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A new species of anchovy, *Stolephorus astrum* (Teleostei: Clupeiformes: Engraulidae), from Palau, Micronesia

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Abstract. A new anchovy, *Stolephorus astrum*, new species, is described based on 17 specimens collected from Babeldaob Island, Palau, Micronesia. The species closely resembles *Stolephorus leopardus* Hata & Motomura, 2021, *Stolephorus pacificus* Baldwin, 1984, and *Stolephorus teguhi* Kimura, Hori & Shibukawa, 2009, in having a short maxilla (posterior tip just reaching or slightly beyond the anterior margin of the preopercle) and 30 or more lower gill rakers, but differs from all three in having lower numbers of gill rakers, the pectoral fin without melanophores, and a combination of a number of other characters.

Key words. Actinopterygii, biodiversity, Caroline Islands, ichthyofauna, Mariana Islands, taxonomy

INTRODUCTION

The anchovy genus *Stolephorus* Lacepède, 1803 (Clupeiformes: Engraulidae) currently includes 46 valid species widespread in the Indo-Pacific region (Whitehead et al., 1988; Wongratana et al., 1999; Kimura et al., 2009; Hata & Motomura, 2018a–e, 2021a–c, 2022a, b, 2023, 2024a, b; Hata et al., 2019, 2020a, b, 2021, 2022a, b, 2023; Gangan et al., 2020). Although the species diversity of *Stolephorus* is high in the Southeast Asian region, many species are distributed in insular areas in Micronesia and Polynesia. These species, such as *Stolephorus multibranchus* Wongratana, 1987 (Caroline Islands endemic) and *Stolephorus scitulus* (Fowler, 1911) (Polynesia endemic), tend to have more gill rakers than their continental congeners, possibly the result of adaptations enabling efficient capture of the small-sized plankton dominant in their habitat, surrounded by oligotrophic waters (Hata & Motomura, 2021). During a revisionary study of *Stolephorus*, 17 specimens from Palau, Micronesia were found to be characterised by numerous gill rakers, and a unique combination of other characters. The new species is described herein, bringing the number of valid species in the genus to 47. An identification key to the five species of *Stolephorus* recorded off Palau is also provided.

MATERIAL AND METHODS

Counts and proportional measurements generally followed Hata & Motomura (2017). All measurements were made with digital calipers to the nearest 0.01 mm. 'Pelvic scute' refers to a scute associated with the pelvic girdle, and 'prepelvic scute', 'postpelvic scute' and 'predorsal scute' to hard spine-like scutes anterior to the pelvic scute, posterior to the pelvic scute, and anterior to the dorsal-fin origin, respectively. Abbreviations are as follows—SL, standard length; UGR, LGR and TGR, upper limb, lower limb and total gill rakers, respectively, with associated numbers indicating the specific gill arch; D–P1, distance from dorsal-fin origin to pectoral-fin insertion; D–P2, distance from dorsal-fin origin to pelvic-fin insertion; D–A, distance between dorsal and anal fin origins; P1–P2, distance between pectoral- and pelvic-fin insertions; P2–A, distance from pelvic-fin insertion to anal-fin origin. Counts and measurements (expressed as percentages of SL) are given in Tables 1 and 2. Osteological characters were observed on soft X-ray photographs. Institutional codes follow Sabaj (2020).

Availability of data and materials. Morphometric and meristic data of the species described in this study are all shown in Tables 1 and 2. Specimen measurements are available from the corresponding author upon reasonable request. All specimens examined in this study have been deposited in museum collections (see Taxonomy section).

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Table 1. Meristics of specimens of *Stolephorus astrum*, new species

	Holotype	**Paratypes**	
	CAS 230413	**n = 16**	
Standard length (mm)	48.1	32.5–54.8	Modes
Dorsal-fin rays (unbranched)	3	3	3
Dorsal-fin rays (branched)	13	12–14	13
Anal-fin rays (unbranched)	3	3	3
Anal-fin rays (branched)	19	18–19	18
Pectoral-fin rays (unbranched)	1	1	1
Pectoral-fin rays (branched)	13	11–14	13
Pelvic-fin rays (unbranched)	1	1	1
Pelvic-fin rays (branched)	6	6	6
Caudal-fin rays	19	19	19
Gill rakers on 1st gill arch (upper)	23	20–24	22
Gill rakers on 1st gill arch (lower)	32	30–34	32
Gill rakers on 1st gill arch (total)	55	50–56	53
Gill rakers on 2nd gill arch (upper)	17	15–18	16
Gill rakers on 2nd gill arch (lower)	29	26–30	29
Gill rakers on 2nd gill arch (total)	46	42–48	46
Gill rakers on 3rd gill arch (upper)	13	12–13	12
Gill rakers on 3rd gill arch (lower)	17	15–17	17
Gill rakers on 3rd gill arch (total)	30	27–30	29
Gill rakers on 4th gill arch (upper)	10	9–10	9
Gill rakers on 4th gill arch (lower)	14	12–14	13
Gill rakers on 4th gill arch (total)	24	21–23	22
Gill rakers on posterior face of 3rd gill arch	6	5–7	6
Prepelvic scutes	3	1–4	4
Scale rows in longitudinal series	35	34–36	35
Transverse scales	8	8	8
Pseudobranchial filaments	18	16–21	18
Total vertebrae	39	38–39	39
Pectoral-fin rays with melanophores	4	2–8	4

