

## Two new species of *Stolephorus* (Teleostei: Clupeiformes: Engraulidae) from the western Pacific

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**Abstract.** *Stolephorus concursus*, new species, and *Stolephorus celsior*, new species, both characterised by the maxilla extending beyond the preopercle posterior margin and numerous black spots on the suborbital area, snout, and lower-jaw tip, are described on the basis of specimens from the southwestern Pacific Ocean and Manila Bay, Luzon, Philippines, respectively. Although the former and *Stolephorus bataviensis* Hardenberg, 1933 both have the pelvic fin extending to below the dorsal-fin origin, *S. concursus*, new species, has greater numbers of total gill rakers on the first and second gill arches (38–41 and 30–34, respectively vs. 33–38 and 27–32 in the latter), and longer pectoral fin (16.5–18.1% SL vs. 14.7–16.4%) and snout (4.8–5.4% SL vs. 3.7–4.7%). *Stolephorus celsior*, new species, is similar to both *Stolephorus babarani* Hata, Lavoué & Motomura, 2020 and *Stolephorus baweanensis* Hardenberg, 1933 in having the pelvic fin not extending to below the dorsal-fin origin, but differs from them in generally having a greater number of total gill rakers on the first gill arch (40 or more vs. 41 or fewer in the latter two), in addition to longer pectoral and pelvic fins (> 16.6% SL and 9.5% SL, respectively vs. < 16.8% and 9.4%).

**Key words.** Actinopterygii, *Stolephorus concursus*, *Stolephorus celsior*, morphology, taxonomy, anchovy

### INTRODUCTION

Species of the genus *Stolephorus* (Clupeiformes: Engraulidae) with numerous spots on the suborbital area, snout, and lower-jaw tip were regarded as a single species (*Stolephorus waitei* Jordan & Seale, 1926) by Whitehead et al. (1988). However, following molecular analyses and morphological examinations, Hata et al. (2019) revealed that *S. waitei* sensu Whitehead et al. (1988) in fact included three species, *Stolephorus bataviensis* Hardenberg, 1933, *Stolephorus baweanensis* Hardenberg, 1933, and true *S. waitei*. Subsequently, *Stolephorus babarani* Hata, Lavoué & Motomura, 2020, a species also characterised by numerous black spots, was described as a new species, based on specimens collected from Panay, Philippines (Hata et al., 2020a). Recently, a number of specimens from the southwestern Pacific (Fiji and Tonga) and Manila Bay, Luzon, Philippines, all having numerous black spots and representing separate species in each locality, were identified as new to science. Both new species, characterised by greater gill raker numbers than in other species of *Stolephorus* so far known, are described herein.

### MATERIAL AND METHODS

Counts and proportional measurements followed Hata & Motomura (2017). All measurements were made with digital callipers to the nearest 0.01 mm. Standard and head lengths are abbreviated as SL and HL, respectively. Osteological characters, including vertebral counts, were observed on radiographs of 17 specimens of *S. celsior* and 23 *S. concursus*. Counts and measurements, expressed as percentages of SL or HL, are given in Tables 1 and 2. Institutional codes follow Sabaj (2019).

### TAXONOMY

#### *Stolephorus celsior*, new species

[New English name: Rosario Anchovy]

(Fig. 1; Tables 1, 2)

**Holotype.** BMNH 1966.1.17.93, 60.0 mm SL, Rosario (formerly Salinas), Cavite, Manila Bay, Luzon, Philippines.

**Paratypes.** 15 specimens, 48.2–64.2 mm SL. BMNH 1966.1.17.94–97, 4 specimens, 56.1–60.4 mm SL, KAUM–I. 146837, 55.8 mm SL, KAUM–I. 146838, 61.0 mm SL, NSMT-P 139183, 64.2 mm SL, NSMT-P 139184, 57.4 mm SL, collected with holotype; BMNH 1966.1.17.135–142, 8 specimens, 48.2–57.5 mm SL, same locality as holotype.

**Diagnosis.** A species of *Stolephorus* with the following combination of characters: long maxilla, 22.1–23.2% SL (mean 22.6%), its posterior tip slightly short of or just reaching posterior margin of opercle; no predorsal scute;

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Table 1. Meristics of two new species of the genus *Stolephorus*.

