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First Records of a Scorpionfish, *Maxillicosta raoulensis* (Scorpaeniformes, Neosebastidae), from the Tasman Sea, with Fresh Colour Notes for the Species

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Abstract. *Maxillicosta raoulensis*, which has to date only been recorded from the Kermadec Islands and the northern North Island of New Zealand, is reported on the basis of four specimens (45.2–101.7 mm standard length) collected from two localities in the Tasman Sea: near Balls Pyramid on the Lord Howe Rise in a depth of 76–81 m, and on the Taupo Bank in a depth of 142 m. These specimens represent the first records from Australian territorial waters and an approximate 1,700–1,800 km range extension from the previously known westernmost record of the species. A colour photograph of a fresh specimen of the species is given for the first time.

Key words: Scorpaenidae, *Maxillicosta raoulensis*, Australia, Tasman Sea, colouration.

Introduction

The scorpionfish genus *Maxillicosta* Whitley, 1935 (Scorpaeniformes, Neosebastidae) was reviewed by Eschmeyer and Poss (1976) who recognized five species, including three new. Of the five species, three are endemic to Australia, *i. e. M. lophlepis* Eschmeyer and Poss, 1976, *M. scabriceps* Whitley, 1935 and *M. whitleyi* Eschmeyer and Poss, 1976, and one, *i. e. M. reticulata* (de Buen, 1961), is known only from the Juan Fernández Islands (660 km west of Chile). The fifth species, *M. raoulensis* was originally described by Eschmeyer and Poss (1976: 442, figs 2d, 4, 7–8) from Raoul Island (29°15′S, 177°57′W) in the Kermadec Island group, north of New Zealand, at a depth of 60 m, on the basis of 12 specimens (37.8–101.0 mm standard length, SL). Subsequently, Paulin (1982) reported a total of 47 specimens (24.5–71.4 mm SL) of *M. raoulensis* from the type locality and off White Island in the Bay of Plenty, New Zealand, at depths of 20–150 m. Thus, this species has been recorded only from New Zealand waters (Francis, 1993: 159).

Two large specimens (93.1–101.7 mm SL), collected from Taupo Bank, off Newcastle, New South Wales, Australia, at a depth of 142 m, and two small specimens (45.2–70.5 mm SL), collected from Balls Pyramid, Lord Howe Rise, at a depth of 86–113 m, are identified here as *M. raoulensis*. These specimens, briefly described herein, represent the first records of the species from the Tasman Sea (Australian waters). Although Eschmeyer and Poss (1976) and Paulin (1982) provided morphological descriptions of the species, such was based on preserved specimens only and therefore lacked any information on fresh colouration. A colour photograph of the Lord Howe Rise specimen (70.5 mm

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SL), taken by K. Parkinson before formalin fixation, is therefore provided here (Fig. 1a) along with a detailed colour description.

Counts and measurements followed Motomura (2004*a*, *b*), with the following additions. Scales above and below the lateral line were counted vertically between the lateral line and the first dorsal-fin spine base and the first anal-fin spine base, respectively. Scales were also counted vertically between the lateral line and the sixth dorsal-fin spine base and the last dorsal-fin spine base. Predorsal scale rows are the number of rows between the first dorsal-fin spine base and the posterior margin of the occipital pit. Scale rows between the pelvic fins are counted between the last pelvic-fin soft ray bases in ventral view. Head width is the straight-line distance between the posterior ends of the pterotic spine bases. Interorbital width is the least bony width. Post-occipital pit length was measured from the origin of the first dorsal-fin spine to the posterior edge of the occipital pit. Maxilla depth is the distance between the two posterior corners. Counts are given as the range with the mode in parentheses. Measurements are expressed as percentages of SL with the mean in parentheses. Institutional abbreviations used in this paper are as follows: AMS, Australian Museum, Sydney; CSIRO, Commonwealth Scientific and Industrial Research Organisation, Marine Research, Hobart; and NMV, National Museum of Victoria, Melbourne.

