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Rabaulichthys squirei, a new species of Sailfin Anthias (Serranidae: Anthiinae) from the Coral Sea

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ABSTRACT

Rabaulichthys squirei is described as a new species of the serranid subfamily Anthiinae from 12 specimens collected at Flinders Reef and Flora Reef in the Coral Sea from 6 to 54 m. A huge population was also observed at Holmes Reef in 55 m. The species is distinct from three others of the genus by the combination of a high count of 23 or 24 lower-limb gill rakers, relatively long snout, a very high spinous portion of the dorsal fin of the male, and subtle differences in colouration. It forms small elusive aggregations that feed on zooplankton, mainly over open substrata of coral rubble. □ Coral Sea, Serranidae, Anthiinae, *Rabaulichthys*, new species.

The Sailfin Anthias, *Rabaulichthys altipinnis*, was described as a new genus and species of serranid fish of the subfamily Anthiinae by Allen (1984) from specimens collected near Rabaul, New Britain. Six specimens, 34.8–45.5 mm SL, were collected from small aggregations about a meter above a sloping coral-rubble bottom in 30–40 m. This species typically forms aggregations of about three to eight individuals. The new genus was characterised by a slender body, the dorsal fin of 10 weak flexible spines, and 15 or 16 rays, the spinous part greatly elevated in the male, 19–21 pectoral rays, over 50 lateral-line scales, no teeth on the vomer and palatines, and fleshy papillae on the edge of the posterior half of the orbit.

A second species of the genus, *R. stigmaticus*, was described by Randall & Pyle (1989) from four specimens collected in 35 m over a rubble bottom at Ari Atoll, Maldive Islands. Its occurrence in

Sri Lanka was confirmed by a photograph of an adult male sent by Rohan Pethiyagoda.

A third species, *Rabaulichthys suzukii*, was described by Masuda & Randall (2001) from three specimens taken in 5–15 m at Izu Peninsula, Shizuoka Prefecture, Japan.

As mentioned by Randall & Pyle (1989) and Masuda & Randall (2001), the Bishop Museum in Honolulu has 40 specimens of a small species of *Rabaulichthys* that were collected by dredging in 1972 by the US National Marine Fisheries Service at Condor Reef in the Caroline Islands from a depth range of 37–46 m. This species is distinct in its very slender body and having a filament on the tip of each caudal-fin lobe. Because of the poor condition of the specimens and no information on life color, this species has not been described.

Two specimens of a fifth species of the genus were collected in October, 2007 by aquarium fish

collector Tim Bennett from 54 m at Flinders Reef in the Coral Sea, 220 km east of Townsville, Queensland. One fish is a male with the expected very high spinous portion of the dorsal fin, and the other a female with a dorsal fin of near-uniform height. The male has a lateral-line scale count of 57 on one side and 59 on the other, whereas the female has counts of 51 and 52 lateral-line scales. This is more variation than expected for a single species of anthiine fish, so we waited for additional material. Ten months later, 10 specimens were collected by Cadel Squire at Flora Reef in 6–9 m. Their lateral-line scale counts of both sides filled the gap between 52 and 57, with seven counts of 54 scales and five of 55 scales.

We present here the description of the new species of *Rabaulichthys* from the Coral Sea, the first of the genus for Australian waters.

METHODS AND MATERIALS

Lengths of specimens are given as standard length (SL), measured from the front of the upper lip to the base of the caudal fin (posterior end of the hypural plate); head length (HL) is measured from the same anterior point to the posterior end of the opercular flap; body depth is taken vertically from the base of first dorsal spine; body width is the maximum width just posterior to the gill opening; orbit diameter is the greatest fleshy diameter, and interorbital width the least fleshy width; upper-jaw length is taken from the front of the upper lip to the mid-posterior end of the maxilla; caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; lengths of fin spines and rays of the dorsal and anal fins are measured to their extreme base; caudal-fin length is the horizontal distance from the base of the fin to a vertical at the tip of the longest ray; caudal concavity is the horizontal distance between verticals at the

tips of the longest and shortest rays; pectoral-fin length is the length of the longest ray; pelvic-fin length is measured from the origin of the pelvic spine to the tip of the longest soft ray. Pectoral-fin ray and lateral-line scale counts were made on both sides. Gill-raker counts were made on the first gill arch of the right side and include rudiments; the raker at the angle is contained in the count of the lower-limb.