	<i>Stolephorus celsior</i> , new species			<i>Stolephorus concursus</i> , new species		
	Holotype (BMNH 1966.1.17.93)	Paratypes (n = 15)		Holotype (USNM 330901)	Paratypes (n = 23)	
	Manila Bay, Luzon, Philippines			Viti Levu Island, Fiji	Fiji and Tonga	
<b>Standard length (SL; mm)</b>	60.0	48.2–64.2	<b>Modes</b>	72.8	68.7–84.7	<b>Modes</b>
Dorsal-fin rays (unbranched)	3	3	3	3	3	3
Dorsal-fin rays (branched)	13	12–14	13	13	11–14	13
Anal-fin rays (unbranched)	3	3	3	3	3	3
Anal-fin rays (branched)	19	16–20	18	18	17–20	19
Pectoral-fin rays (unbranched)	1	1	1	1	1	1
Pectoral-fin rays (branched)	14	12–13	12	13	12–15	13
Pelvic-fin rays (unbranched)	1	1	1	1	1	1
Pelvic-fin rays (branched)	6	6	6	6	6	6
Gill rakers on 1st gill arch (upper)	19	17–19	18	18	16–18	17
Gill rakers on 1st gill arch (lower)	24	23–25	23	23	21–23	23
Gill rakers on 1st gill arch (total)	43	40–44	42	41	38–41	39
Gill rakers on 2nd gill arch (upper)	13	11–13	12	13	11 or 12	12
Gill rakers on 2nd gill arch (lower)	22	20–22	21	21	19–22	20
Gill rakers on 2nd gill arch (total)	35	32–35	32	34	30–34	32
Gill rakers on 3rd gill arch (upper)	10	9–11	10	10	9 or 10	9
Gill rakers on 3rd gill arch (lower)	12	12 or 13	12	12	10–12	12
Gill rakers on 3rd gill arch (total)	22	21–23	22	22	19–22	21
Gill rakers on 4th gill arch (upper)	10	8 or 9	8	9	7–9	8
Gill rakers on 4th gill arch (lower)	11	10 or 11	10	10	9–11	10
Gill rakers on 4th gill arch (total)	21	18–20	18	19	16–19	18
Gill rakers on posterior face of 3rd gill arch	6	5–7	6	5	4–6	5
Prepelvic scutes	6	4–6	6	6	3–6	6
Scale rows in longitudinal series	34	34 or 35	34	35	35–37	36
Transverse scales	8	8	8	8	8 or 9	8
Pseudobranchial filaments	18	17–20	19	22	19–25	22
Abdominal vertebrae	19	18–20	19	20	19 or 20	20
Caudal vertebrae	20	19 or 20	19	20	20 or 21	20
Total vertebrae	39	37–39	39	40	40 or 41	40

Table 2. Morphometrics of two new species of the genus *Stolephorus*.

	<i>Stolephorus celsior</i> , new species			<i>Stolephorus concursus</i> , new species		
	Holotype (BMNH 1966.1.17.93)	Paratypes (n = 15)		Holotype (USNM 330901)	Paratypes (n = 23)	
	Manila Bay, Luzon, Philippines			Viti Levu Island, Fiji	Fiji and Tonga	
<b>Standard length (SL; mm)</b>	60.0	48.2–64.2	<b>Means</b>	72.8	68.7–84.7	<b>Means</b>
Head length (HL)	26.6	26.0–27.5	26.6	27.0	26.4–28.5	27.4
Body depth	22.0	20.3–22.2	21.2	20.3	19.4–21.7	20.5
Pre-dorsal-fin length	56.6	54.6–58.0	56.0	54.6	53.7–57.2	55.2
Snout tip to pectoral-fin insertion	29.3	27.2–29.8	28.5	29.1	27.8–30.8	29.6
Snout tip to pelvic-fin insertion	46.7	44.5–48.0	46.0	47.9	46.1–48.8	47.7
Snout tip to anal-fin origin	65.3	62.4–66.9	64.4	65.5	63.0–66.6	64.9
Dorsal-fin base length	14.8	14.1–16.7	15.6	15.9	15.0–17.3	16.0
Anal-fin base length	21.2	18.0–23.3	20.6	19.5	18.9–21.7	20.7
Caudal-peduncle length	17.0	15.0–18.7	17.3	16.5	14.1–18.4	16.5
Caudal-peduncle depth	10.4	10.1–11.1	10.5	9.3	8.8–10.8	9.4
Orbit diameter	9.0	8.7–9.3	9.0	8.9	7.8–9.7	8.9
Eye diameter	7.3	6.8–8.1	7.3	7.5	6.4–7.8	7.4
Snout length	4.3	4.0–4.5	4.3	5.0	4.8–5.4	5.0
D–P1	33.7	32.5–36.0	34.4	33.8	33.6–34.7	34.0
D–P2	24.3	23.5–25.3	24.4	21.6	21.0–24.1	22.5
D–A	21.8	20.5–23.3	22.2	22.1	21.8–23.6	22.6
P1–P2	17.8	16.5–21.8	18.1	20.0	17.3–20.6	19.3
P2–A	18.7	16.6–21.0	18.2	17.5	15.9–19.2	17.4
Pectoral-fin length	17.0	16.6–17.9	17.2	17.0	16.5–18.1	17.0
Pelvic-fin length	10.4	9.5–10.2	9.8	10.2	9.5–10.6	10.1
Maxilla length	22.4	22.1–23.2	22.6	23.3	22.5–25.2	23.7
Mandibular length	18.3	17.9–18.5	18.1	19.6	19.1–20.7	19.9
Supramaxilla end to maxilla end	6.1	5.1–6.1	5.5	5.1	4.8–5.6	5.2
<b>As % HL</b>						
Orbit diameter	33.9	33.0–34.6	33.8	32.8	29.4–36.6	32.7
Eye diameter	27.4	24.9–29.6	27.3	27.9	24.2–29.4	26.9
Snout length	16.2	14.8–16.5	16.1	18.6	17.0–19.4	18.4
Interorbital width	22.1	21.2–24.1	22.3	20.8	18.4–21.0	20.1
Postorbital length	50.7	46.9–52.8	50.3	49.4	48.9–58.1	51.7
D–P1	126.8	118.1–138.2	129.2	125.3	117.8–131.3	124.4
D–P2	91.2	85.6–95.2	91.5	80.0	77.6–87.4	82.2
D–A	82.0	75.7–87.7	83.2	81.8	78.9–87.4	82.7
P1–P2	66.8	61.5–83.8	68.0	74.3	61.9–77.7	70.6
P2–A	70.1	63.6–76.9	68.7	64.7	57.3–71.8	63.7

Abbreviations: 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 origins of dorsal- and anal fins); P1–P2 (distance between insertions of pectoral- and pelvic fins); P2–A (distance between pelvic-fin insertion to anal-fin origin).

