Bull. Natl. Mus. Nat. Sci., Ser. A, Suppl. 7, pp. 11–18, March 22, 2013

Suttonia coccinea, a New Grammistin Fish from Japan (Acanthopterygii: Serranidae)

Hiromitsu Endo[1] and Kenta Kenmotsu[1,2]

[1] Laboratory of Marine Biology, Faculty of Science, Kochi University,
2–5–1 Akebono-cho, Kochi 780–8520, Japan
E-mail: endoh@kochi-u.ac.jp
[2] Yasuzuka High School, 129 Kamigata, Yasuzuka, Jouetsu, Niigata 942–0405, Japan

Abstract A new serranid, *Suttonia coccinea*, is described based on a single specimen of 65.1 mm SL collected from the rocky shore of Okinoshima Island, Kochi Prefecture, Shikoku Island, southern Japan. The new species differs from its two congeners, *S. lineata* and *S. suttoni*, in the following characters: shorter lower jaw (its length 60.9% HL vs. 62.5–66.6); lower jaw slightly projecting anteriorly beyond upper jaw when closed (vs. clearly beyond upper in *S. lineata*); longest 3rd–5th dorsal-fin spines shorter (each length 6.8% SL vs. 7.9–9.5); longest 19–20th dorsal-fin soft-rays longer (each length 18.0% SL vs. 12.6–16.5); longest 16–17th anal-fin soft-ray longer (each longest length 17.2% SL vs. 12.9–15.5); shorter pelvic fin (its length 11.8% SL vs. 13.0–14.8); scaly inner base of pectoral fins (vs. naked in *S. suttoni*); fewer pored scales on lateral line (26 vs. 35–41 in *S. lineata*, 27–35 in *S. suttoni*); uniform scarlet head and body with bright red fins when fresh (vs. partly pale in *S. lineata,* uniform vermilion with chrome-yellow margins of vertical fins in *S. suttoni*); and a distinct dark spot on opercle (vs. faint in *S. lineata*). The new species represents the northernmost record of the genus.

Key words: Serranidae, Pseudogrammina, *Suttonia*, new species, Japan.

The serranid genus *Suttonia* Smith, 1953 belongs to the tribe Grammistini of the subfamily Epinephelinae, and is composed of two nominal species, *Suttonia suttoni* Smith, 1953 and *Suttonia lineata* Gosline, 1960 (Baldwin and Johnson, 1993; Randall and Baldwin, 1997; Nelson, 2006; Craig and Hastings, 2007). Members of this small genus are less than 10 cm long, and adults have a reddish body, with a pale medial line on the head (e.g., Randall and Baldwin, 1997; Randall, 2005). They live in cryptic habitats of coral and rocky reefs (6–30.5 m depth) of tropical and subtropical waters in the Indo–West Pacific: *S. suttoni* is restricted to the eastern Indian Ocean, Pemba Island off Tanzania (type locality) and Comoro Islands, and *S. lineata* is known widely from the eastern Indian Ocean, Cocos-Keeling Islands and Christmas Island, to the mid-Pacific, Hawaiian Islands (type locality) and Tahiti, and from northeastern Australia to Japan (e.g., Randall and Baldwin, 1997; Kuiter, 2004; Randall, 2005, 2007; Hoese *et al.*, 2006; Allen and Erdmann, 2012). Although Allen and Erdmann (2012) included Japan in the range of *S. lineata*, they did not refer to the source of their information. To our knowledge, no specimens or underwater photographs of the species taken in Japan are known.

During SCUBA sampling of fishes by the Laboratory of Marine Biology, Faculty of Science, Kochi University, around Okinoshima Island, southwest of Kochi, in July of 2010, the first author collected a small serranid of 65 mm SL at a depth of 16 m on a rocky bottom with corals. The specimen, which was a uniformly bright reddish color with a mesial pale line on the head when alive, is identified as *Suttonia*. Here, we describe the specimen as a new species, and report the northernmost record of the genus.