Maxillicosta raoulensis Eschmeyer and Poss, 1976
(Fig. 1a)
New English name: Red Little Gurnard Perch

Material examined. CSIRO CA 3173, 93.1 mm SL, Taupo Bank (33˚08′S, 156˚11′E), approximately 425 km east of Newcastle, New South Wales, Australia, 142 m depth, coll. by FRV *Soela*, 28 Jan. 1982; CSIRO CA 3174, 101.7 mm SL, same data as CSIRO CA 3173; NMV A 25132–002, 70.5 mm SL, Balls Pyramid (31˚52′S, 159˚14–15′E), Lord Howe Rise, New South Wales, Australia, 76–81 m depth, coll. by RV *Tangaroa*, 23 May 2003; NMV A 25132–003, 45.2 mm SL, same data as NMV A 25132–002.

Description. *Meristics*—Dorsal fin with 13 spines and 8 soft rays. Anal fin with 3 spines and 5 soft rays. Pectoral fin with 24–26 (mode 26) rays; 1 or 2 (1) uppermost ray and 10–17 lower rays unbranched, remaining rays branched (number of branched rays increasing with growth). Longitudinal scale rows 47–49 (48). Pored lateral-line scales 27–29 (27). Scales above lateral line 2 or 3 (3), below 13–16 (14). Scale rows between sixth dorsal-fin spine base and lateral line 3 or 4 (3); between last dorsal-fin spine base and lateral line 4. Predorsal scale rows 4 or 5 (4). Gill rakers on upper limb 4 or 5 (4), lower limb 9 or 10 (10), including 1 or 2 (2) rakers on hypobranchial; total rakers 13–15 (14). *Morphometrics*—Body depth 33.8–28.2% of SL (mean 36.2%); body width 23.2–25.7 (24.7); head length 44.0–45.4 (44.7); snout length 8.2–9.5 (8.9); orbit diameter 16.9–18.6 (17.4); interorbital width 2.8–4.0 (3.3); head width 16.6–18.1 (17.2); upper-jaw length 20.4–21.5 (21.0); maxilla depth 6.7–7.3 (6.9); postorbital length 19.0–20.5 (19.8); post-occipital pit length 6.9–8.9 (7.6); predorsal-fin length 37.1–38.3 (37.8); preanal-fin length 67.0–69.7 (68.5); prepelvic-fin length 41.4–44.8 (43.0); first dorsal-fin spine length 10.0–11.3 (10.4); second dorsal-fin spine length 15.0–17.3 (16.4); third dorsal-fin spine length 20.4–23.0 (22.0); fourth dorsal-fin spine (longest) length 26.5–30.5 (28.0); fifth dorsal-fin spine length 25.1–26.2 (25.8); twelfth dorsal-fin spine length 8.6–10.7 (9.4); thirteenth dorsal-fin spine length 13.2–13.9 (13.5); longest dorsal-fin ray (first or second) length 21.5–22.4 (21.9); first anal-fin spine length 10.4–12.8 (11.8); second anal-fin spine (longest) length 19.0–21.5 (20.3); third anal-fin spine length 12.8–15.2 (13.9); longest anal-fin ray (first or second) length 19.5–21.3 (20.5); longest pectoral-fin ray (ninth or tenth) length 33.2–36.6 (35.2); pelvic-fin spine length17.2–18.1 (17.7); longest pelvic-fin ray (second) length 28.1–31.1 (29.2); caudal-fin length 29.0–29.9 (29.5); caudal-peduncle length 17.0–18.4 (17.4); caudal-peduncle depth 10.5–10.9 (10.7). *Scales*—Cycloid scales,