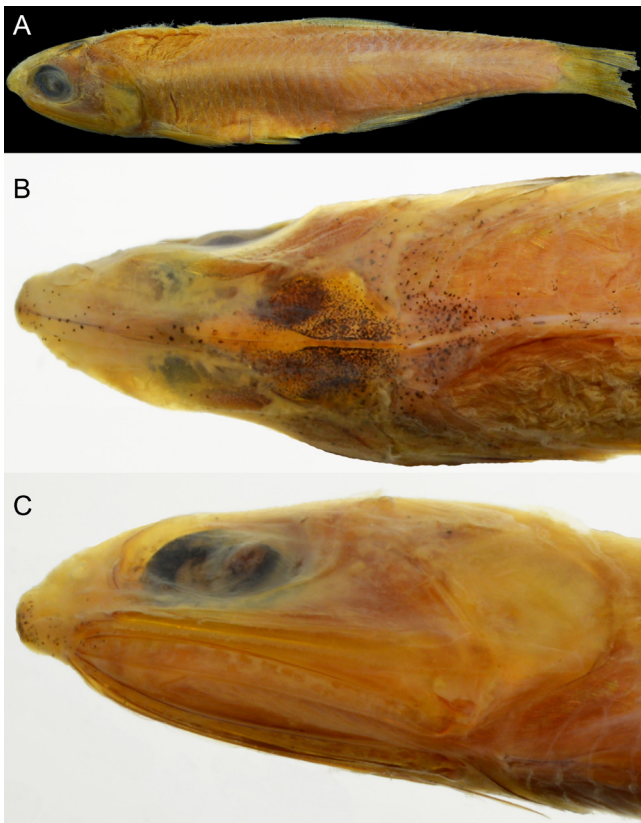


Fig. 1. (A) Lateral view of body and (B) dorsal and (C) ventral view of head of holotype of *Stolephorus celsior*, new species, BMNH 1966.1.17.93, 60.0 mm SL, Rosario, Cavite, Manila Bay, Luzon, Philippines.

pelvic scute without spine; gill rakers 17–19 (modally 18) in upper series on first gill arch, 23–25 (23) in lower series, 40–44 (42) in total; gill rakers 11–13 (12) in upper series on second gill arch, 20–22 (21) in lower series, 32–35 (32) in total; gill rakers 9–11 (10) in upper series on third gill arch, 12 or 13 (12) in lower series, 21–23 (22) in total; gill rakers 8–10 (8) in upper series on fourth gill arch, 10 or 11 (10) in lower, 18–21 (18) in total; gill rakers 5–7 (6) on hind face of third gill arch; prepelvic scutes 4–6 (6); transverse scales 8; pseudobranchial filaments 17–20 (19); paired dark patches on parietal and occipital regions without a following pair of dark lines; numerous black spots on snout and lower-jaw tip, rarely on suborbital area; depressed pelvic fin not reaching to vertical through dorsal-fin origin; snout rather long, 4.0–4.5% SL (mean 4.3%); pectoral fin rather long, 16.6–17.9% SL (17.2%); pelvic fin long, 9.5–10.4% SL (9.8%); head large, 26.0–27.5% SL (26.6%); orbit large, 8.7–9.3% SL (9.0%); lower jaw rather short, 17.9–18.5% SL (18.1%).

**Description.** Data for holotype presented first, followed by paratype data in parentheses (if different). Counts and measurements, expressed as percentages of SL or HL, given in Tables 1 and 2.

Body laterally 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 slightly convex from lower-jaw tip to pelvic-fin

