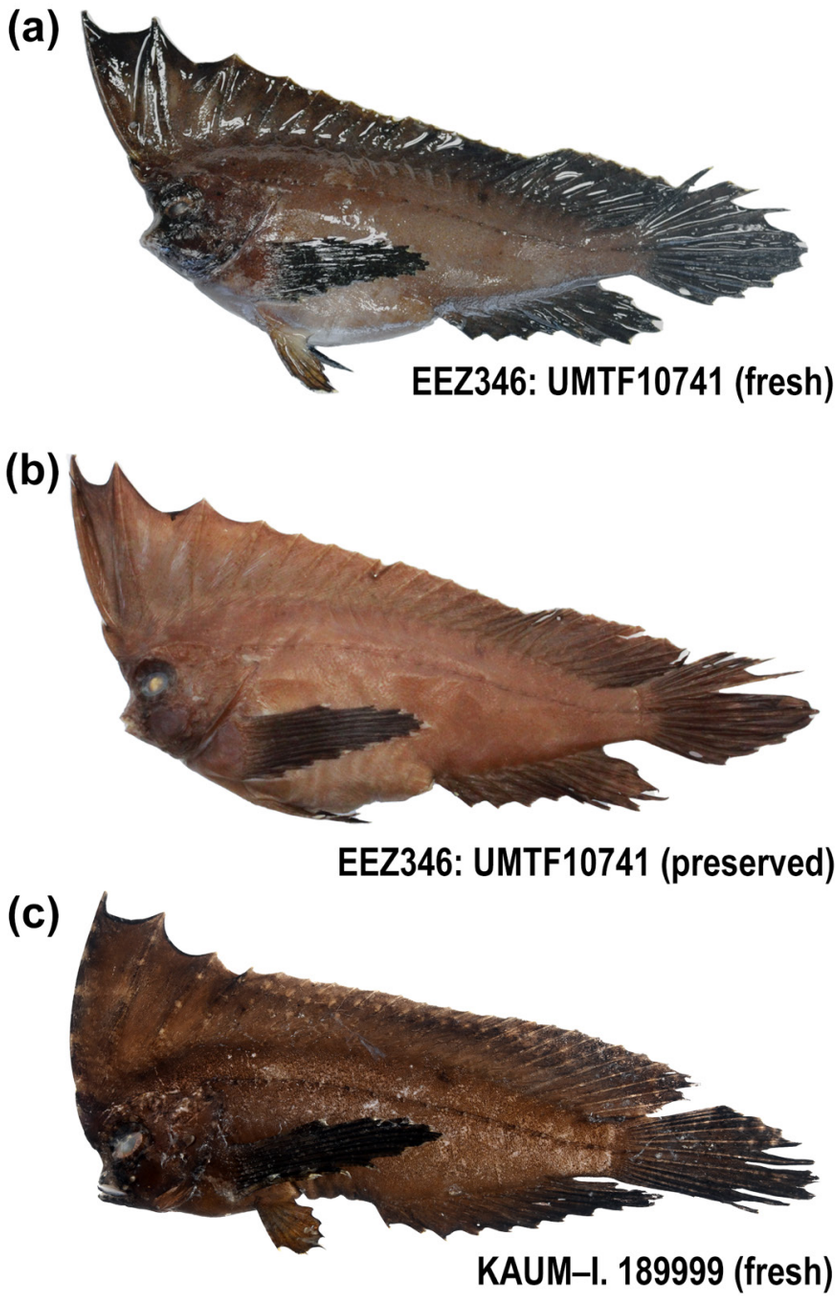

FIGURE 2. *Ablabys gymnothorax* (UMTF 10741 and KAUM-I. 189999), collected in the waters of the east coast of Peninsular Malaysia and LKIM Kuantan, Pahang

Remarks Though *Ablabys gymnothorax* and its congener, *A. macracanthus* share a similar distribution range across the Indo-West Pacific (Prokofiev 2008; Chungthanawong & Motomura 2021), they can be consistently differentiated based on subtle morphological distinctions. *Ablabys gymnothorax* can be distinguished from *A. macracanthus* by having higher dorsal and anal fin ray counts (XVI, 9 vs. XV, 8) and more gill rakers (6 vs. 4 or 5).

Ablabys gymnothorax also differs in certain fin connections, scale coverage, and proportional measurements including shorter head length, narrower interorbital width, shorter snout/jaw lengths, shallower caudal peduncle, longer dorsal spines 3-6 and last 2 spines, longer dorsal soft rays, and shorter pelvic spines.

DNA verification We obtained a novel COI sequence from our specimen, representing the first DNA barcode data for *A. gymnothorax*. Comparisons to existing sequences in GenBank and BOLD databases did not yield any matches (>98% identity threshold), as reference barcodes (i.e., COI sequence) for this species are currently unavailable. The COI sequence generated here will enable DNA-based identification and future comparative analyses.

The discovery of *Ablabys gymnothorax* in Malaysian waters of the South China Sea represents the first record of this species outside of its previously documented range in Japan, Taiwan, and Vietnam (Chungthanawong & Motomura 2018). This new locality extends the known range considerably to the southwest into the epicentre of marine biodiversity of the Coral Triangle. The trawl catch in the EEZ of Malaysia indicates that *A. gymnothorax* probably inhabits the soft sediments of the Sunda Shelf between the Malay Peninsula and Borneo. Its occurrence here was expected given this region falls within its presumed wider Indo-Pacific distribution. However, this discovery is the first definitive record that closes a gap between the previous records in the western Pacific and the presumed range in the Indonesia-Philippines archipelago. It shows that *A. gymnothorax* inhabits a large part of the tropical western Pacific and confirms its presence in one of the most biodiverse marine hotspots on Earth.