Materials and Methods

Specimens examined are deposited in the following institutions: Bernice P. Bishop Museum, Honolulu (BPBM); Laboratory of Marine Biology, Faculty of Science, Kochi University (BSKU); National Museum of Nature and Science, Tsukuba (NSMT, formerly National Science Museum, Tokyo); and Royal Ontario Museum, Toronto (ROM). Counts and measurements follow Randall and Baldwin (1997): e.g., caudal-peduncle length is measured as the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; the length of the preopercular spine is measured along its ventro-anterior margin to the tip; and pelvic-fin length is measured from the base of the spine to the tip of the longest soft ray. Observation of dentition, cephalic sensory pores, scales, and external bony elements were made after cyanine blue staining. Total length, standard length, and head length are abbreviated as TL, SL, and HL, respectively. Fin rays and vertebrae were counted from radiographs.

Suttonia Smith, 1953

[New Japanese name: Kurenai-toge-megisu-zoku]

Remarks. Members of the genus *Suttonia* possess scales with cteni that do not extend posteriorly beyond the membranous portion of the scale, which is a unique character state among the Pseudogrammina (Fig. 5; Randall and Baldwin, 1997: fig. 11B). Several characters included in Randall and Baldwin's (1997) generic diagnosis need slight modification based on data obtained from the new species: dorsal-fin rays VII, 22–25; anal-fin rays III, 18–22; pectoral-fin rays 14–17; a single lateral- line with 26 − 40 scales in adults; longitudinal scale series 50–56; gill rakers 5–6 + 9–12; vertebrae 10 + 16–17 (usually 16); body depth 27–33% SL; HL 37–41% SL; snout length 17–22% HL; caudal-peduncle length 11–17% HL; caudal-peduncle depth 29–35% HL; maxilla extending posteriorly to a vertical at rear edge of orbit; a band of villiform teeth in jaws with a small canine-like tooth (sometimes a close-set pair) laterally on each side or a pair on one side of upper-jaw symphysis; a V-shaped patch of villiform teeth on vomer; palatines with a band of villiform teeth in 1–4 rows; longest dorsal-fin spine 17–28%HL; longest dorsal-fin soft ray 43–50%HL; second anal-fin spine clearly longest, 16–25%HL; longest anal-fin soft ray 42–49%HL; caudal fin rounded to slightly rhomboidal, 57–71 %HL; pectoral fins 67–80% HL (26–32% SL); pelvic fin short, its origin distinctly anterior to base of pectoral fin; absence of cteni on scale edge (Fig. 5); life color primarily mottled red to scarlet with a median dorsal pale pink stripe on head from lower lip to dorsal-fin origin.

Craig and Hastings (2007) indicated that the subtribe Pseudogrammina (*sensu* Randall and Baldwin, 1997), which includes *Aporops*, *Pseudogramma* and *Suttonia*, is monophyletic based on the genetic analysis of two nuclear and two mitochondrial genes. This supported an earlier hypothesis based on morphological data by Baldwin and Johnson (1993). Members of this subtribe lack the dermal toxin "grammistin," which is present in other members of the tribe Grammistini (Baldwin and Johnson, 1993).

The new Japanese name of the genus, Kurenai-toge-megisu-zoku, is based on the Japanese name of the new species, Kurenai-toge-megisu. The new species represents the first documented record of the genus from Japanese waters.

Suttonia coccinea sp. nov.

[New English name: Scarlet Freckle-faced Podge]

[New Japanese name: Kurenai-toge-megisu]

(Figs. 1–5, Tables 1–2)

Holotype. NSMT-P 110917 (formerly BSKU 103900) 65.1 mm SL, 79.7 mm TL, Kuboura, Okinoshima Island, Sukumo City, Kochi Prefecture, Shikoku Island, Japan (32°44′44″N, 132°33′32″E), 16 m depth, hand net by SCUBA, coll. by H. Endo, 21 July 2010.

Diagnosis. A new species of *Suttonia* with the following combination of characters: lower jaw