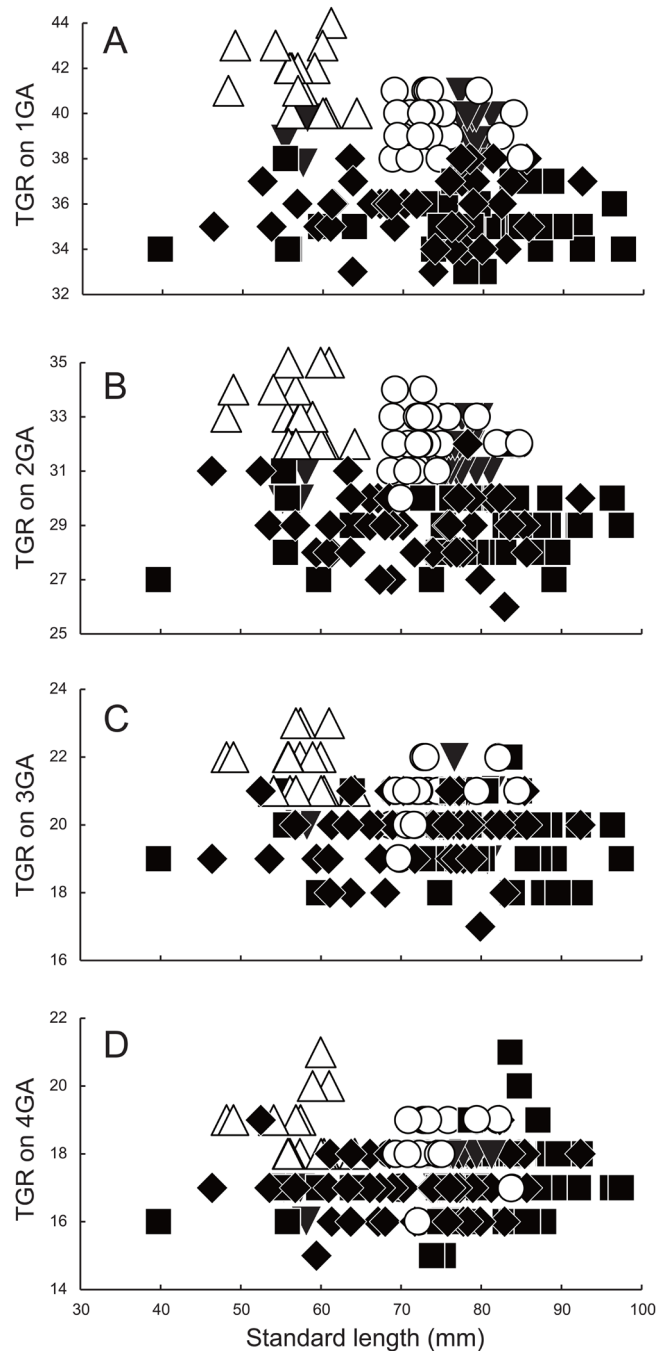


Fig. 2. Relationships of total gill-raker numbers (TGR) on (A) first gill arch (1GA), (B) second gill arch (2GA), (C) third gill arch, and (D) fourth gill arch relative to standard length in *Stolephorus celsior*, new species (triangles), *S. concursus*, new species (circles), *S. babarani* (inverted triangles), *S. bataviensis* (squares), and *S. baweanensis* (diamonds).

insertion, thereafter nearly straight and parallel to body axis and ventral profile of body from anal-fin origin to caudal-fin base slowly rising. Abdomen rounded, covered with six (four to six) spine-like scutes. Postpelvic and predorsal scutes absent. Anus just anterior to anal-fin origin. Snout tip rounded; snout length less than eye diameter. Mouth large, inferior, ventral to body axis, extending backward beyond posterior margin of eye. Maxilla long, its posterior tip pointed, just short of or reaching posterior border of opercle. Lower jaw slender. Single row of conical teeth on each jaw and palatines. Small conical teeth patch on pterygoids. Several small conical

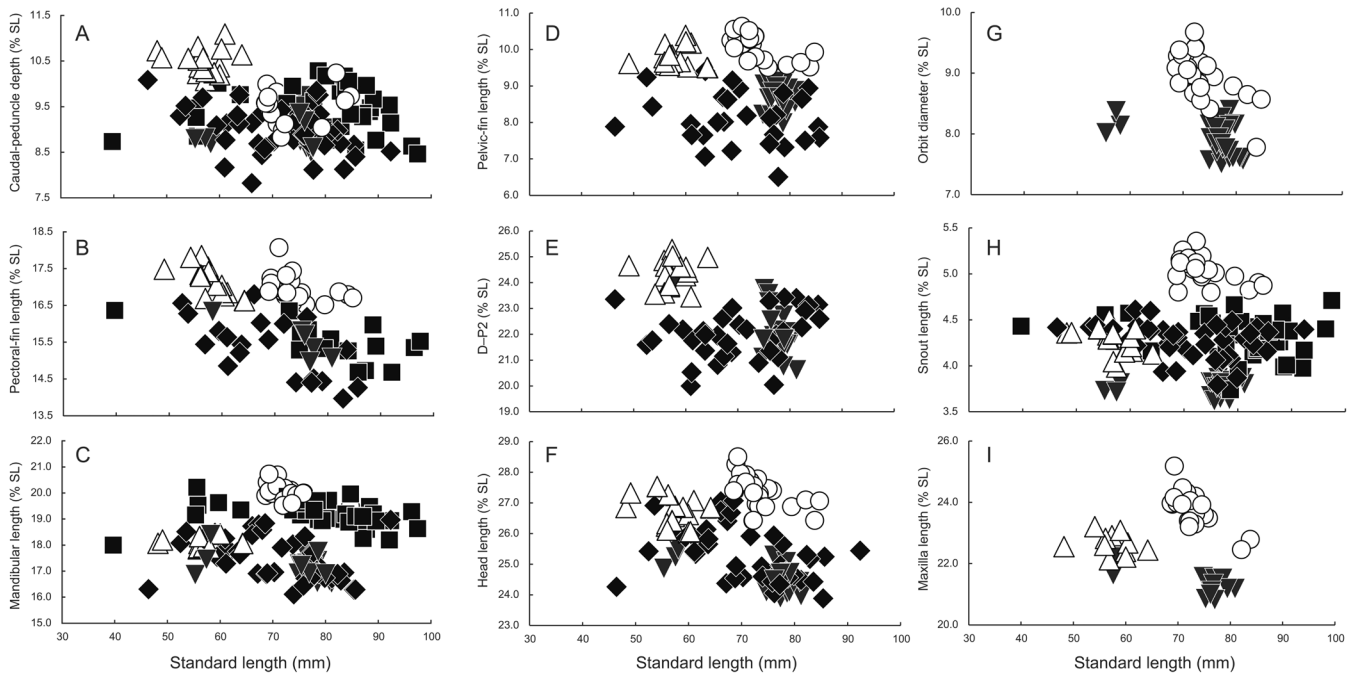


Fig. 3. Morphometrics and meristic of *Stolephorus celsior*, new species (triangles), *S. concursus*, new species (circles), *S. babarani* (inverted triangles), *S. bataviensis* (squares), and *S. baweanensis* (diamonds) (all vs. standard length; SL). **A**, ratio of caudal-peduncle depth to SL; **B**, pectoral-fin length to SL; **C**, mandibular length to SL; **D**, pelvic-fin length to SL; **E**, distance from dorsal-fin origin to pelvic-fin insertion to SL; **F**, head length to SL; **G**, orbit diameter to SL; **H**, snout length to SL; **I**, maxilla length to SL.