Table 2. Morphometrics of specimens of *Stolephorus astrum*, new species

	Holotype	**Paratypes**	
	CAS 230413	**n = 16**	
Standard length (mm; SL)	48.1	32.5–54.8	Modes
As % SL			
Head length	25.0	24.4–27.6	26.1
Body depth	17.6	16.8–19.0	18.1
Pre-dorsal fin length	53.6	50.1–53.4	52.3
Snout tip to pectoral-fin insertion	26.9	26.1–28.7	27.2
Snout tip to pelvic-fin insertion	44.9	43.9–47.1	45.6
Snout tip to anal-fin origin	61.7	59.9–64.2	62.4
Dorsal-fin base length	14.8	13.3–15.8	14.7
Anal-fin base length	20.6	19.8–22.3	21.0
Caudal-peduncle length	17.1	16.8–18.6	17.5
Caudal-peduncle depth	9.7	9.0–10.0	9.4
D–P1	32.6	31.9–34.1	32.9
D–P2	20.1	18.3–20.5	19.7
D–A	20.2	19.1–20.3	19.7
P1–P2	18.8	17.6–20.8	19.4
P2–A	16.1	15.9–18.8	17.5
Pectoral-fin length	16.1	15.9–16.3	16.2
Pelvic-fin length	11.1	10.2–11.3	10.9
Maxilla length	17.6	15.9–17.8	17.0
Mandibular length	16.7	15.9–17.3	16.6
Supramaxilla end to maxilla end	2.4	1.9–3.2	2.5
1st unbranched dorsal-fin ray length	1.5	1.3–2.2	1.8
2nd unbranched dorsal-fin ray length	broken	8.2	8.2
3rd dorsal-fin ray length	broken	16.9	16.9
1st unbranched anal-fin ray length	1.2	0.9–1.7	1.3
2nd unbranched anal-fin ray length	5.4	4.8–4.9	5.0
3rd anal-fin ray length	13.7	12.8–13.6	13.4
Orbit diameter	7.8	8.0–9.3	8.7
Eye diameter	6.2	6.5–8.2	7.3
Snout length	4.1	3.8–4.4	4.0
Interorbital width	5.9	5.8–6.6	6.1
Postorbital length	12.5	11.9–13.9	12.9
As % of maxilla length			
Supramaxilla end to maxilla end	13.9	12.2–18.0	14.4

TAXONOMY

Stolephorus astrum, new species

(English name: Astral Anchovy)
(Figs. 1, 2A; Tables 1–5)

Holotype. CAS 230413, 48.1 mm SL, ca. 300 yards (approx. 274 m) from mouth of channel draining waters from Ngeremeskang and Ngkebeduul Rivers, Karamado Bay, Babeldaob Island, Palau (7°29′47″N, 134°31′31″E), 10 feet (approx. 3.05 m) depth (water brown, turbid), 7 September 1955, 1630–1730 hours.

Paratypes. 16 specimens: 32.5–54.8 mm SL. CAS 230408, 11 specimens, 35.8–54.8 mm SL, KAUM–I. 188269, 43.1 mm SL, KAUM–I. 188270, 32.5 mm SL, USNM 445732, 35.3 mm SL, USNM 445733, 34.9 mm SL, 0–50 feet (approx. 15.2 m) off muddy shore of mangrove estuary in Kamiyangaru Bay, Babeldaob Island, Palau (7°26′29″N, 134°29′4″E), 2–10 feet (approx. 0.61–3.05 m) depth (water very muddy; current ca. 0.25–1 knot); CAS 248277, 54.2 mm SL, collected with holotype.

Diagnosis. A species of *Stolephorus* with the following combination of characters: maxilla short, 15.9–17.8% of SL, its posterior tip just reaching to or slightly beyond anterior margin of preopercle (just short of anterior margin in individuals < 36 mm SL); posterior margin of preopercle convex, rounded; no predorsal scutes; prepelvic scutes 1–4 (modally 4); pelvic scute without spine; dorsal fin with three unbranched and 12–14 (13) branched rays; anal fin with three unbranched and 18 or 19 (18) branched rays, its origin located just below base of ninth to eleventh dorsal-fin ray; 1UGR 20–24 (22), 1LGR 30–34 (32), 1TGR 50–56 (53); 2UGR 15–18 (11), 2LGR 26–30 (29), 2TGR 42–48 (46); 3UGR 12–13 (12), 3LGR 15–17 (17), 3TGR 27–30 (29); 4UGR 9–10 (9), 4LGR 12–14 (13), 4TGR 21–24 (22); gill rakers 5–7 (6) on posterior face of third gill arch; transverse scales 8; pseudobranchial filaments 16–21 (18); total vertebrae 38 or 39 (39); pelvic fin short, 10.2–11.3% of SL, tip of depressed pelvic fin reaching posteriorly to vertical through 3rd to 6th dorsal-fin ray origin; pectoral fin short, 15.9–16.3% of SL; predorsal fin length short, 50.1–53.6% of SL (mean 52.3%); caudal peduncle rather long, 16.8–18.6% of SL (17.5%); body slender, 16.8–19.0% of SL (18.1%), distance between dorsal-fin origin and pelvic-fin insertion 20.1–23.4% of SL (22.0%), between origins of dorsal and anal fins 19.1–20.3% (19.7%); pairs of dark patches on parietal and occipital areas; no dark lines on dorsum; black spots on tips of snout and lower jaw, but not on suborbital area; melanophores scattered on 2nd to 8th uppermost pectoral-fin rays.