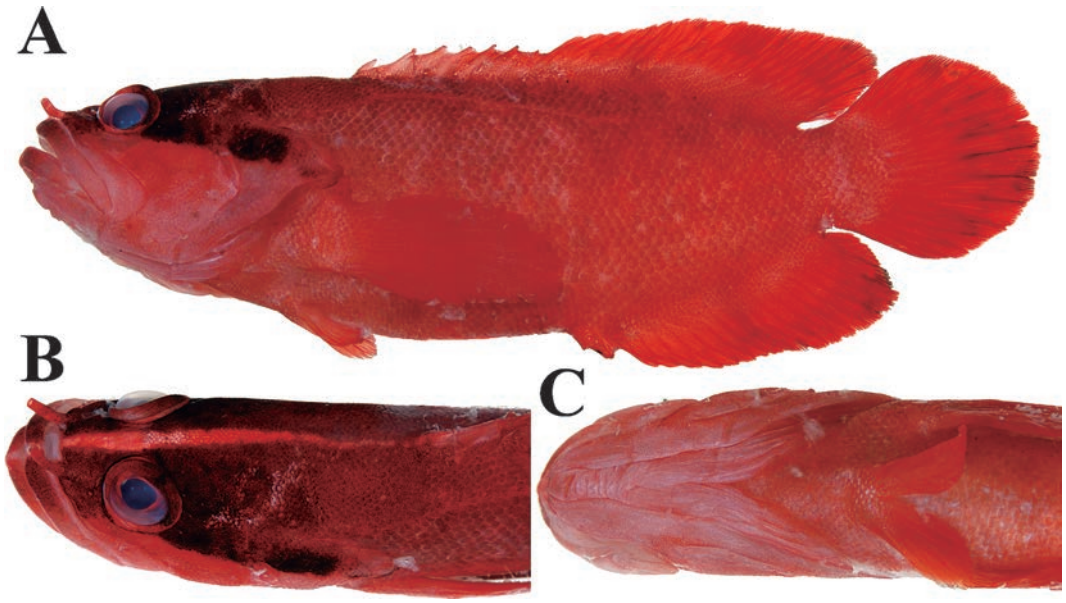

Fig. 1. *Suttonia coccinea* sp. nov., holotype, NSMT-P 110917, 65 mm SL, in fresh condition: **A**, left lateral view; **B**, left dorsolateral view of head; **C**, ventral view of head to anterior of abdomen. Photographed by H. Endo.

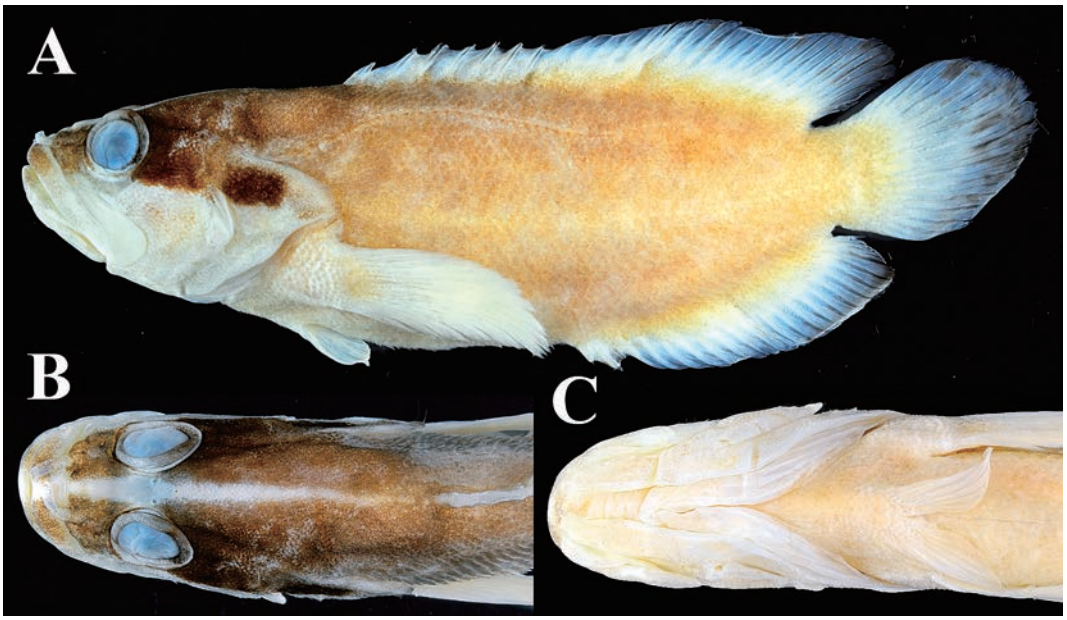

Fig. 2. *Suttonia coccinea* sp. nov., holotype, NSMT-P 110917, 65 mm SL, in preserved condition: **A**, left lateral view; **B**, dorsal view of head; **C**, ventral view of head to anterior of abdomen. Photographed by H. Endo.