teeth on vomer. No teeth on dorsal surface of hyoid. 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. Posterior margins of preopercle and opercle rounded, smooth. Subopercle with rounded posterior margin. Posterior margin of preopercle slightly concave (moderately concave in some paratypes), indented. Gill membrane without serrations. Interorbital space flat, width less than eye diameter. Pseudobranchial filaments present, longest filament shorter than eye diameter. Gill rakers long, slender, rough, visible from side of head when mouth opened. Isthmus muscle long, reaching anteriorly to posterior margin of gill membranes. Urohyal hidden by isthmus muscle (visible only following dissection). Gill membrane on each side joined distally, most of isthmus muscle exposed (not covered by gill membrane). Head scales and lateral line absent. Fins scaleless, except for broad triangular sheath of scales on central part of both lobes of caudal fin. Dorsal-fin origin posterior to vertical through base of last pelvic-fin ray, slightly posterior to midpoint of body. Dorsal and anal fins with three anteriormost rays unbranched and closely spaced, first ray of both fins minute. Anal-fin origin just below base of eighth (seventh to ninth) 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; pelvic fin shorter than pectoral fin; pelvic-fin insertion anterior to vertical through dorsal-fin base. Posterior tip of depressed pelvic fin not reaching to vertical through dorsal-fin origin.

**Colour of preserved specimens.** Body uniformly pale ivory with whitish longitudinal band, width slightly less than

pupil diameter, from just behind upper opercular margin to caudal-fin base. Pairs of dark patches on parietal and occipital regions. No dark lines on dorsum. Numerous black spots on snout and lower-jaw tip (sometimes on suborbital area). Melanophores scattered on posterior margin of dorsal scale pockets. All fins whitish, semi-transparent. Melanophores scattered along fin rays of dorsal and caudal fins. Live and fresh colouration unknown.

**Distribution.** Currently known only from the southern part of Manila Bay, Luzon, Philippines (Rosario, Cavite).

**Etymology.** The specific name *celsior*, a Latin adjective, refers to the higher gill raker counts in the new species compared to similar 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 membrane, the urohyal covered by muscle, and prepelvic scutes, in addition to the absence of postpelvic scutes. *Stolephorus celsior*, new species, differs from all other congeners, except for *S. babarani*, *S. baweanensis*, *S. bataviensis*, and *S. concursus*, new species (described herein) in having a long upper jaw, its posterior tip beyond the preopercle posterior margin (slightly short of or extending beyond the opercle posterior margin) and numerous dusky spots on the snout and lower-jaw tip (Whitehead et al., 1988; Wongratana et al., 1999; Kimura et al., 2009; Hata & Motomura, 2018a–d; Hata et al., 2019, 2020a, b, 2021; Gangan et al., 2020; this study). However, *S. celsior* has a greater number of total gill rakers on each gill arch (e.g., 40–44 on first gill arch in *S. celsior* vs. 41 or fewer in the

Table 3. Frequency distribution of total vertebrae in *Stolephorus celsior*, new species, *S. concursus*, new species, *S. babarani*, *S. bataviensis*, and *S. baweanensis*.

		Total vertebrae				
		37	38	39	40	41
<i>Stolephorus celsior</i>	<i>n</i> = 17	1	7	9		
<i>Stolephorus concursus</i>	<i>n</i> = 23				22	1
<i>Stolephorus babarani</i>	<i>n</i> = 23		1	21	1	
<i>Stolephorus bataviensis</i>	<i>n</i> = 19			4	14	1
<i>Stolephorus baweanensis</i>	<i>n</i> = 9			8	1	

other four species; Table 1; Fig. 2A) and a generally deeper caudal peduncle (10.1–11.1% of SL vs. < 10.3%; Table 1; Fig. 3A). Moreover, the new species differs distinctly from *S. bataviensis* and *S. concursus* in having the posterior tip of the depressed pelvic fin not reaching to below the dorsal-fin origin (vs. beyond vertical through dorsal-fin origin). *Stolephorus celsior* further differs from *S. bataviensis* in having a longer pectoral fin (16.6–17.9% SL vs. 14.7–16.4%; Table 2; Fig. 3B) and mandible (17.9–18.5% SL vs. 18.0–20.2%; Table 2; Fig. 3C), and lower vertebral number (total vertebrae 18–20 + 19 or 20 = 37–39 vs. 20 or 21 + 19–21 = 39 or 40; Tables 1, 3). Detailed comparisons between *S. celsior* and *S. concursus* are given under Comparisons of the latter.

Although *S. celsior*, *S. babarani*, and *S. baweanensis* all have the pelvic fin extending to below the dorsal-fin origin, the pectoral fin (16.6–17.9% SL) is longer in *S. celsior* (vs. < 16.8% in the other species; Table 2; Fig. 3B). Additionally, the pelvic fin (9.5–10.4% SL) is longer (vs. < 9.4%; Table 2; Fig. 3D), and the dorsal-fin origin to pelvic-fin insertion distance (23.5–25.3% SL vs. < 24.0%; Table 2; Fig. 3E) generally greater in *S. celsior*. The latter also differs from *S. babarani* in its larger head (26.0–27.5% SL in *S. celsior* vs. 23.9–25.5% in *S. babarani*; Table 2; Fig. 3F) and orbit (8.7–9.3% SL vs. 7.6–8.4%; Table 2; Fig. 3G), and longer snout (4.0–4.4% SL vs. 3.6–3.9%; Table 2; Fig. 3H) and maxilla (22.1–23.2% SL vs. 20.8–22.3%; Table 2; Fig. 3I). Moreover, the vertebral number in *S. celsior* tends to be lower than in *S. baweanensis* (18–20 + 19 or 20 = 37–39 in *S. celsior* vs. 19 or 20 + 19 or 20 = 39 or 40 in *S. baweanensis*; Tables 1, 3).