Description. Data for holotype given in parentheses (if different). Body laterally rather compressed, elongate, deepest at dorsal-fin origin. Dorsal profile of head and body gently elevated from snout tip to dorsal-fin origin, thereafter gradually lowering to uppermost point of caudal-fin base. Ventral profile of head and body gently lowering from lower-jaw tip to below pectoral fin, thereafter nearly straight (parallel to body axis) to anal-fin origin, gradually elevating along anal-fin base, thereafter nearly straight (parallel to body axis) to lowermost point of caudal-fin base. Abdomen rounded, covered with one to four (three) spine-like prepelvic scutes anterior to pelvic fin insertion. Pelvic scute without spine. Postpelvic and predorsal scutes absent. Anus just anterior to anal-fin origin.

Snout round, projecting, length less than eye diameter. Eye large, round, covered with adipose eyelid, positioned laterally on head dorsal to horizontal through pectoral-fin insertion, visible in dorsal view. Pupil round. Orbit elliptical. Nostrils close to each other, anterior to orbit. Mouth large, inferior, ventral to body axis, extending backward beyond posterior margin of eye. Maxilla short, its posterior tip just reaching to or slightly beyond anterior margin of preopercle (just reaching in holotype; just short of anterior margin in paratypes < 36 mm SL). Lower jaw slender.

Single row of conical teeth on each jaw, palatines, and inner edges of pterygoids. Several conical teeth on vomer. Small fine teeth patch on pterygoids. No teeth on upper edge of hyoid arch. Single row of blunt poorly-formed conical teeth on upper edges of basihyal and basibranchial.

Posterior margins of preopercle, subopercle and opercle rounded, smooth. Gill membrane without serrations. Interorbital space flat. Interorbital width less than eye diameter. Pseudobranchial filaments present, length of longest filament less than eye diameter. Gill rakers long, slender, rough, visible from side of head when mouth open. Isthmus muscle long, reaching anteriorly to posterior margin of gill membranes. Urohyal hidden by isthmus muscle (not visible without dissection). Gill membrane on each side joined distally, most of isthmus muscle exposed (not covered by gill membrane).

Dorsal-fin origin posterior to vertical through base of last pelvic-fin ray, slightly posterior to middle of body. Dorsal and anal fins with three anteriormost rays closely spaced and unbranched. First dorsal- and anal-fin rays minute. Dorsal profile of dorsal fin elevated from dorsal-fin origin to third fin ray tip and lowering to last dorsal-fin ray tip. Anal-fin origin just below base of ninth to eleventh (tenth) dorsal-fin ray. Posterior tip of depressed anal fin not reaching caudal-fin base. Uppermost pectoral-fin ray unbranched, inserted below midline of body. Posterior tip of pectoral fin not reaching vertical through pelvic-fin insertion. Dorsal, ventral, and posterior contours of pectoral fin nearly straight. Pelvic fin shorter than pectoral fin. Posterior tip of depressed pelvic fin reaching to vertical through third to sixth (fourth) dorsal-fin ray origin. Caudal fin forked, tips of both lobes pointed.

Body scales deciduous (completely lost in all specimens, except for prepelvic scutes). Head scales absent. Fins scaleless, except for broad triangular sheath of scales on caudal fin.

Colouration of preserved specimens. Body uniformly pale, light ivory longitudinal band running from just behind upper opercular margin to caudal-fin base. Pairs of dark patches on