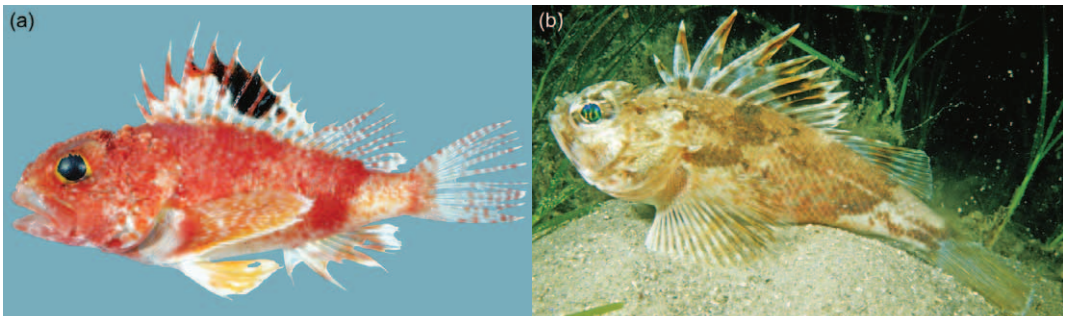

Fig. 1. *Maxillicosta* fishes of Australia. a. *M. raoulensis*, NMV A 25132–002, 70.5 mm SL, Balls Pyramid, Lord Howe Rise, New South Wales (photo by K. Parkinson). b. *M. scabriceps*, Port Philip Bay, Victoria (photo by R. Kuiter).

with a weak median ridge, covering area behind orbit above suborbital ridges and upper opercle. Cycloid scales, without a median ridge, covering cheek and middle of opercle. Predorsal scales ctenoid, with a serrated median ridge. No scales on snout, interorbital space, occipital pit, maxilla, and underside of lower jaw. Most scales above lateral line with a distinct serrated median ridge. Scales below lateral line cycloid, without median ridge. Exposed cycloid scales covering pectoral-fin base and ventral surface of body, including between pelvic fins. *Spines and Ridges*—Nasal spine with 2–13 spinous points distally, 1–19 spinous points on anterior surface of spine. Median interorbital ridge absent. Interorbital ridges weakly developed; adjacent to each ridge at slightly anterior to a vertical through centre of eye; ending at anterior margin of occipital pit, then forming distinct coronal spines. Coronal spine well developed, with 3–22 spinous points distally. Preocular spine well developed, anterior and dorsal surface with 4–6 distinct ridges and 11–30 spinous points on ridges. Supraocular and postocular bones continuous, with 8–13 ridges and 33–121 spinous points on ridges. Occipital pit relatively shallow, surrounded laterally by tympanic spines, parietal spines, several spinous points and low ridges in dorsal view; surface of pit with several spinous points. Tympanic and parietal spines serrated; several serrated spinous points around spines. Nuchal spine serrated; not joined with parietal spine at base. Sphenotic with 4–13 small spines. Postorbital with numerous spinous points. Pterotic, upper and lower posttemporal and supracleithral spines serrated. Lateral surface of maxilla with 5 or 6 distinct longitudinal ridges, uppermost ridge on dorsal edge. Posterior margin of maxilla just reaching or extending slightly beyond a vertical at posterior margin of pupil. Underside of lower jaw with 3 distinct ridges in ventral view. Lacrimal with numerous small sharp spines laterally; continuous with suborbital ridges. Three or 4 suborbital ridges with numerous pointed spines. Suborbital pit absent. Preopercle with 5 spines; preopercular margin, between uppermost preopercular spine and upper end of preopercle, with 5–18 small pointed spines. Upper opercular spine with 3–7 spinous points at spine tip; spine with a low median ridge, 2–15 spinous points on ridge. Lower opercular spine with 1–5 spinous points at spine tip; spine with a distinct median ridge, 6–15 spinous points on ridge. Cleithral spine flattened with a pointed spine.

Colour when fresh (Fig. 1a). Head mostly red. Anterior portion of lacrimal yellowish. Lips pale red with vertical white narrow bands. Membrane between upper lip and premaxilla whitish. Underside of mandible mottled with red and white blotches. Preocular and supraocular spines brilliant red. Parietal, nuchal, pterotic, upper and lower posttemporal spines red with whitish tip. Anterior portion of suborbital ridge brilliant red, progressively whitish posteriorly. Cheek red, whitish dorsoposteriorly. Lower part of opercle white with distinct red