#### *Stolephorus concursus*, new species

[New English name: Concourse Anchovy]

(Fig. 4; Tables 1, 2)

**Holotype.** USNM 330901, 72.8 mm SL, Nadi Bay, Viti Levu Island, Fiji, 4 July 1973.

**Paratypes.** 23 specimens, 68.7–84.7 mm SL. BPBM 38338, 2 specimens, 82.2–84.7 mm SL, Pangaimotu, Vava'u, Tonga; URM-P. 33477, 84.7 mm SL, Vava'u Bay, Vava'u Island, Vava'u Islands, Tonga; USNM 451515, 3 specimens, 68.9–73.4 mm SL, KAUM-I. 146839, 75.8 mm SL, KAUM-I. 146840, 79.4 mm SL, NSMT-P 139185, 75.1 mm SL,



Fig. 4. (A) Body and (B) head of holotype of *Stolephorus concursus*, new species, USNM 330901, 72.8 mm SL, Nadi Bay, Viti Levu Island, Fiji.

NSMT-P 139186, 73.0 mm SL, collected with holotype; USNM 330906, 13 specimens, 69.7–74.6 mm SL, Fiji.

**Diagnosis.** A species of *Stolephorus* with the following combination of characters: long maxilla, 22.5–25.2% SL (mean 23.7%), its posterior tip slightly short of or extending beyond posterior margin of opercle; no predorsal scute; pelvic scute without spine; gill rakers 16–18 (modally 17) in upper series on first gill arch, 21–23 (23) in lower series, 38–41 (39) in total; gill rakers 11–13 (12) in upper series on second gill arch, 19–22 (20) in lower series, 30–34 (32) in total; gill rakers 9 or 10 (9) in upper series on third gill arch, 10–12 (12) in lower series, 19–22 (21) in total; gill rakers 7–9 (8) in upper series on fourth gill arch, 9–11 (10) in lower, 16–19 (18) in total; gill rakers 4–6 (5) on hind face of third gill arch; prepelvic scutes 3–6 (6); transverse scales 8 or 9 (8); pseudobranchial filaments 19–25 (22); paired dark patches on parietal and occipital regions without a following pair of dark lines; numerous black spots on suborbital area, snout, and lower-jaw tip; depressed pelvic fin extending

posteriorly beyond vertical through dorsal-fin origin; snout long, 4.8–5.4% SL (mean 5.0%); pectoral fin rather long, 16.5–18.1% SL (17.0%); pelvic fin long, 9.5–10.6% SL (10.1%); head large, 26.4–28.5% SL (27.4%); lower jaw long, 19.1–20.7% SL (19.9%).

**Description.** Data for holotype presented first, followed by paratype data in parentheses (if different). Counts and measurements, expressed as percentages of SL or HL, given in Tables 1 and 2.

Body laterally 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 slightly convex from lower-jaw tip to pelvic-fin insertion, thereafter nearly straight and parallel to body axis and ventral profile of body from anal-fin origin to caudal fin base slowly rising. Abdomen rounded, covered with six (three to six) spine-like scutes. Postpelvic and predorsal scutes absent. Anus just anterior to anal-fin origin. Snout tip rounded; snout length less than eye diameter. Mouth large, inferior, ventral to body axis, extending backward beyond posterior margin of eye. Maxilla long, its posterior tip pointed, just short of or reaching posterior border of opercle. Lower jaw slender. Single row of conical teeth on each jaw and palatines. Small conical teeth patch on pterygoids. Several small conical teeth on vomer. 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. Posterior margins of preopercle and opercle, smooth. Subopercle with rounded posterior margin. Posterior margin of preopercle indented, convex (rounded, concave in one paratype). Gill membrane without serrations. Interorbital space flat, width less than eye diameter. Pseudobranchial filaments present, longest filament shorter than eye diameter. Gill rakers long, slender, rough, visible from side of head when mouth opened. Isthmus muscle long, reaching anteriorly to posterior margin of gill membranes. Urohyal hidden by isthmus muscle (visible only following dissection). Gill membrane on each side joined distally, most of isthmus muscle exposed (not covered by gill membrane). Scales cycloid, thin, deciduous, except for prepelvic scutes. Numerous vertical grooves on body scales. Head scales and lateral line absent. Fins scaleless, except for broad triangular sheath of scales on caudal fin. Dorsal-fin origin posterior to vertical through base of last pelvic-fin ray, slightly posterior to midpoint of body. Dorsal and anal fins with three anteriormost rays unbranched and closely spaced, first ray of both fins minute. Anal-fin origin just below base of eleventh (ninth to twelfth) 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; pelvic fin shorter than pectoral fin; pelvic-fin insertion anterior to vertical through dorsal-fin base. Posterior tip of depressed pelvic fin reaching to vertical through third (first to sixth) dorsal-fin ray origin.

**Colour of preserved specimens.** Body uniformly pale ivory with whitish longitudinal band, slightly less than pupil diameter, from just posterior to upper opercular margin to caudal-fin base. Pairs of dark patches on parietal and occipital regions. No dark lines on dorsum. Numerous black spots on snout, lower-jaw tip, and suborbital area. Melanophores scattered on posterior margin of dorsal scale pockets. All fins whitish, semi-transparent. Melanophores scattered along fin rays of dorsal and caudal fins. Posterior margin of caudal fin dark. Live and fresh colouration unknown.