In the description of the new species, data in parentheses refer to paratypes. Measurements in Table 1 and the diagnosis are given as percent of the standard length, those in the description as proportions of the standard length or head length, rounded to the nearest .05.

Specimens for this study have been deposited in the fish collections of the Bernice P. Bishop Museum, Honolulu (BPBM); the Queensland Museum, Brisbane (QM), the National Museum of Natural History, Washington, D.C. (USNM); and the Western Australian Museum, Perth (WAM).

KEY TO THE SPECIES OF *RABAUlichthys*

1. Snout short, 5.5–6.4% SL; lower-limb gill rakers 21–22; length of longest dorsal spine of mature male 25.3–26.2% SL; body depth 26.6–29.7% SL (New Britain) *altipinnis*
- Snout not short, 6.8–7.4% SL; lower-limb gill rakers 23–24; length of longest dorsal spine of mature male 28.7–39.0% SL; body depth 23.8–27.7% SL 2
2. A narrow, elliptical, black band parallel to back near middle of soft portion of dorsal fin; a large, pale-edged, nearly square, dark reddish blotch on body below soft portion of dorsal fin (Maldive Islands and Sri Lanka; only males available) *stigmaticus*
- No black band in soft portion of dorsal fin; no large, nearly square, pale-edged, dark reddish bar on body below soft portion of dorsal fin. 3
3. Body depth 23.8–25.3% SL; caudal-fin length

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- of males 31.8–35.8% SL (Coral Sea)
*squirei*, sp. nov.
- Body depth 26.0–27.7% SL; caudal-fin length
 of males 25.5–31.2% SL (only males available,
 Shizuoka Prefecture, Japan).....*suzukii*

148°25'3"E, 54 m, barrier net, T. Bennett, 1/10/2007.
 PARATYPES. QM I.38441, 53.0 mm, same data as
 holotype; QM I.38420, 4: 36.2–47.6 mm SL, Coral Sea,
 Flora Reef, 16°45'S, 147°46'E, 6–9 m, 8/2008; BPBM
 40978, 2: 35.0–46.6 mm; USNM 395918, 2: 37.2–43.1
 mm; and WAMP.P.33113-001, 2: 37.8–42.5 mm, all with
 same data as QM I.38420.

Rabaulichthys squirei Randall & Walsh sp. nov.
 (Figs. 1A–D)

Diagnosis. Dorsal rays X,16; anal rays III,7;
 pectoral rays 19–21 (rarely 21); lateral-line scales
 51–59; gill rakers 9 + 23–24; body depth 23.8–25.3%
 SL; head length 28.5–30.6% HL; snout length 6.8–
 7.4% SL; longest dorsal spine of mature males
 28.7–31.3% SL; caudal fin of mature males 31.8–

Etymology. We are pleased to name this species for
 Cadel Squire who collected most of the type specimens.

Material. HOLOTYPE: QM I.38237, 62.2 mm
 SL, Coral Sea, Flinders Reef, north end, 17°24'1"S,

TABLE 1. Proportional measurements of type specimens of *Rabaulichthys squirei* as percentages of the standard length