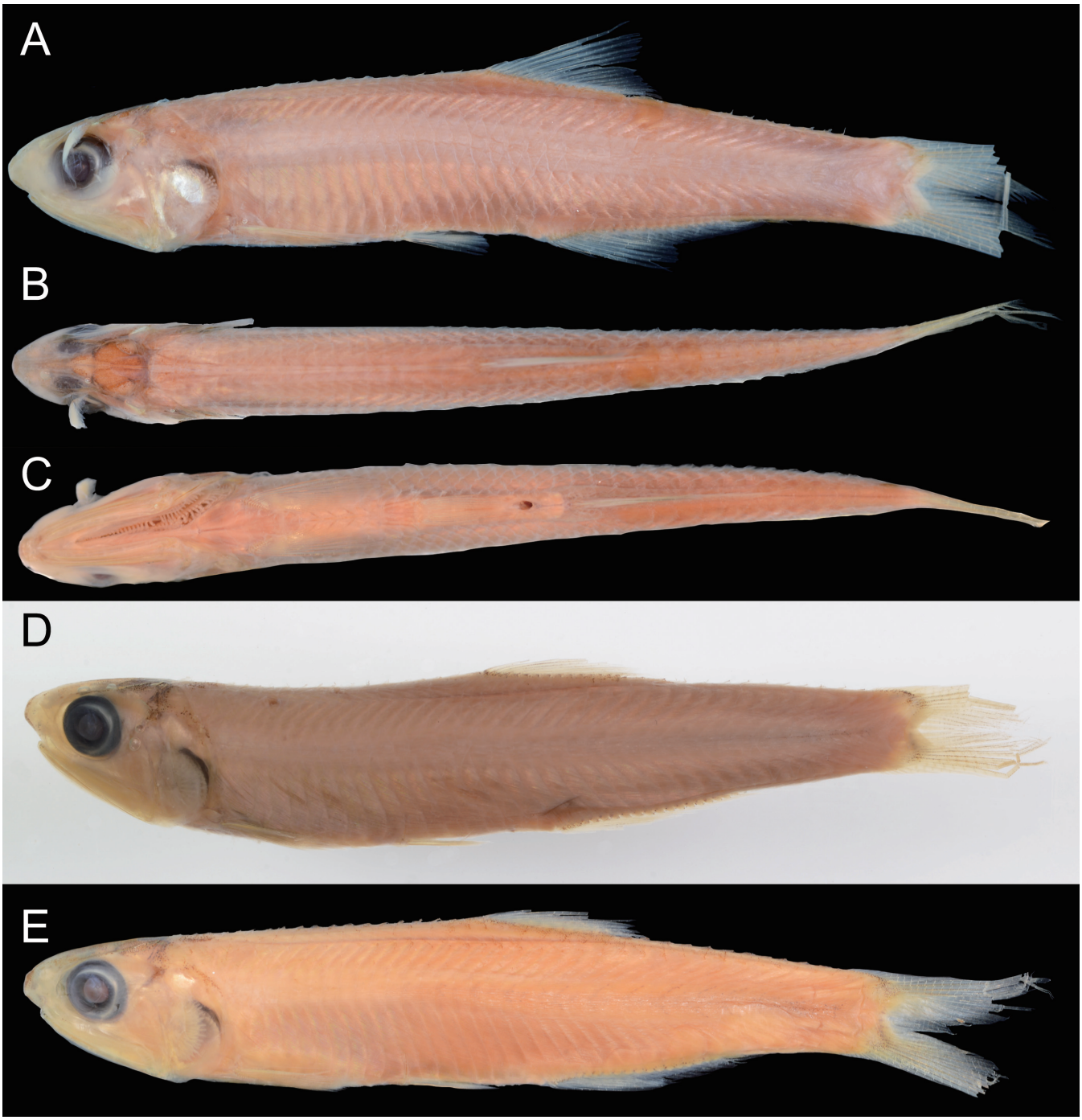

Fig. 1. A, lateral, B, dorsal, and C, ventral views of the holotype (CAS 230413, 48.1 mm SL, Babeldaob Island, Palau), and paratypes (D, CAS 248277, 53.3 mm SL, and E, CAS 248277, 54.8 mm SL (both Babeldaob Island, Palau) of *Stolephorus astrum*, new species (preserved specimens).

parietal and occipital regions. No dark lines on dorsum either anterior or posterior to dorsal fin. Melanophores scattered along posterior margin of dorsal scale pockets, tips of snout and lower jaw, and lateral surfaces of post-temporal region, and upper part of gill slit, but not on suborbital area. Fin rays transparent, colourless. Melanophores scattered along bases of dorsal and anal fins, and along fin rays of dorsal and caudal fins and anterior part of anal fin. Melanophores scattered on 2nd to 8th (2nd) pectoral-fin rays from uppermost ray (Fig. 2A), gill rakers and gill filaments on first gill arch, gill arch, pseudobranch, and inner side of hyoid arch. Fresh colouration unknown.

Distribution. The new species is currently known only from Babeldaob Island, Palau. All of the type specimens were collected from around river estuaries (see collection localities).

Etymology. The specific name '*astrum*' is given in reference to the starry black spots on the pectoral fins of the new species.

Comparisons. The new species is assignable to the genus *Stolephorus*, as defined by Whitehead et al. (1988) and Wongratana et al. (1999), having a long isthmus muscle reaching anteriorly to the posterior margin of the gill