**Distribution.** Currently known only from Tonga and Fiji.

**Etymology.** The specific name *concurus* is derived from Latin meaning “crowd”, in reference to the schooling habit of the species.

**Comparisons.** Included in the genus *Stolephorus* sensu Whitehead et al. (1988) and Wongratana et al. (1999) (see “Comparisons” under *S. celsior*), the new species is easily distinguishable from all other congeners—except for *S. babarani*, *S. bataviensis*, *S. baweanensis*, and *S. celsior*, new species—by the long upper jaw, its posterior tip beyond the preopercle posterior margin (slightly short of or extending beyond the opercle posterior margin), and numerous dusky spots on the suborbital area, snout, and lower-jaw tip (Whitehead et al., 1988; Wongratana et al., 1999; Kimura et al., 2009; Hata & Motomura, 2018a–d; Hata et al., 2019, 2020a, b, 2021; Gangan et al., 2020; this study). However, the former is easily distinguished from *S. babarani*, *S. baweanensis*, and *S. celsior* by the posterior tip of the depressed pelvic fin extending beyond vertical through the dorsal-fin origin (vs. not reaching to below the dorsal fin origin in the other three species), a longer snout (4.8–5.4% SL in *S. concurus* vs. < 4.6% SL; Table 2; Fig. 3H) and mandible (19.1–20.7% SL vs. < 19.0%; Table 2; Fig. 3C), and higher vertebral number [total vertebrae 40 or 41 (modally 40) vs. 39 or 40 (39) in *S. baweanensis*, 39 or fewer in *S. babarani* and *S. celsior*; Tables 1, 3]. *Stolephorus concurus* further differs from *S. babarani* and *S. baweanensis* in having a longer head (26.4–28.5% SL vs. 23.9–25.5% in *S. babarani*; 23.9–27.1% in *S. baweanensis*; Table 2; Fig. 3F), pectoral fin (16.5–18.1% SL vs. 15.0–16.3% in *S. babarani*; 14.0–16.8% SL in *S. baweanensis*; Table 2; Fig. 3B), and pelvic fin (9.5–10.6% SL vs. 8.1–9.4% in *S. babarani*; 6.5–9.4% in *S. baweanensis*; Table 2; Fig. 3D), and from *S. babarani* in maxilla length (22.5–25.2% SL in *S. concurus* vs. 20.8–22.3% in *S. babarani*; Table 2; Fig. 3I). *Stolephorus concurus* is distinguished from *S. celsior* by higher longitudinal series scale row numbers (35–37 in *S. concurus* vs. 34–35 in *S. celsior*; Table 1).

*Stolephorus concurus* differs from *S. bataviensis* in having higher gill raker numbers on the first [16–18 (modally 17) + 21–23 (23) = 38–41 (39) vs. 14–17 (15) + 19–22 (20) = 33–38 (35) in *S. bataviensis*; Fig. 2A] and second gill arches [11–13 (modally 12) + 19–22 (20) = 30–34 (32) vs. 9–12 (11) + 17–20 (18) = 27–32 (29); Fig. 2B], and a longer snout [4.8–5.4% SL (mean 5.0%) vs. 3.7–4.7% (4.3%); Fig. 3H]

and pectoral fin [16.5–18.1% SL (17.0%) vs. 14.7–16.4% (15.5%); Fig. 3B].

**Key to species previously identified as *Stolephorus waitei* “Spotty-face Anchovy” by Whitehead et al. (1988)**

*Stolephorus waitei* sensu Whitehead et al. (1988) was diagnosed by a long maxilla, extending posteriorly at least beyond the preopercle anterior margin; dusky spots on the suborbital area (in adults), snout, and lower-jaw tip; and fewer gill rakers on the lower limb of first gill arch (25 or fewer). The included species can be separated as follows [data for *S. babarani*, *S. bataviensis*, *S. baweanensis*, and *S. waitei* based on Hata et al. (2019, 2020a)]:

1. Maxilla short (< 19.2% SL), not reaching preopercle posterior margin; a few spots on suborbital area and lower-jaw tip; pseudobranchial filaments 28 or more.....*S. waitei* (Queensland, Australia)
- Maxilla long (> 19.9% SL), just short of or extending beyond preopercle posterior margin; numerous spots on suborbital area (adults) and lower-jaw tip; pseudobranchial filaments 25 or fewer.....2
2. Posterior tip of depressed pelvic fin beyond vertical through dorsal-fin origin.....3
- Posterior tip of depressed pelvic fin not reaching vertical through dorsal-fin origin.....4
3. Gill rakers on first and second gill arches 14–17 + 19–22 = 33–38 and 9–12 + 17–20 = 27–32, respectively; snout short (3.7–4.7% SL); pectoral fin short (14.7–16.4% SL).....*S. bataviensis* (Taiwan to Indonesia)
- Gill rakers on first and second gill arches 16–18 + 21–23 = 38–41 and 11–13 + 19–22 = 30–34, respectively; snout long (4.8–5.4% SL); pectoral fin long (16.5–18.1% SL).....*S. concursus*, new species (Tonga and Fiji)
4. Gill rakers on first gill arch 40 or more; pectoral and pelvic fins long (> 16.6% SL and 9.5% SL, respectively).....*S. celsior*, new species (Manila Bay, Luzon, Philippines)
- Gill rakers on first gill arch 41 or less; pectoral and pelvic fins short (< 16.8% SL and 9.4% SL, respectively).....5
5. Gill rakers on first and second gill arches 14–17 + 19–22 = 33–38 and 9–12 + 17–21 = 26–32, respectively; snout long (3.8–4.6% SL).....*S. baweanensis* (India to Vietnam and Indonesia)
- Gill rakers on first and second gill arches 16–18 + 21–23 = 38–41 and 10–13 + 18–21 = 30–33, respectively; snout short (3.6–3.9% SL).....*S. babarani* (Panay, Philippines)