	Holotype	Paratypes					
	QM I.38237	QM I.38441	QM I.38420	QM I.38420	WAM P.33113	QM I.38420	QM I.38420
Standard length (mm)	62.2	53.0	47.6	47.2	42.5	39.5	36.2
Sex	male	female	male	male	male	female	female
Body depth	24.2	23.8	25.2	25.0	24.0	24.5	25.3
Body width	14.1	14.7	13.2	13.7	14.8	14.6	13.8
Head length	28.7	28.5	29.2	30.3	30.6	30.4	30.5
Snout length	7.4	7.1	7.0	6.8	7.0	6.8	7.3
Orbit diameter	7.6	7.9	8.5	8.7	9.0	9.0	9.6
Interorbital width	8.8	8.6	8.9	9.2	9.5	9.5	9.7
Upper-jaw length	12.3	12.2	13.0	13.4	13.5	12.8	13.5
Caudal-peduncle depth	10.7	10.7	11.5	11.6	11.8	11.0	10.9
Caudal-peduncle length	24.2	24.5	25.2	25.0	25.0	25.1	24.0
Predorsal length	25.8	26.3	25.2	26.0	26.7	26.6	27.8
Preanal length	57.8	59.8	59.5	59.7	57.4	59.9	58.7
Prepelvic length	29.0	27.9	28.5	28.7	27.8	27.7	27.6
Dorsal-fin base	60.5	60.2	60.5	60.3	60.5	60.8	58.7
First dorsal spine	9.0	7.5	9.2	9.2	8.7	7.7	7.9
Second dorsal spine	15.2	9.7	16.3	15.0	14.9	10.1	10.1
Longest dorsal spine	30.4	13.2	31.0	31.3	27.4	13.7	13.0
Longest dorsal ray	19.3	12.2	18.8	19.1	19.1	12.9	13.1
Anal-fin base	17.7	17.3	16.8	16.5	17.8	16.8	17.7
First anal spine	4.7	4.5	4.4	4.6	4.7	5.1	5.2
Third anal spine	9.5	8.2	9.3	9.5	9.6	8.8	9.1
Longest anal ray	14.4	13.0	12.6	13.7	14.4	15.2	13.3
Caudal-fin length	31.8	27.0	34.7	35.2	35.8	27.7	28.3
Caudal concavity	21.4	13.7	17.6	22.5	24.0	12.8	13.9
Pectoral-fin length	25.7	25.2	25.2	25.4	25.9	26.2	25.7
Pelvic-spine length	12.9	13.3	12.7	12.1	13.5	13.4	13.8
Pelvic-fin length	22.9	20.8	23.0	23.4	23.5	20.8	22.1

35.8% SL; no black band in soft portion of dorsal fin; a series of indistinct dark bars of unequal width in middle third of standard length, none with pale margins; colour in life light red, the scale centres pale, the dark bars reddish brown; an oblique, pale-edged, brownish orange band from snout through eye and across cheek; pelvic fins black with red rays; remaining fins pink to yellowish. Largest specimen, 62.2 mm SL.

Description. Dorsal-fin rays X,16, the first 3 (3–6) soft rays unbranched, the last branched to base; anal-fin rays III,7, all soft rays branched; pectoral-fin rays 19 (19–21, only one of 11 paratypes with 21), the rays branched except upper two and lowermost; pelvic rays I,5, all soft rays branched; principal caudal-fin rays 15, the middle 13 branched, upper and lower procurrent caudal-fin rays 12, the posterior three segmented; lateral-line scales 57 (51–59); scales above lateral line to middle of spinous portion of dorsal fin 3.5; scales below lateral line to origin of anal fin 15; lowest count of circumpeduncular scales 28; gill rakers 9 + 24 (9 + 23–24, five of 11 with 24); pseudobranchial filaments of holotype 15; vertebrae 10 + 16; supraneural (predorsal) bones 2, projecting toward first neural spine; first two dorsal spines close together, associated with first dorsal pterygiophore, in space between first two neural spines; pterygiophores of third and fourth dorsal spines in space between second and third neural spines; remaining pterygiophores one on one for each vertebra.

Body elongate, the depth 4.15 (3.95–4.2) in SL; body compressed, the width a little more than one-half body depth, 1.95 (1.95–2.0) in HL; snout length 3.9 (4.0–4.5) in HL; eye diameter 3.8 (3.2–3.6) in HL; posterior half of orbit with 14 small

fleshy papillae; interorbital space convex, the least fleshy width 3.25 (3.25–3.4) in HL; caudal-peduncle depth 2.7 (2.6–2.85) in HL; caudal-peduncle length 1.2 (1.15–1.25) in HL.