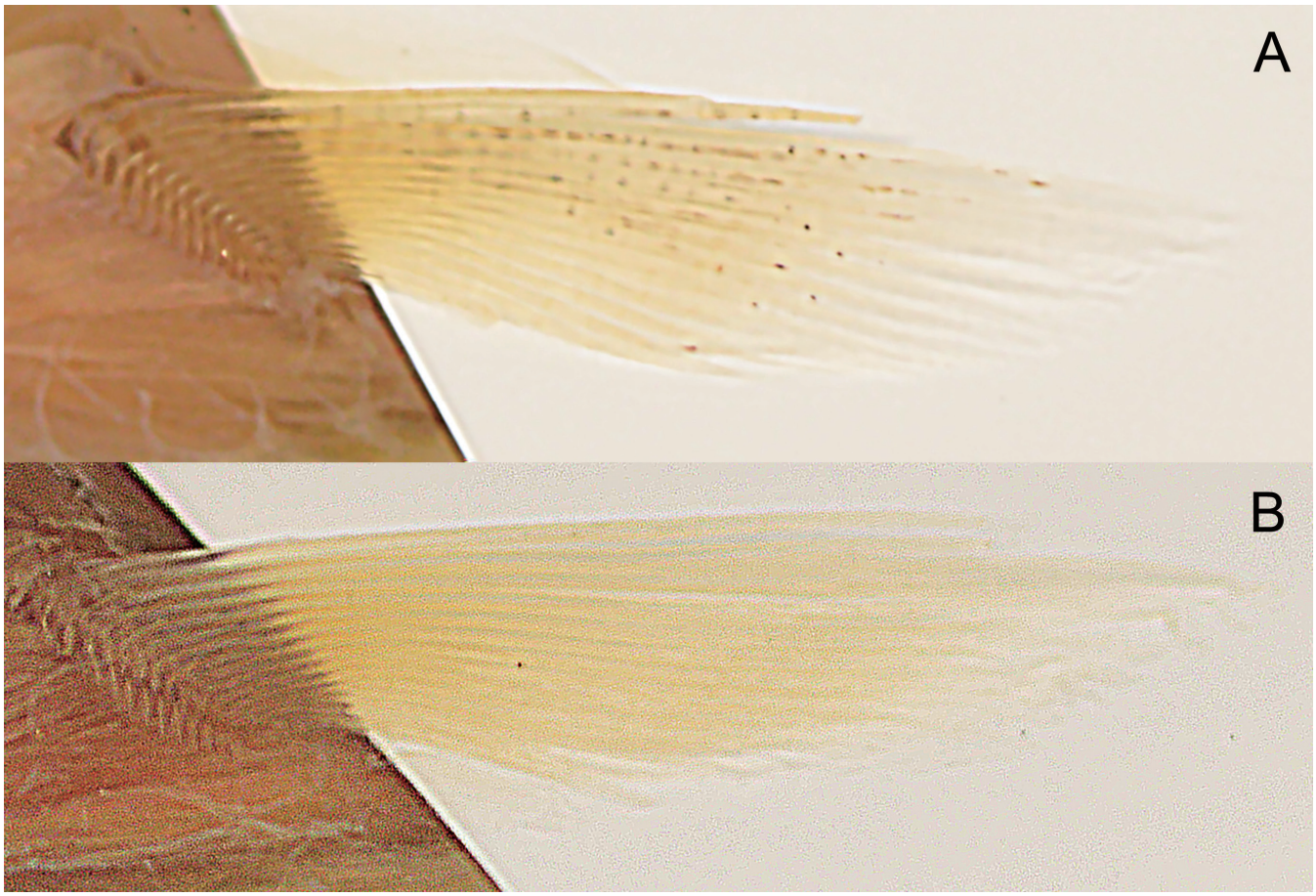

Fig. 2. Pectoral-fin rays of preserved specimens of A, *Stolephorus astrum*, new species (CAS 230408, 49.8 mm SL, Babeldaob Island, Palau; melanophores scattered on 6 uppermost fin rays; left-right inverted) and B, *S. pacificus* (USNM 263476, 57.8 mm SL, Talofofo Bay, Guam; no melanophores on pectoral fin).

membrane, the urohyal covered by the isthmus muscle, possession of prepelvic scutes, and the anal fin originating just below the middle of the dorsal-fin base, in addition to the absence of postpelvic scutes.

The short maxilla of the new species (posteriorly just reaching or slightly beyond the anterior margin of the preopercle; just short of anterior margin in individuals < 36 mm SL) separates the former from the majority of congeners, except for *Stolephorus advenus* (Wongratana, 1987), *Stolephorus balinensis* (Bleeker, 1849), *Stolephorus belaerius* Hata, Lavoué & Motomura, 2021, *Stolephorus commersonnii* Lacepède, 1803, *Stolephorus horizon* Hata & Motomura, 2023, *Stolephorus indicus* (van Hasselt, 1823), *Stolephorus leopardus* Hata & Motomura, 2021, *Stolephorus meteorum* Hata, Lavoué, Bogorodsky, Alpermann & Motomura, 2023, *Stolephorus pacificus* Baldwin, 1984, *Stolephorus scitulus* (Fowler, 1911), and *Stolephorus teguhi* Kimura, Hori & Shibukawa, 2009 (Whitehead et al., 1988; Wongratana et al., 1999; Kimura et al., 2009; Hata & Motomura 2018a–e, 2021a–c, 2022a, b, 2023, 2024a, b; Hata et al., 2019, 2020a, b, 2021, 2022b, c, 2023; Gangan et al., 2020). Among them, *S. astrum* can be easily distinguished from *S. advenus*, *S. balinensis*, *S. belaerius*, *S. commersonnii*, *S. horizon*, *S. indicus*, *S. meteorum*, and *S. scitulus* by its higher numbers of gill rakers (1LGR 30 or more in *S. astrum* vs. 28 or fewer in the others) and the pelvic fin reaching posteriorly beyond vertical through the dorsal-fin origin (vs. not reaching) (Wongratana, 1987a; Hata et al., 2021, 2023; Hata & Motomura, 2023; this study).

On the other hand, the new species is differentiated from the remaining three species (*S. leopardus*, *S. pacificus*, and *S. teguhi*), which all have higher gill-raker numbers (1TGR 50–56 in *S. astrum* vs. 57 or more in the others; Table 3). Moreover, the new species differs from the other three species in its narrower body [body depth 16.8–19.0% of SL (mean 18.1%) vs. 17.5–22.2% (19.6%) in *S. pacificus*, < 19.5% in *S. leopardus* and *S. teguhi*; D–P2 18.3–20.5 % of SL (19.7%) vs. 20.1–23.4% (22.0%) in *S. pacificus*, < 22% in *S. leopardus* and *S. teguhi*; D–A 19.1–20.3% of SL (19.7%) vs. 19.8–23.0% (21.6%) in *S. pacificus*, < 21% in *S. leopardus* and *S. teguhi*; Fig. 3A–C], shorter predorsal-fin length [50.1–53.6% of SL (mean 52.3%) vs. 56.4–57.4% (56.6%) in *S. leopardus*; 52.9–56.9% (mean 54.3%; less than 50% in 2 of 27 specimens) in *S. pacificus*; 50.6–57.4% (54.5%) in *S. teguhi*; Fig. 3D], and longer caudal peduncle [16.8–18.6% of SL (mean 17.5%) vs. 13.8–17.4% (15.6%) in *S. pacificus*; > 16.5% in *S. leopardus* and *S. teguhi*; Fig. 3E]. *Stolephorus astrum* further differs from *S. leopardus* in having a shorter snout (3.8–4.4% of SL in *S. astrum* vs. 4.7–4.8% in *S. leopardus*; Fig. 3F), anal-fin base (19.8–22.3% of SL vs. 22.4–22.5%; Fig. 3G), D–P1 (31.9–34.1% of SL vs. 34.6–35.6%; Fig. 3H), postorbital length (11.9–13.9% of

Table 3. Frequency distribution of longitudinal series of scale rows in *Stolephorus astrum*, new species, *S. pacificus*, *S. leopardus*, and *S. teguhi*.