moderately short, its length 61% HL); moderately low spinous dorsal fin, its longest spine length 17% HL; moderately high soft dorsal fin, its longest soft-ray length 46% HL; moderately high anal fin, its longest soft-ray length 44% HL; somewhat short pelvic fin, its length 61% HL);

Table 1. Counts and aspects of squamation of three *Suttonia* species. G (1960) and R&B (1997) indicate Gosline (1960) and Randall and Baldwin (1997) respectively. One and two asterisks indicate the counts of specimens larger than 50 and 40 mm SL respectively.

	S. coccinea	*S. lineata*			*S. suttoni*	
	Holotype	this study	R&B (1997)	G (1960)	R&B (1997)	Smith (1953)
		n = 12	n = 39	n = 6	n = 27	n = 4
Standard length (mm)	65	66–80	17–81	38–78	34–65	63–78
Dorsal-fin rays	VII, 23	VII, 23–25	VII, 22–25	VII, 23–24	VII, 22–24	VII, 23–24
Anal-fin rays	III, 19	III, 19–21	III, 19–22	III, 20–22	III, 18–20	III, 19
Pectoral-fin rays	16	15–18	15–17	16	14–15	16
Pored lateral-line scales	26	37–41	35–40*	—	27–35**	31
Longitudinal scale series	51	47–54	52–56	58–64	50–53	—
Vertebrae	10 + 16	10 + 16	10 + 16–17	—	10 + 16	—
Inner base of pectoral fin	scaly	scaly	scaly	—	naked	—

pored scales in lateral line 26; scaly inner base of pectoral fins; head, body, and fins uniform scarlet when fresh; a distinct dark spot on opercle and dusky to black pigment on dorso-lateral portion of head.

Description. Counts and proportions are shown in Tables 1 and 2. Body somewhat robust, compressed. Spinous dorsal fin much lower than soft dorsal fin; first spine short, its length 71% of longest spine; second to seventh spines almost equal in length, third to fifth spines longest; all soft rays branched. Posterior corners of 19–20th dorsal- and 16–17th anal-fin soft rays greatly elongated. First anal-fin spine shortest, slender, its length 67% of second spine; second spine robust, longest, its length 16% HL; third spine slender, slightly longer than first; all soft rays branched. Pectoral fin elongate, just reaching posteriorly beyond a vertical at anal-fin origin; its base narrow, height 21% HL; upper origin below dorsal-fin origin; all fin-rays branched. Pelvic fin short, its origin anterior to lowermost base of pectoral fin; spine short, its length 13% HL, 42% of pelvic-fin length; all soft-rays branched. Anus located immediately anterior to anal-fin origin. Caudal peduncle short, its length 40% of its depth. Caudal fin large, rounded, with 15 principal rays.

Dorsal outline of head nearly straight anteriorly, gently curved posteriorly. Snout short, rounded, moderately wide, its length almost equal to orbit diameter. Anterior nostril on anterior rim of snout, forming long tube that projects slightly beyond upper lip when depressed anteriorly, reaching posterior nostril when depressed posteriorly, its length half of orbit diameter; posterior nostril without tube, oval, close to orbit, its longitudinal diameter one fifth of orbit diameter. Eyes somewhat small. Interorbital space narrow, flat, without dermal flap or small tentacle. Cephalic lateral-line pores (Fig. 3): two pairs of nasal pores medially near nostrils; pair of anterior interorbital pores near orbital rims; single

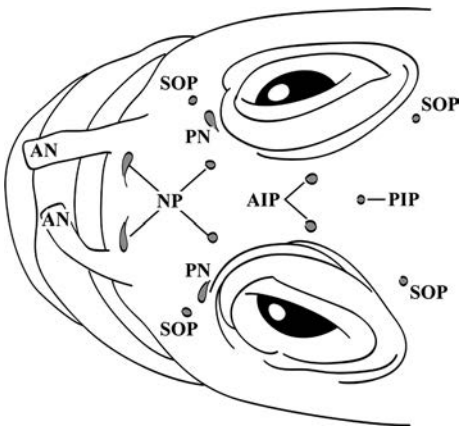

Fig. 3. Dorsal view of anterior head of *Suttonia coccinea* sp. nov., holotype, NSMT-P 110917, 65 mm SL, showing cephalic sensory pores on snout and interorbital region: AN, anterior nostril; AIP, anterior interorbital pore; PIP, posterior interorbital pore; PN, posterior nostril; SOP, suborbital pore. Drawn by N. Nakayama.