Mouth moderately large, the maxilla reaching slightly posterior to middle of eye, the upper-jaw length 2.35 (2.25–2.4) in HL mouth terminal and moderately oblique, forming an angle of about 40° to horizontal axis of body; posterior end of maxilla truncate, the upper corner rounded; front of upper jaw with a pair of stout, blunt, forward-projecting, conical teeth (double on one side of holotype), about one-fourth pupil diameter in length, separated by an indented symphyseal gap of one-half pupil diameter; side of upper jaw with a row of 16 small, slender, conical teeth, progressively shorter posteriorly, the tips not reaching edge of upper lip; lower jaw with a pair of stout, very blunt, canine teeth that project laterally as much as anteriorly, and fit medially to upper canine teeth when jaws closed; side of lower jaw with a row of 16 teeth, more slender than upper teeth; anterior teeth of lower jaw retrorse and progressively larger to eighth, which is recurved; remaining teeth more slender, near-vertical, and unevenly spaced; no teeth on vomer or palatines; tongue thin and leaf-like with sharply pointed tip, the upper surface with small papillae. Gill rakers long and slender, the longest at angle three-fourths orbit diameter.

Anterior nostril a short fleshy tubule, the rim higher posteriorly, about three-fourths pupil diameter before centre of eye; posterior nostril ovate, without a rim, about 1.5 anterior nostril diameters dorsoposterior to anterior nostril.

FIG. 1. A, *Rabaulichthys squirei*, holotype, QM I.38237, male, 62.2 mm SL, Flinders Reef, Coral Sea (F. Walsh). B, paratype, immature female, 35.0 mm SL, Flora Reef, Coral Sea (F. Walsh). C, paratype, WAM P.33113, male, 42.5 mm SL, Flora Reef, stress colour pattern (F. Walsh); D, paratype, QM I.38420, female, 36.2 mm SL, Flora Reef, stress colour pattern (F. Walsh); E, *R. altipinnis*, holotype, WAM P.28179, male, 45.5 mm SL, New Britain (G.R. Allen); F, *R. altipinnis*, paratype, WAM P.28280, female, 38.6 mm SL, New Britain (G.R. Allen). G, *R. stigmaticus*, male, Sri Lanka (R. Pethiyagoda); H, *R. suzukii*, male, Suruga Bay, Japan (A. Mishiku).

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Opercle with three small flat spines, the middle one largest and most posterior; opercular membrane extending a spine's length beyond tip of middle spine; posterior edge of preopercle of holotype with 45 serrae, progressively larger, in general, ventrally, with only five small serrae continuing on ventral edge (largest paratype with 34 serrae posteriorly on preopercle, and smallest paratype with 29).

Scales coarsely ctenoid, less so ventrally, and cycloid on abdomen before anus; head fully scaled, including maxilla, except a narrow zone around orbit that is broader anteriorly to include nostrils; scales dorsally on snout progressively smaller and more embedded anteriorly, the extreme front naked; no scales on dorsal and anal fins; scales on caudal fin extending nearly to posterior margin; scales present on about basal one-third to two-fifths of pectoral fins; pelvic fins with a pointed, midventral, scaly process that extends two-thirds length of pelvic spine.

Lateral-line ascending in a straight line to 3.5 scale rows below base of fifth dorsal spine, then following contour of back to base of caudal fin. Pores of cephalic lateral-line system small. Those apparent are: dorsally at front of snout, above posterior nostril, one on each side in inter-orbital, and as a series of very small pores around orbit, ending in pore below anterior nostril; 11 pores in preopercular-mandibular series.