		Total gill rakers on first gill arch (continued)																			
		50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
Stolephorus astrum, new species	n = 17	1		1	6	3	2	4														
Stolephorus pacificus	n = 24								5	5	1	2	4	5	2							
Stolephorus leopardus	n = 4														1		1		1	1		

		Total gill rakers on first gill arch (continued)																			
		71		72		73		74		75		76		77		78		79		80		81		82
Stolephorus astrum, new species	n = 17																					
Stolephorus pacificus	n = 24																					
Stolephorus leopardus	n = 4																					
Stolephorus teguhi	n = 23			2		4		5		2		3		1		1		3		1		1

		Total gill rakers on first gill arch (continued)													
		42	43	44	45	46	47	48	49	50	51	52	53	54	55
Stolephorus astrum, new species	n = 17	1	2	2	2	8	1	1							
Stolephorus pacificus	n = 24						2	3	4	6	4	5	1		
Stolephorus leopardus	n = 4													2	
Stolephorus teguhi	n = 23														

		Total gill rakers on first gill arch (continued)											
		56	57	58	59	60	61	62	63	64	65	66	67
Stolephorus astrum, new species	n = 17												
Stolephorus pacificus	n = 24												
Stolephorus leopardus	n = 4		1		1								
Stolephorus teguhi	n = 23					6	6	2	2	3	2		1

		Total gill rakers on first gill arch (continued)																
		27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Stolephorus astrum, new species	n = 17	1	4	7	5													
Stolephorus pacificus	n = 24				2	3	8	6	5	1								
Stolephorus leopardus	n = 4							1	1			2						
Stolephorus teguhi	n = 23										5	5	3	5	1	0	1	1

		Total gill rakers on first gill arch (continued)									
		21	22	23	24	25	26	27	28	29	30
Stolephorus astrum, new species	n = 17	5	6	5	1						
Stolephorus pacificus	n = 24			4	8	9	3	1			
Stolephorus leopardus	n = 4				1	2	1				
Stolephorus teguhi	n = 23					1	2	9	6	2	2

SL vs. 13.9–14.6%; Fig. 3I), distance from supramaxilla end to maxilla end (12.2–18.0% of maxilla length vs. 8.1–10.8%; Fig. 3J), more branched dorsal-fin rays [12–14 (modally 13) vs. 11 or 12; Table 4] and fewer branched anal-fin rays [18 or 19 (18) vs. 19–21 (19); Table 5], dorsum without dark lines (vs. single dark line on dorsum from occipital region to upper margin of caudal-fin base), and no pigmentation on lateral surface of both upper and lower jaws (vs. melanophores scattered on both jaws).

Furthermore, *S. astrum* can be distinguished from *S. pacificus* by having a shorter pectoral fin (15.9–16.3% of SL in *S. astrum* vs. 16.5–18.3% in *S. pacificus*; Fig. 3K), with melanophores scattered on 2nd to 8th uppermost rays (vs. pectoral fin without melanophores; Fig. 2). The new species differs from *S. teguhi* in having the anal fin with fewer branched rays [18 or 19 (modally 18) in *S. astrum* vs. 19–21 (20) in *S. teguhi*; Table 4] and shorter base (19.8–22.3% of SL vs. 22.7–25.3%; Fig. 3G), shorter pectoral fin (15.9–16.3% of SL vs. 16.5–18.8%; Fig. 3K), greater distance from supramaxilla end to maxilla end (12.2–18.0% of maxilla length vs. 6.3–12.2%; Fig. 3J), the dorsum without dark lines (vs. single dark line on dorsum from occipital region to upper margin of caudal-fin base), and no pigmentation on lateral surface of both upper and lower jaws (vs. melanophores scattered on both jaws) (Hata & Motomura, 2021c; this study; Table 6).

DISCUSSION

Species of the genus *Stolephorus* in Palau and Micronesia. Five species (*S. balinensis*, *Stolephorus bataviensis* Hardenberg, 1933, *Stolephorus rex* Jordan & Seale, 1926, and *Stolephorus mercurius* Hata, Lavoué & Motomura, 2021, and *S. astrum*) are known from Palau (supported by voucher specimens) (Hata et al., 2019, 2021, 2022a). Additionally, *Stolephorus multibranchus* Wongratana, 1987 and *S. pacificus* have been recorded from the eastern Mariana Islands based on specimens. Although Myers (1999) reported *Stolephorus apiensis* (Jordan & Seale, 1906) from Pohnpei, Caroline Islands, the 1LGR number given was 32–35, clearly higher than that given for *S. apiensis* (28–30) by Hata & Motomura (2018e), but closely matching that of *S. multibranchus* (1LGR 32–36: Hata & Motomura, 2018c). Because the paired dark lines on the dorsum of *S. multibranchus*, a major diagnostic character (c.f. *S. apiensis* – no lines on dorsum), are sometimes obscure in some individuals of the former (Hata & Motomura, 2018c: fig. 1B), Myers's (1999) *S. apiensis* was likely a misidentification of *S. multibranchus*.

Wongratana et al. (1999) and Myers (1999) also reported *S. indicus* from the Mariana and Caroline Islands referring to the figure of *S. indicus* shown in Whitehead et al. (1988). Although Hata et al. (2021, 2023) and Hata & Motomura (2023) indicated that Whitehead et al.'s (1988) *S. indicus* included at least seven species (*S. balinensis*, *S. belaerius*, *S. commersonnii*, *S. horizon*, *S. indicus*, *S. meteorum*, and *S. scitulus*), they did not consider specimens from Micronesia.