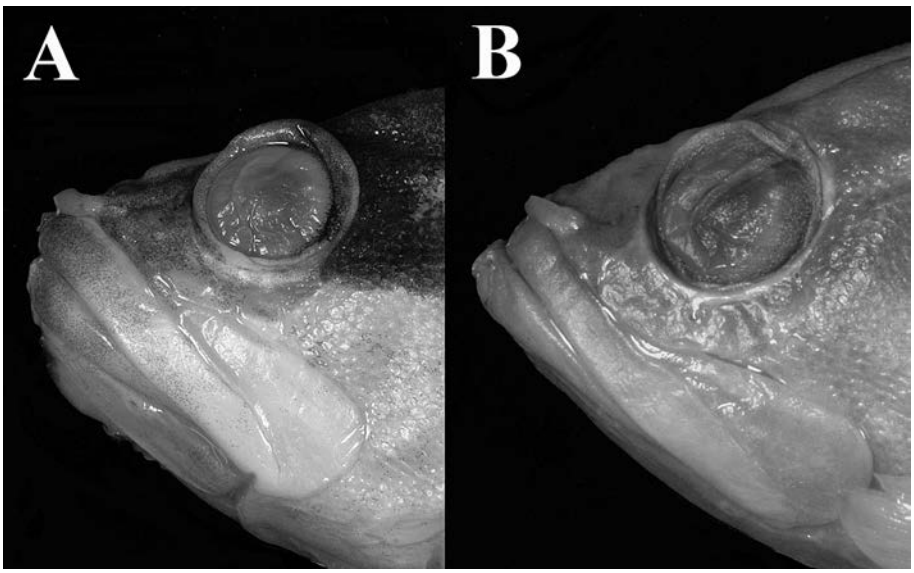

Fig. 4. Lateral views of head of two *Suttonia* species: **A**, *Suttonia coccinea* sp. nov., holotype, NSMT-P 110917, 65 mm SL; **B**, *Suttonia lineata*, BPBM 7974, 67 mm SL. Photographed by H. Endo.

posterior interorbital pore on a mesial plane; suborbital pores 9; preoperculo-mandibular pores 13 (4 dentary and 9 preopercular pores); postorbital pores 6.

Mouth large, somewhat oblique. Maxilla extending posteriorly beyond a vertical at rear edge of orbit. Tip of lower jaw slightly projecting anteriorly beyond upper when mouth closed (Figs. 1B, 4A). A band of villiform teeth in jaws inwardly curved, conical: 4–6 irregular rows near symphysis, 2–4 irregular rows posteriorly, teeth in inner row somewhat enlarged; two large canine-like teeth on right side of upper-jaw symphysis (presumably two on left side missing); vomer with a V-shaped patch of villiform teeth; palatines with a narrow band of villiform teeth in 1–3 rows.

Gill rakers on first arch (right side) 5 + 9 = 14: upper 6 rakers on lower limb short, digit-like with fine spinules; other rakers rudimentary, plate-like with fine spinules. Tongue slender, without teeth. Left and right branchiostegal membranes united antero-ventrally near isthmus, attached to antero-ventral portion of urohyal. Branchiostegal rays 7.

Opercle with three flat spines, covered by skin (invisible externally). Opercular flap well developed, extending posteriorly to a vertical at uppermost point of pectoral-fin base. Upper edge of operculum joined by thin membrane to head. Spine on posterior edge of preopercle with deep furrow, slender, projecting ventro-posteriorly, directed at an angle of about 50 degrees from the horizontal.

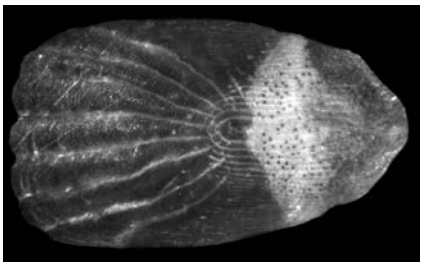

Fig. 5. Scale of *Suttonia coccinea* sp. nov., NSMT-P 110917, 65 mm SL. Photographed by K. Kenmotsu.