spots; upper part of opercle mottled with red and white blotches. Outer margin of eye membrane whitish with small red spots; membrane, between pupil and outer eye membrane, brilliant yellow; pupil dense black. Trunk strongly variegated, mainly red. Three red saddles; first saddle indistinct, extending from first to fifth dorsal-fin spine base to above pectoral-fin base; second widest, extending from sixth to twelfth dorsal-fin spine base to under pectoral fin; third distinct, extending from soft-rayed portion of dorsal-fin base to above anal-fin base; trunk between second and third saddles whitish with poorly defined small red spots; caudal-fin base with a narrow vertical pale red band; caudal peduncle whitish with small reddish yellow spots. Abdomen whitish without distinct red spots. Pectoral-fin base whitish with red posteriorly. Membrane of spinous portion of dorsal fin transparent basally and whitish medially, with red distally in anterior spines and a large black blotch between fourth and tenth dorsal-fin spines. Dorsal-fin spines whitish with yellowish red spots; dorsal-fin soft rays white with red spots. Pectoral fin whitish with several vertical irregular narrow yellowish bands. Pelvic fin white with a poorly defined yellow blotch medially. Membrane of anal fin whitish anteriorly, transparent basally, pale red medially and white distally. Anal-fin spines and soft rays without red or yellow spots. Membrane of caudal fin transparent. Caudal-fin rays whitish with red spots posterior two-thirds of fin, forming irregular vertical bands.

Distribution. Currently known from New Zealand (Raoul Island, the Kermadec Islands and off White Island, the northern North Island; Eschmeyer and Poss, 1976; Paulin, 1982; Francis, 1993) and Australia (Balls Pyramid on Lord Howe Rise and Taupo Bank, Tasman Sea; this study) (Fig. 2). The Tasman Sea specimens represent the first records from Australian waters and an approximate 1,700–1,800 km westward range extension from the previously known westernmost record of the species. The absence of the species from Norfolk or Three King Ridges, which are located between the Kermadec Islands and Lord Howe Rise, is probably due to inadequate sampling.

Remarks. *Maxillicosta raoulensis* is characterized by having a large black blotch on the spinous portion of the dorsal fin (*versus* blotch absent in *M. reticulata*), scales above the lateral line with a strong serrated median ridge (distinct median ridge absent in *M. scabriceps* and *M. whitleyi*; serrations absent from median ridge in *M. lopholepis*), 25–27 pectoral-fin rays (20–23 in *M. whitleyi*; 21 or 22 in *M. lopholepis*; 21–23 in *M. scabriceps*; 23–25 in *M. reticulata*), and 14–17 gill rakers (10 or 11 in *M. whitleyi*; 11 in *M. lopholepis*; 11–13 in *M. scabriceps*; 14 or 15 in *M. reticulata*) (Eschmeyer and Poss, 1976). Characters of the present specimens from the Tasman Sea agreed closely with those of *M. raoulensis* from New Zealand, given by Eschmeyer and Poss (1976: 435, 442–445) and Paulin (1982: 443–444), with the exception of the following minor differences: 24–26 pectoral-fin rays in four Tasman Sea specimens (*versus* 25–27 in 59 New Zealand specimens; Eschmeyer and Poss, 1976; Paulin, 1982) and 13–15 gill rakers (*versus* 14–17 in 12 specimens; Eschmeyer and Poss, 1976).

In their review of *Maxillicosta*, Eschmeyer and Poss (1976: 444) presumed that body colour of *M. raoulensis* in life was "probably mostly red", and it was verified by this study. A colour photograph of a fresh specimen of *M. raoulensis* is provided here for the first time (Fig. 1a). Several underwater photographs of *M. scabriceps* and *M. whitleyi* have been reported (*e. g.* Kuiter, 1993: 118, unnumbered fig.; Gomon *et al.*, 1994: fig. 483) after Eschmeyer and Poss (1976), although the remaining two species (*M. lopholepis* and *M. reticulata*) are still known only from two and three preserved specimens, respectively (one of the three specimens was lost). An underwater photograph of *M. scabriceps*, taken in Port Philip Bay, Victoria by R. Kuiter, is provided here for comparative purposes (Fig. 1b). Live colouration of *M. scabriceps* and *M. whitleyi* are similar to each other (Poss, 1994). Colouration of *M. raoulensis* (Fig. 1a) significantly differs from that of *M. scabriceps* (Fig. 1b) and *M. whitleyi* in having a reddish body and yellowish pectoral and pelvic fins,