Our first record of *Ablabys gymnothorax* in Malaysian waters indicates a pronounced southwestern range extension approximately 1500 km from the nearest documented record in Vietnam. Direct migration over such a vast distance is improbable for these benthic, sedentary adult fish. However, dispersal and gene flow of pelagic larvae could be facilitated by the continuity of suitable habitats on the interconnected Sunda shelves, along with ocean current dynamics and comparable environmental conditions within the South China Sea basin between Malaysia and Vietnam (Hoeksema 2007). While adult *A. gymnothorax* likely demonstrate limited movements, the oceanographic connectivity and larval transport mechanisms in this region may enable this extensive distributional range expansion (Bashevkin et al. 2020). Further research focused on larval biology, population genetics, and hydrographic links across the South China Sea is warranted to elucidate the processes underlying this biogeographic pattern. Moreover, additional sampling and surveys within Malaysian waters will help further delineate the boundaries and habitat associations of this poorly known waspfish. Undoubtedly though, this first occurrence in Malaysia's EEZ significantly expands our understanding of the geographic range and degree of connectivity for *A. gymnothorax* populations throughout the Indo-Pacific region.

TABLE 1. Range variations in morphometric measurements and meristic counts of *Ablabys gymnothorax* in comparison to Chungthanawong and Motomura (2018)

Character	Present study			Chungthanawong & Motomura (2018)	
	UMTF 10741	KAUM–I. 189999	Mean	Paratypes	Mean
Standard length (mm)	73.2	60.5		59.9-82.8	
As % of standard length					
Head length	29.2	30.0	29.6	27.7-29.5	29
Head width	14.3	13.8	14.1	12.2-15.3	13.8
Head depth	21.2	21.9	21.5	17.8-22.9	20.2
Snout length	6.7	6.3	6.5	5.6-6.8	6.1
Body depth	39.6	30.7	35.2	29.6-35.3	31.1
Body width	15.9	13.3	14.6	11.9-16.0	13.9
Orbit diameter	8.2	8.4	8.3	8.1-9.9	8.9
Suborbital width	3.9	3.2	3.6	3.2-3.5	3.3

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Interorbital width	4.1	4.2	4.2	4.1-4.4	4.2
Upper-jaw length	7.9	9.1	8.5	7.6-8.4	8.1
Postorbital length	15.7	15.5	15.6	14.9-15.6	15.2
Pre-dorsal-fin length	10.4	10.9	10.6	8.1-12.2	10.3
Pre-anal-fin length	60.5	52.8	56.6	55.9-60.1	57.9
Pre-pelvic-fin length	31.0	30.7	30.8	27.4-32.2	30.5
Caudal-peduncle depth	10.1	10.1	10.1	9.3-9.7	9.6
Caudal-peduncle length	11.6	10.5	11.1	11.6-15.7	13.6
Dorsal-fin base length	94.1	93.3	93.7	85.8-91.0	89.2
Anal-fin base length	34.2	33.7	34.0	32.1-35.0	32.9
Caudal-fin length	34.3	41.9	38.1	39.1-43.3	42.6
Pectoral fin length	36.9	40.6	38.8	36.1-38.2	37.7
Posterior lacrimal spine length	2.7	3.6	3.1	2.4-3.3	3.1
First dorsal-fin spine length	8.7	9.8	9.3	7.6-8.9	8.2
Second dorsal-fin spine length	38.9	44.3	41.6	39.0-48.5	44.3
Third dorsal-fin spine length	31.0	38.1	34.6	35.8-40.8	38.3
Fourth dorsal-fin spine length	20.5	27.2	23.8	25.4-30.6	28.1
Fifth dorsal-fin spine length	18.2	22.7	20.4	19.1-24.7	22.2
Sixth dorsal-fin spine length	16.7	20.9	18.8	17.4-19.6	18.6
Penultimate dorsal-fin spine length	17.8	20.8	19.3	17.2-19.8	18.9
Last dorsal-fin spine length	17.9	21.6	19.7	17.8-19.8	19.5
Longest dorsal-fin soft ray length	25.0	25.0	25.0	24.2-29.9	28.2
First anal-fin spine length	5.5	5.9	5.7	5.6-6.9	6.5
Second anal-fin spine length	9.9	9.3	9.6	10.0-11.6	10.7
Third anal-fin spine length	10.9	10.8	10.8	10.9-12.2	11.4
Longest anal-fin soft ray length	23.4	25.3	24.3	21.9-28.5	25.2
Pelvic-fin spine length	13.0	13.5	13.3	12.7-14.9	14.0
Longest pelvic-fin soft ray length	19.0	20.5	19.7	20.7-21.7	21.5
Counts					*Modes*
Dorsal-fin	XVI, 9	XVI,10		XVI, 9	XVI, 9
Anal-fin	III, 8	III,9		III, 9	III, 9
Pectoral-fin rays	12	12	12	12	
Pelvic-fin rays	I, 5	I, 5	I, 5	I, 5	
Lateral line pores	20	20	20	20	
Gill rakers (upper + lower = total)	1+5=6	1+5=6	1+5=6	1+5=6	

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