Scales ctenoid, cteni completely absent (Fig. 5), adherent, covering entire head and body except the following: snout to middle of interorbital space anterior to anterior interorbital pores, lachrymal, both jaws except postero-dorsal end

of dentary, preopercular spine, posterior rim of preopercle, branchiostegal membrane, and gular. Fins variously covered with smaller scales except the following: margin of spinous dorsal fin, distal three-fifths to two-thirds of soft dorsal and anal fins (naked area widest at the posterior corner of fins), distal half of caudal fin, and distal three-fourths of paired fins. Inner base of pectoral fin scaled.

Single lateral line with 26 pored scales, reaching posteriorly to a vertical at space between first and second anal-fin soft rays.

Color when fresh (Fig. 1). Ground color of head and body uniformly scarlet; fins bright red; head dusky dorsally, somewhat pale ventrally; a reddish to whitish mesial line between lips and dorsal-fin origin; anterior portion of lips dusky except at mesial line; orbital rim dusky except ventrally, iris red, pupil black; a wide dusky rectangular blotch behind eye to preopercle and an elongate blackish spot on opercle; dorsum of body slightly dusky; posterior corners of dorsal- and anal-fin membranes and distal half of caudal fin mottled blackish.

Color in alcohol (Fig. 2). Reddish coloration when fresh completely faded. Head, body, and scaled vertical fin bases yellowish brown, slightly dusky; dorsal portion of body more dusky (Fig. 2A). Dorsal portion of head and anterior portion of both lips, brown (Fig. 2B). Large marking behind eye and spot on opercle dark brown. Ventral half of head, mesial line on dorsal portion of head, unscaled areas of vertical fins, and paired fins yellowish white. Posterior corners of dorsal- and anal-fin membranes, distal half of caudal fin mottled pale blackish brown.

Distribution. Known only from the type locality, Okinoshima Island, southwest of Kochi, Shikoku Island, Japan, at a depth of 16 m. Taken from an opening under large rocks.

Etymology. From the Latin *coccinea* (scarlet) in reference to its bright reddish coloration. The new Japanese standard name of the species, "Kurenai-toge-megisu," is also in reference to its coloration.

Comparisons. The new species clearly belongs to the genus *Suttonia* based on its having the following combination of characters: dorsal-fin rays VII, 22; anal-fin rays III, 19; pectoral-fin rays 16; vertebrae 10 + 16; a large inclined preopercular spine with furrow; pair of large interorbital pores, one on each side and situated at edge of orbit; single lateral line; cteni on scales completely absent; and reddish coloration with pale middorsal stripe from upper jaw to origin of dorsal fin (Table 1; Figs. 1, 3, 5). *Suttonia coccinea* differs from *S. lineata* and *S. suttoni* in the following proportions: longest dorsal-fin spine shorter (length 6.8% SL vs. 7.9–9.5 and 7.9 respectively), longest dorsal-fin soft-ray longer (length 18.0 % SL vs. 12.6–16.2 and 16.5), longest anal-fin soft ray longer (length 17.2% SL vs. 12.9–15.5 and 14.1), pelvic fin shorter (length 11.8% SL vs. 13.0–14.6 and 14.8), lower jaw shorter (length 60.9% HL vs. 62.5–66.6) (Table 2; Fig. 4). *Suttonia coccinea* differs from *S. lineata* in having fewer pored scales in the lateral line (26 vs. 35–41), lower jaw slightly projecting anteriorly beyond upper jaw when closed (vs. clearly beyond upper), uniformly red pectoral fins (vs. pale with reddish margin) and a distinct dark spot on the opercle (vs. faint spot) (Table 1, Figs. 1, 2, 4; Randall and Baldwin, 1997: pl. 1–I). Although *S. coccinea* resembles *S. suttoni* in having fewer pored scales in the lateral line than *S. lineata* (26 in *S. coccinea,* 27–35 in *S. suttoni* — 31 in the four type specimens of 63–78 mm SL counted by Smith, 1953), bright reddish coloration, and a distinct spot on the opercle, the new species differs from *S. suttoni* in having scales on the inner base of the pectoral fin (vs. naked) and a uniformly scarlet head and body with bright red fins (vs. uniform vermilion with chrome-yellow margins of vertical fins — Smith, 1953). Additionally, Smith (1953: fig. 3) noted that one of 4 types of *S. suttoni* has 3 dark longitudinal lines along the side of the body (scarlet when fresh). However, based on examination of 27 specimens of *S. suttoni,* including 3 paratypes and ROM 56690, Randall and Baldwin (1997) described 3 grooves along the sides instead of 3 dark lines. Neither *S. coccinea* nor *S.*