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**LITERATURE CITED**

Gangan SS, Pavan-Kumar A, Jahageerdar S & Jaiswar AK (2020) A new species of *Stolephorus* (Clupeiformes: Engraulidae) from the Bay of Bengal. *Zootaxa*, 4743(4): 561–574.

Hardenberg JDF (1933) New *Stolephorus* species of the Indo-Australian seas. *Natuurkundig Tijdschrift voor Nederlandsch Indië*, 93: 258–263.

Hata H, Lavoué S & Motomura H (2019) Taxonomic status of seven nominal species of the anchovy genus *Stolephorus* described by Delsman (1931), Hardenberg (1933), and Dutt and Babu Rao (1959), with redescription of *Stolephorus tri* (Bleeker 1852) and *Stolephorus waitei* Jordan and Seale 1926 (Clupeiformes: Engraulidae). *Ichthyological Research*, 67(1): 7–38. doi: 10.1007/s10228-019-00697-7

Hata H, Lavoué S & Motomura H (2020a) *Stolephorus babarani*, a new species of anchovy (Teleostei: Clupeiformes: Engraulidae), from Panay Island, central Philippines. *Zootaxa*, 4178(4): 509–520.

Hata H, Lavoué S & Motomura H (2020b) *Stolephorus acinaces*, a new anchovy from northern Borneo, and redescription of *Stolephorus andhraensis* (Babu Rao, 1966) (Clupeiformes: Engraulidae). *Marine Biodiversity*, 50. doi: 10.1007/s12526-020-01115-2

Hata H, Lavoué S & Motomura H (2021) Taxonomic status of nominal species of the anchovy genus *Stolephorus* previously regarded as synonyms of *Stolephorus commersonnii* Lacepède 1803 and *Stolephorus indicus* (van Hasselt 1823), and descriptions of three new species (Clupeiformes: Engraulidae). *Ichthyological Research*, doi: 10.1007/s10228-020-00792-0 [Published 21 February 2021].

Hata H & Motomura H (2017) A new species of anchovy, *Encrasicicholina auster* (Clupeiformes: Engraulidae), from Fiji, southwestern Pacific Ocean. *New Zealand Journal of Zoology*, 44(2): 122–128. doi: 10.1080/03014223.2016.1268177

Hata H & Motomura H (2018a) *Stolephorus continentalis*, a new anchovy from the northwestern South China Sea and redescription of *Stolephorus chinensis* (Günther 1880) (Clupeiformes: Engraulidae). *Ichthyological Research*, 65(3): 374–382. doi: 10.1007/s10228-018-0621-z

Hata H & Motomura H (2018b) Additional specimens of the poorly known anchovy *Stolephorus multibranchus* (Clupeiformes: Engraulidae) from Kosrae, Caroline Islands. *Biogeography*, 20: 78–84.

Hata H & Motomura H (2018c) Redescription and distributional range extension of the poorly known anchovy *Stolephorus nelsoni* (Clupeiformes: Engraulidae). *Acta Ichthyologica et Piscatoria*, 48(4): 381–385.

Hata H & Motomura H (2018d) *Stolephorus insignis*, a new anchovy from the western Pacific, and redescription of *Stolephorus apiensis* (Jordan and Seale 1906) (Clupeiformes: Engraulidae). *Ichthyological Research*, 66(2): 280–288. doi: 10.1007/s10228-018-00675-5

Jordan DS & Seale A (1926) Review of the Engraulidae, with descriptions of new and rare species. *Bulletin of the Museum of Comparative Zoology at Harvard College*, 67(11): 355–418.



- Kimura S, Hori K & Shibukawa K (2009) A new anchovy, *Stolephorus teguhi* (Clupeiformes: Engraulidae) from north Sulawesi, Indonesia. *Ichthyological Research*, 56(3): 292–295.
- Sabaj MH (2019) Standard symbolic codes for institutional resource collections in herpetology and ichthyology: an online reference. Version 7.1. American Society of Ichthyologists and Herpetologists, Washington, DC. <http://www.asih.org/> (Electronic version accessed 14 October 2020).
- Whitehead PJP, Nelson GJ & Wongratana T (1988) FAO species catalogue. Vol. 7. Clupeoid fishes of the world (suborder Clupeoidei). An annotated and illustrated catalogue of the herrings, sardines, pilchards, sprats, shads, anchovies and wolf-herrings. Part 2 – Engraulididae. FAO Fisheries Synopsis No. 125, 7 (Part 2): i–viii + 305–579.
- Wongratana T, Munroe TA & Nizinski MS (1999) Order Clupeiformes. Engraulidae. Anchovies. In: Carpenter KE & Niem VH (eds.) FAO Species Identification Guide for Fishery Purposes. The Living Marine Resources of the Western Central Pacific, Vol. 3. Batoid Fishes, Chimaeras and Bony Fishes Part 1 (Elopidae to Linophrynidae). FAO, Rome. Pp. 1698–1753.