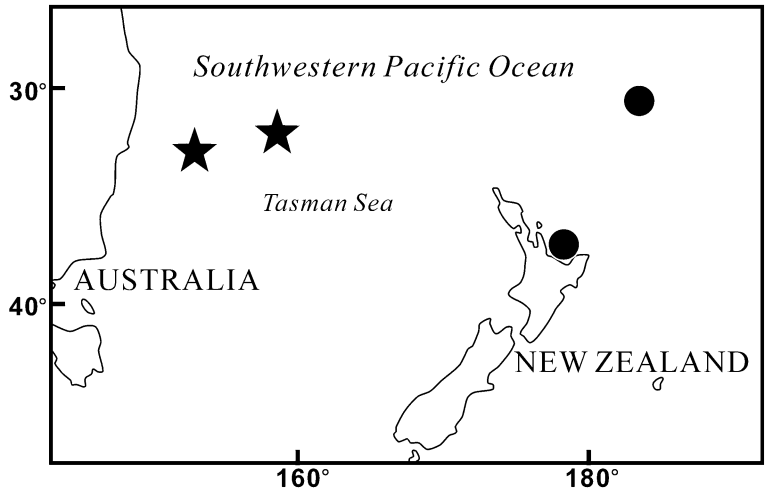

Fig. 2. Distributional records of *Maxillicosta raoulensis*. Circles and stars indicate localities of previously recorded specimens and specimens examined in this study, respectively.

compared to a whitish body with brownish or blackish blotches and whitish pectoral and pelvic fins for the latter two species. Many deep water species of scorpionfish tend to have a reddish body colouration, compared to a whitish or blackish colouration for shallow water species. In addition, the colouration of some scorpionfishes can vary intraspecifically according to the water depth in which they occur (*e. g*. Motomura and Shinohara, 2005). However, capture depths of *M. raoulensis* (20–150 m; Paulin, 1982) are similar to those of *M. whitleyi* (26–137 m; Poss, 1994), and all preserved specimens of *M. whitleyi* examined here have distinct melanophores on the body (although all specimens of *M. raoulensis* examined here lack distinct melanophores), indicating that a reddish body and the yellowish pectoral and pelvic fins when fresh appear to be a diagnostic character for *M. raoulensis*.

Maxillicosta raoulensis has been classified as 'threat level 7 – range restricted' by the Department of Conservation, New Zealand Government (DOC, 2005). The threat level 7 is defined as "These taxa either occur in a small geographic area, are restricted to a particular habitat, or require very specific substrates, and for colonial breeders, have fewer than 10 subpopulations (DOC, 2005)". However, this study suggests that *M. raoulensis* is more widely distributed on the oceanic ridges in the southwestern Pacific Ocean than was first thought.

Comparative material examined. *Maxillicosta scabriceps*: AMS IA. 21, holotype, 60.5 mm SL, Kingscote, Kangaroo Island, South Australia; CSIRO A 705, 75.4 mm SL, Great Australian Bight, Western Australia, RV *Commiles*, 28 May 1951. *Maxillicosta whitleyi*: AMS IB. 4409, holotype, 56.1 mm SL, off Southport, Queensland, Australia; AMS IB. 4406, paratype, 48.0 mm SL, same data as holotype; AMS IB. 7023, paratype, 45.3 mm SL, off Port Stephens, New South Wales, Australia, trawl; AMS I. 23469–005, 51.0 mm SL, off Eden (37˚02–04′S, 150˚03–04′E), New South Wales, 73 m depth, prawn trawl, FRV *Kapala*, 12 Nov. 1982; AMS I. 25936–004, 67.5 mm SL, off Clarence River (28˚40′S, 152˚32′E), New South Wales, 55 m depth, FRV *Kapala*, 12 Oct. 1985; AMS I. 26023–003, 57.6 mm SL, off Green Cape (37˚18–22′S, 150˚05′E), New South Wales, 80–82 m depth, FRV *Kapala*, 22 Nov. 1984; AMS I. 26397–003 (1 of 2), 55.7 mm SL, off Broken Bay (33˚36′S, 151˚29′E), Sydney, New South Wales, 71 m depth, FRV *Kapala*, 10 Feb. 1986.

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