Table 4. Frequency distribution of branched dorsal-fin rays in *Stolephorus astrum*, new species, *S. pacificus*, *S. leopardus*, and *S. teguhi*.

		Branched dorsal-fin rays			
		11	12	13	14
Stolephorus astrum, new species	n = 17		1	14	2
Stolephorus pacificus	n = 26		2	22	2
Stolephorus leopardus	n = 4	1	3		
Stolephorus teguhi	n = 23	1	22		

Table 5. Frequency distribution of branched anal-fin rays in *Stolephorus astrum*, new species, *S. pacificus*, *S. leopardus*, and *S. teguhi*.

		Branched anal-fin rays				
		17	18	19	20	21
Stolephorus astrum, new species	n = 30		12	5		
Stolephorus pacificus	n = 26	9	13	4		
Stolephorus leopardus	n = 4			3		1
Stolephorus teguhi	n = 23			10	10	3

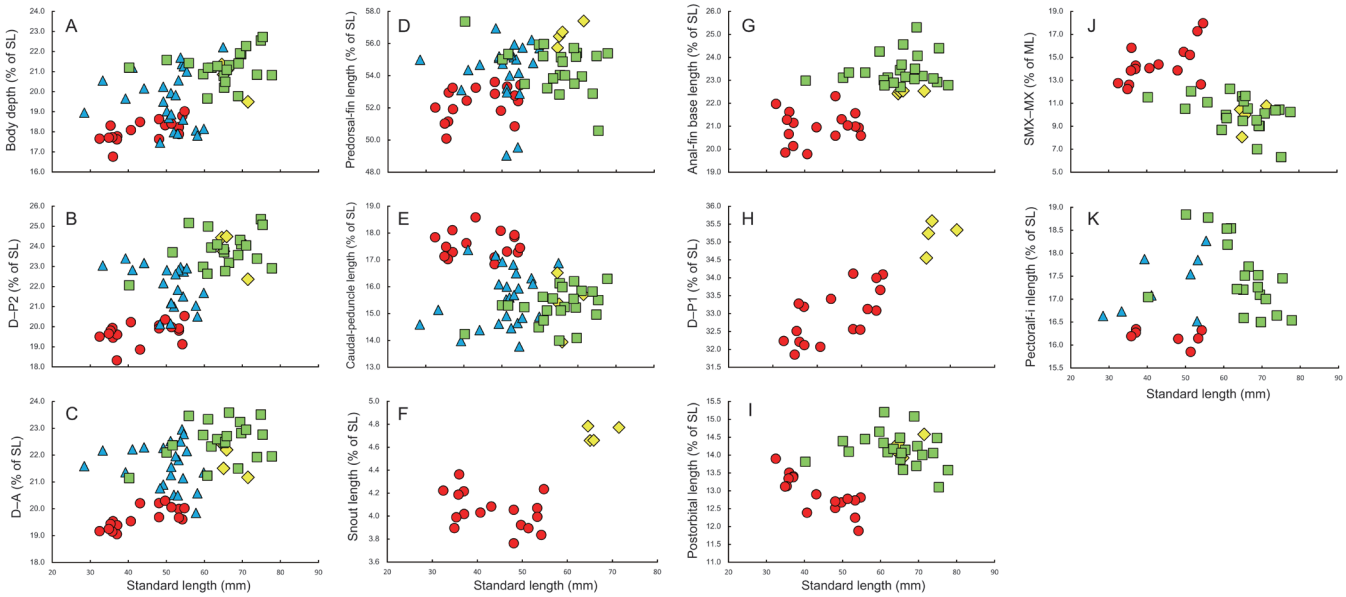

Fig. 3. Relationships of selected measurements relative to standard length (SL) versus SL or maxilla length in *Stolephorus astrum*, new species (red circles), *S. leopardus* (yellow diamonds), *S. pacificus* (blue triangles), and *S. teguhi* (green squares). A, body depth (as % of SL); B, distance between dorsal-fin origin and pelvic-fin insertion (D–P2; as % of SL); C, distance between origins of dorsal and anal fins (D–A; as % of SL); D, predorsal-fin length (as % of SL); E, caudal-peduncle length (as % of SL); F, snout length (as % of SL); G, anal-fin base length (as % of SL); H, distance between dorsal-fin origin and pectoral-fin insertion (D–P1; as % of SL); I, postorbital length (as % of SL); J, distance between ends of supramaxilla and maxilla [SMX–MX; as % of maxilla length (ML)]; K, pectoral-fin length (as % of SL).

Therefore, the identification of "*S. indicus*" sensu Myers (1999) is still unclear.

Myers (1999) further reported *Stolephorus insularis* Hardenberg, 1933 from the Caroline Islands (precise locality not indicated), referring to the figure of that species shown in Whitehead et al. (1988). According to Hata et al. (2019, 2022c), Whitehead et al.'s (1988) *S. insularis* in fact included four species [*Stolephorus bengalensis* (Dutt & Babu Rao, 1959), *Stolephorus eldorado* Hata, Lavoué & Motomura, 2022, *Stolephorus diabolus* Hata, Lavoué & Motomura, 2022, and *Stolephorus eclipsis* Hata, Lavoué & Motomura, 2022], with the nominal species, *S. insularis*, currently being regarded as a junior synonym of *Stolephorus tri* (Bleeker, 1852). However, none of these species have been recorded from Micronesia. Despite the description of *S. insularis*

Table 6. Comparison of significant meristics and morphometrics between *Stolephorus astrum*, new species, *S. leopardus*, *S. pacificus*, and *S. teguhi* (counts and proportions differing significantly from *S. astrum* in bold type).