Origin of dorsal fin slightly anterior to upper end of gill opening, the predorsal length 3.9 (3.6–3.85) in SL. Dorsal-fin spines very slender and flexible; first spine 3.2 (3.2–3.95) in HL; second spine 1.9 (1.8–2.05) in HL in males, (2.95–3.0) in females; fifth spine longest, longer than HL in males, 3.3 (3.2–3.5) in SL, and (7.3–7.7) in females; first soft ray longest, 1.5 (1.55–1.6) in HL in males, (2.15–2.3) in females. First anal-fin spine 6.1 (5.9–6.6) in HL; second spine notably thicker than third spine, but slightly shorter; third spine 3.0 (3.1–3.5) in HL; second soft ray longest, 2.0 (2.0–2.3) in HL. Caudal fin lunate,

its length in males 3.15 (2.8–2.9) in SL, in females (3.5–3.7) in SL; caudal concavity in males 1.35 (1.25–1.65) in HL, in females (1.15–1.2) in HL. Pectoral fins pointed, the middle rays longest, 1.1 (1.15–1.2) in HL. Pelvic spine 2.2 (2.15–2.5) in HL; third soft ray longest, 1.15 (1.25–1.3) in HL in males, (1.35–1.45) in females.

Colour of holotype in alcohol pale yellowish with four dusky bars on side of body, about one-fourth of their length above lateral line; first dark bar a double bar, the third bar about twice as broad as others and darker anteriorly; occipital region dusky; pelvic fins with pale grey rays and blackish membranes; remaining fins with pale lavender-grey rays and translucent pale yellowish membranes.

Colour of holotype in life as in Fig. 1A. The colour of paratypes is shown in Fig. 1B–D. The darker red and more strongly barred pattern of the male and female of Figs. C and D are stress colouration.

Remarks. The genus *Rabaulichthys* is currently represented by four described species from widely separated localities of the Indo-Pacific region: Maldive Islands and Sri Lanka, New Britain, Japan, and with the description of *R. squirei*, reefs of the Coral Sea off Queensland.

All four species share the same fin-ray counts, and any difference in the number of lateral-line scales will be modal at best. Among the meristic characters, only the lower-limb gill-raker count provides a slight separation of the type species, *R. altipinnis*, from the remaining three species. The salient morphological difference is in the more slender body of *R. squirei*, 23.8–25.3% SL, compared to 25.5–29.7% SL for the others. Although there is a sharing of salient features of colour pattern, red to pink overall, with an oblique, pale-edged, brownish orange band from the eye across the cheek, and predominantly black pelvic fins in the male, some colour differences are evident from a comparison of the images of Fig. 1.

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The species of *Rabaulichthys* form small aggregations that feed on zooplankton above the substratum. They are generally found over open stretches of coral rubble, and therefore avoid the many predators of coral reefs. Because of their small size, they readily take shelter in the rubble. The paucity of specimens of this genus can be partly explained by this habitat, which is not often visited by scubadivers, whether sport divers or aquarium fish collectors.

Our first two specimens of *R. squirei*, the 62.2-mm male holotype and the 53.0-mm female paratype, were collected from Flinders Reef in 54 m. Our next 10 specimens, which include males that measured 35.0–47.6 mm SL, were collected in 6–9 m at Flora Reef. In view of the difference in size of the specimens, the different depth of the two collections, and the different localities, we wondered if the fish might represent two different species. The collectors assured us they are the same, explaining that the species is generally larger in deeper water. We could find no differences in colour or morphology in specimens from the two localities.

In addition to Flinders Reef and Flora Reef, this species has been seen at Holmes Reef (16°43'S, 147°55'E) in about 55 m, where thousands occur over a very large expanse of nearly flat rubble bottom. They swim together in small groups, often as only two or three individuals, and feed from 1–3 m above the substratum. In shallower water, this species sometimes mixes with aggregations of other anthiine fishes, especially *Pseudanthias dispar* (Herre), and is easily overlooked.

Mature males of all the species of *Rabaulichthys* have the spinous portion of the dorsal fin greatly elevated, and as expected, display it fully erect

during courtship. The first species of the genus was named *R. altipinnis* for this feature. Ironically, it has the lowest spinous dorsal fin of the four known species. Mature males also have longer and more lunate caudal fins and longer pelvic fins than females (see Table 1).

Immature males and females of *Rabaulichthys squirei* are morphologically indistinguishable, but black pigment develops in the pelvic fins of the males before the dorsal spines become longer.

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