Table 2. Proportional measurements of three *Suttonia* species.

	S. coccinea NSMT-P Holotype	*S. lineata* BPBM 8 larger spec.	*S. suttoni*	
			ROM 56690 1 specimen	Smith (1953) 4 types
Standard length (mm)	65.1	65.5–79.8	40.5	63–78
As % of standard length				
Body depth	30.4	25.9–30.6	28.9	31–32
Predorsal length	38.2	36.6–38.8	41.2	
Preanal length	69.3	62.3–70.8	67.9	
Prepelvic length	37.5	32.5–38.6	33.8	
Dorsal-fin base length	55.5	54.6–61.9	59.8	54
Anal-fin base length	33.9	31.0–33.2	32.8	
Longest dorsal-spine length	6.8	7.6–9.5	7.9	8
Longest dorsal soft-ray length	18.0	12.6–16.2	16.5	14.5
Longest anal-spine length	6.3	5.3–7.6	6.4	8
Longest anal soft-ray length	17.2	12.6–15.5	14.1	
Caudal-fin length	24.1	18.3–23.2	24.4	
Pectoral-fin length	26.0	24.7–27.8	29.1	28
Pelvic-fin length	11.8	13.0–14.6	14.8	10
Caudal-peduncle length	6.1	5.6–7.5	5.7	
Caudal-peduncle depth	12.0	10.9–12.7	11.6	12
Head length	39.3	36.4–37.9	38.5	38–39
As % of head length				
Snout length	20.3	16.8–20.4	16.7	
Orbit diameter	19.9	19.3–21.2	24.4	
Interorbital width	9.4	7.6–9.1	7.1	
Upper-jaw length	50.8	49.0–51.9	51.9	
Lower-jaw length	60.9	62.5–66.6	63.0	
Preopercular-spine length	17.2	15.1–19.9	19.9	

lineata has grooves or dark lines laterally on the body.

The new species represents the northernmost record of *Suttonia* based on published specimen data, and the range of the genus now extends from Oahu, Hawaiian Islands (type locality of *S. lineata*) to Okinoshima Island, southwest of Shikoku Island (32°45′N). Okinoshima Island of Kochi is located in a subtropical- to temperate-water region off the Pacific coast of southern Japan (*sensu* Nakabo, 2002), and is strongly influenced by the Kuroshio Current. Hence, rocky reefs in this area are exposed to warm temperatures in the winter and have many developed corals. This ecosystem undoubtedly provides cryptic environments suitable for *S. coccinea*.

Comparative materials. *Suttonia suttoni* (1 specimen): Moheli, Comoro Islands, ROM 56690, 41 mm SL. *Suttonia lineata* (11): Oahu, Hawaiian Islands, BPBM 6003 (1 specimen, 72 mm SL), BPBM 6350 (3, 66–80), BPBM 7974 (2, 67–79), BPBM 9767 (1, 66), BPBM 22660 (1, 78); Guam, BPBM 7276 (1, 36); Tahiti, BPBM 8371 (1, 23); Manado, Sulawesi, Indonesia, BPBM 36744 (1, 29). *Pseudogramma polyacanthum* (2): Okinoshima Island, Kochi, BSKU 71946 (1, 44), BSKU 71948 (1, 30), 19 July 2004. *Aporops bilinearis* (1): Kikaijima Island, Amami Islands, BSKU 5425 (holotype of *Aporops japonicus* Kamohara, 55).

Acknowledgments

We are most grateful to K. Matsuura (NSMT) and S. Kimura (Mie University) for their efforts in preparing this supplement. We also thank the following: members of the field sampling team at Okinoshima Island in 2010, Z. Imoto (Usa Marine Biological Institute, Kochi University), E. Katayama (NSMT), M. Tsuboi and Y. Kimura (Hiroshima University), Y. Takata (Osaka City, Osaka), M. Yamamura (Tosa Town, Kochi), M.