	Stolephorus astrum	***Stolephorus leopardus***	***Stolephorus pacificus***	***Stolephorus teguhi***
Branched dorsal-fin rays	12–14 (modally 13)	11 or 12 (12)	12–14 (13)	11 or 12 (12)
Branched anal-fin rays	18 or 19 (modally 18)	19–21 (19)	17–19 (18)	19–21 (19, 20)
Dorsum colouration	no lines	single dark line	no lines	single dark line
Pigmentation on jaws	no pigmentation	scattered on both jaws	no pigmentation	scattered on both jaws
Melanophores on pectoral-fin rays	present	present	none	present
Body depth (% of SL)	16.8–19.0% (mean 18.1%)	19.5–21.4%	17.5–22.2% (mean 19.6%)	19.7–22.7%
Pre-dorsal fin length (% of SL)	50.1–53.6% (mean 52.3%)	56.4–57.4% (mean 56.6%)	52.9–56.9% (mean 54.3%; rarely < 50%)	50.6–57.4% (mean 54.5%)
Anal-fin base length (% of SL)	19.8–22.3%	22.4–22.5%	18.9–22.8%	22.7–25.3%
Caudal-peduncle length (% of SL)	16.8–18.6% (mean 17.5%)	13.9–16.5%	13.8–17.4% (15.6%)	14.0–16.3%
D–P1 (% of SL)	31.9–34.1% (mean 32.9%)	34.6–35.6% (35.2%)	32.8–37.1% (34.7%)	33.7–38.2% (35.9%)
D–P2 (% of SL)	18.3–20.5% (mean 19.7%)	22.4–24.5%	20.1–23.4% (22.0%)	22.1–25.4%
D–A (% of SL)	19.1–20.3% (mean 19.7%)	21.2–22.4%	19.8–23.0% (21.6%)	21.1–23.6%
Pectoral-fin length (% of SL)	15.9–16.3%	15.6–16.3%	16.5–18.3%	16.5–18.8%
Snout length (% of SL)	3.8–4.4%	4.7–4.8%	3.5–4.4%	3.7–4.5%
Postorbital length (% of SL)	11.9–13.9% (mean 12.9%)	13.9–14.6% (14.2%)	11.9–14.3% (12.8%)	13.1–15.9% (14.2%)
Supramaxilla end to maxilla end (% of maxilla length)	12.2–18.0% (mean 14.4%)	8.1–10.8%	10.2–16.8% (14.6%)	6.3–12.2%

by Myers (1999) being relatively brief, the reference to a golden hue and long maxilla (posteriorly reaching or extending beyond the preopercular margin) is suggestive of an unrecognised (undescribed) species, since no species of *Stolephorus* with such characters has been recorded from the Caroline Islands.

Species of the genus *Stolephorus* in the Mariana Islands. With the exception of *S. astrum*, all species of the genus *Stolephorus* recorded from Palau are also widely distributed in Southeast Asia, including the Philippines. However, species of *Stolephorus* recorded unequivocally from the Mariana Islands include only the two endemic species *S. multibranchus* and *S. pacificus*, suggesting the existence of an ichthyofaunal boundary between Palau and the Mariana Islands.

Key to species of *Stolephorus* recorded from Palau

Data for *S. bataviensis* and *S. balinensis*, and *S. mercurius* and *S. rex*, taken from Hata et al. (2019 and 2021), respectively.

1. Maxilla short, not reaching to posterior margin of preopercle 2
– Maxilla long, reaching to posterior margin of preopercle 3
2. 1LGR ≦25; pelvic fin not reaching posteriorly to vertical through dorsal-fin origin when depressed ..... *S. balinensis*
– 1LGR ≧30; pelvic fin posteriorly beyond vertical through dorsal-fin origin when depressed ..... *S. astrum*
3. Dorsum without lines; 1TGR ≦ 38; numerous melanophores on suborbital area in individuals <56 mm SL .. *S. bataviensis*
– Double dark lines on dorsum anterior to dorsal fin; 1TGR ≧ 39; no melanophores on suborbital area.....4
4. 1TGR ≧44; head short, 23.1–24.8% SL ..... *S. mercurius*
– 1TGR ≦43; head long, 24.3–27.6% SL ..... *S. rex*

CONCLUSION

Stolephorus astrum, new species, is described. The new species can be distinguished from all other congeners by its combinations of short maxilla, pigmentation on pectoral fin, and unique range of gill-raker counts. The difference between species of *Stolephorus* that occur in Palau (most species are common with those of Southeast Asia) and the Mariana Islands (only two endemic species) suggests the existence of an ichthyofaunal boundary between these areas.

Comparative material examined. *Stolephorus leopardus* (4 specimens: 64.6–71.5 mm SL): listed in Hata & Motomura (2021c); *Stolephorus pacificus*: (27 specimens: 28.4–64.9 mm SL): listed in Hata et al. (2021c) and one additional specimen: AMNH 49494, 44.2 mm SL, estuary of Agfayan River, south of Inarajan, Guam (13°16′05.5″N, 144°44′18.1″E); *Stolephorus teguhi*: (23 specimens: 40.3–77.8 mm SL): listed in Hata et al. (2021c) and one additional specimen: ZUMT 62055, 67.2 mm, Jolo Island, Philippines.

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