Hirota (Tosa City, Kochi), K. Tose (Kochi University), K. Matsuno (Aquas Kashiwajima Diving Service, Kochi) and J. Sakaue (Southern Marine Laboratory, Palau) for their generous assistance; Boyokan Sawachika (our regular inn at Okinoshima Island, Kochi) and Sukumo-wan Japan Fisheries Cooperative (Sukumo City, Kochi) for assistance and permission for the sampling respectively; R. Winterbottom (ROM), A. Y. Suzumoto (BPBM), and G. Shinohara (NSMT) for loaning and cataloging the type specimen; K. Shibukawa (Nagao Natural Environment Foundation, Tokyo) for providing us with valuable information about *Suttonia*; E. Katayama (NSMT) for obtaining literature; N. Nakayama (BSKU) for drawing the illustration; and G. Yearsley (Hobart, Australia) for editing the English text. We sincerely thank an anonymous reviewer and S. Kimura for their valuable comments on the manuscript. The study was partly supported by Grant-in-Aids for Scientific Research from the Japan Society for the Promotion of Science, Tokyo, Japan (A19208019 and B24370041), the Grant-in-Aid of "Marine Science Project"of Natural Science Cluster, Sciences Unit, Kochi University, and the "Kuroshio Sougou Project" of National Museum of Nature and Science, Tsukuba.

Literature Cited

Allen, G. R. and M. V. Erdmann. 2012. Reef fishes of the East Indies. Vol. I. Tropical Reef Research, Perth. x + 420 pp. + end note.

Baldwin, C. C. and G. D. Johnson. 1993. Phylogeny of the Epinephelinae (Teleostei: Serranidae). Bulletin of Marine Science, 52(1): 240–283.

Craig, M. T. and P. A. Hastings. 2007. A molecular phylogeny of the groupers of the subfamily Epinephelinae (Serranidae) with a revised classification of the Epinephelini. Ichthyological Research, 54: 1–17.

Gosline, W. A. 1960. A new Hawaiian percoid fish, *Suttonia lineata*, with a discussion of its relationships and definition of the family Grammistidae. Pacific Science, 14(1): 28–38.

Hoese, D. F., D. J. Bray and J. E. Gates. 2006. Grammistini. Podge Soapfishes. Pages 1026–1028 *in* D. F. Hoese, D. J. Bray, J. R. Paxton and G. R. Allen, eds. Fishes. *In* P. L. Beesley and A. Wells, eds. Zoological catalogue of Australia. Volume 35. ABRS & CSIRO Publishing: Australia Part 2, xxi + 671–1472 pp.

Kuiter, R. H. 2004. Basslets, Hamlets, and their relatives. A comprehensive guide to selected Serranidae and Plesiopidae. TMC Publishing, Chorleywood. 216 pp.

Nakabo, T. 2002. Characteristics of the fish fauna of Japan and Adjacent waters. Pages xliii–lii. T. Nakabo, ed. Fishes of Japan with pictorial keys to the species, English edition. Tokai University Press, Tokyo.

Nelson, J. S. 2006. Fishes of the world. Fourth edition. John Wiley & Sons, Ins., Hoboken, New Jersey. xx + 601 pp.

Randall, J. E. 2005. Reef and shore fishes of the Southern Pacific. New Caledonia to Tahiti and the Pitcairn Islands. University of Hawai'i Press, Honolulu. xii + 707 pp.

Randall, J. E. 2007. Reef and shore fishes of the Hawaiian Islands. Sea Grant College Program, University of Hawai'i, Honolulu. xiv + 546 pp.

Randall, J. E. and C. C. Baldwin. 1997. Revision of the serranid fishes of the subtribe Pseudogrammina, with descriptions of five new species. Indo-Pacific Fishes, (26): 1–56.

Smith, J. L. B. 1953. The fishes of the family Pseudogrammidae from East Africa. Annals and Magazine of Natural History, Series 12, 6: 548–560.

Manuscript received 3 November 2012; revised 20 January 2013; accepted 31 January 2013.

Associate editor: S. Kimura