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Lioscorpius trifasciatus, a new scorpionfish (Scorpaeniformes: Setarchidae) from the South-West Pacific Ocean

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Abstract

A new scorpionfish, *Lioscorpius trifasciatus* sp. nov., is described from material collected from the eastern Australian continental slope between Hinchinbrook Island (central Queensland) and Port Jackson (New South Wales) in 250–400 m depth. It differs from the only other member of the genus, the widely distributed Indo–West Pacific congener, *L. longiceps* Günther, in having the following combination of characters: 3 anal-fin spines (rather than 2), smaller head dimensions (i.e. length 38.7–42.3% SL, orbit 7.4–8.2% SL, upper jaw 19.1–20.7% SL, and maxilla depth 5.3–6.1% SL), shorter predorsal distance (36.2–38.8% SL), some relatively long fin elements (i.e. longest pelvic-fin ray 18.6–19.8% SL, first anal-fin spine 5.0–6.6% SL, and second anal-fin spine 10.4–12.7% SL), 3 diagonal red bands across the pectoral fin, and a red caudal-fin margin.

Key words: Setarchidae, *Lioscorpius*, new species, Coral Sea, Tasman Sea, southwestern Pacific Ocean, Australia

Introduction

The setarchid genus *Lioscorpius* Günther, 1880 is represented by a single species, *Lioscorpius longiceps* Günther, 1880, which has been collected in numerous Indo–West Pacific localities from Japan to Western Australia (Eschmeyer and Collette, 1966; Poss, 1999, 2000; Hutchins, 2001). Diagnostic characters of *Lioscorpius* include: a greatly reduced first spine of the lacrimal (preorbital) bone; 2 spines and 6 rays in the anal fin; 23–25 pectoral-fin rays; the last 2–3 dorsal-fin spines small and frequently buried; body depth 21–28% SL; and interorbital width 6–7% SL (Eschmeyer and Collette, 1966).

During 1985–86, two exploratory trawl surveys of the Coral Sea were conducted using the Commonwealth Scientific and Industrial Research Organisation (CSIRO) research vessel, FRV *Soela*. Amongst numerous new and interesting fishes discovered on these

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cruises were 8 unidentified scorpionfish specimens collected from south of the Saumarez Reef and east of Hinchinbrook Island at depths of 300–319 m. Since the Coral Sea expedition, additional material from further south has been collected. A closer examination of these specimens, and comparisons with material of *L. longiceps* from Western Australia, revealed them to be a new species. However, some characteristics of the new *Lioscorpius*, such as the presence of three anal-fin spines typical of other setarchids, differ from Eschmeyer and Collette's (1966) generic diagnosis.

The Coral and Tasman Sea specimens are described in detail below as a new species, and the generic diagnosis of *Lioscorpius* is modified to account for intrageneric variation. Comments are also made on the biogeography of *Lioscorpius*.

Methods

Counts and measurements follow Eschmeyer and Collette (1966). Rudiments on the gill arches are not counted; measurements from the anterior snout are taken from the anteriormost end of the left premaxilla rather than at the notch between the premaxillaries. Caudal-peduncle length is the horizontal distance from the posterior end of the anal-fin base to the posterior margin of the hypural plate. Standard length is expressed as SL. The last soft rays of the dorsal and anal fins, which are divided to their base (each pair being associated with a single pterygiophore), are counted as single rays. Pored lateral-line scales that had an external median tube were counted from the first pored scale near the upper end of the gill opening to the pored scale on the posterior margin of the hypural plate; pored scales on the caudal fin were not counted. Branchiostegal rays of the holotype could not be obtained without damaging the specimen.

Terminology of head spines followed Randall and Eschmeyer (2002) with the following additions: the spine occurring at the base of the uppermost preopercular spine is referred to as the supplemental preopercular spine (Eschmeyer, 1965); and the coronal and pretympanic (as extra) spines are figured in Chen (1981: fig. 1) and Motomura *et al*. (2004: fig. 14b). Institutional codes follow Leviton *et al*. (1985).

The holotype and 5 paratypes (CSIRO H 601–19) were measured for the full complement of characters.

Genus *Lioscorpius*

Diagnosis: A setarchid genus with the following combination of characters: body relatively elongate, depth 21–28% SL; first spine of lacrimal bone greatly reduced; long dorsal projection covering dorsal articulating surface of preorbital; anal elements II, 6 or III, 5; pectoral-fin rays 23–25; last 2–4 spines of first dorsal fin reduced, often embedded; swim bladder well developed with large gas gland; interorbit narrow, 5–7% SL.

Remarks: Consistent with definition provided by Eschmeyer and Collette (1966) based on *Lioscorpius longiceps*, except that the new species has three anal-fin spines typical of other setarchids, 5 anal-fin rays, and can have more reduced and embedded dorsal-fin spines and a body that is even more elongate with a narrower interorbit than its congener. One specimen of *L. longiceps* (AMS I 22821–025, 113.6 mm SL) had a broken first anal-fin ray that resembled a thin spine. The first soft ray of the fin is simple and the basal half or so of this element is unsegmented resembling a spine. *Lioscorpius* species are very similar to each other in appearance and distinct from the much deeper-bodied members of the genus *Setarches*. Nevertheless, the validity of *Lioscorpius*, and the reality of the setarchids as a family, is subject to debate.

***Lioscorpius trifasciatus* sp. nov.**
Tripleband Scorpionfish
(Figure 1)

Holotype: CSIRO H 601–18, 111.8 mm SL, south of Saumarez Reef (22°34–35'S, 153°37–40'E), Coral Sea, western Pacific Ocean, 319 m depth, coll. by FRV *Soela*, 16 Nov. 1985.

Paratypes: All from western Pacific Ocean. CSIRO H 601–19, 5 spec., 96.5–115.2 mm SL, same data as holotype; CSIRO H 595–16, 2 spec., 89.4–96.0 mm SL, east of Hinchinbrook Island (18°37–39'S, 148°05–07'E), Townsville Trough, Coral Sea, 300 m depth, coll. by FRV *Soela*, 8 Dec. 1985; QM I 21042, 125.9 mm SL, east of Stradbroke Island (27°40'S, 153°58'E), Coral Sea, 400 m depth, coll. by Queensland Fisheries Service, 16 Dec. 1982; QM I 33989, 2 spec., 108.2–117 mm SL, northeast of Leopard Reef (18°56'S, 149°10'E), Coral Sea, 400 m depth, coll. by P. Duncan, 9 Jul. 2002; AMS I 20437–002, 82.4 mm SL, northeast of North Solitary Island (29°48'S, 153°43'E), Tasman Sea, 380–390 m depth, coll. by FRV *Kapala*, 2 Aug. 1978; AMS I 30094–001, 92.2 mm SL, east of Port Jackson (33°S, 151°E), Tasman Sea, 250 m depth, coll. by P. Hawes, Nov. 1989.

Other material: QM I 20670, 3 spec., 107.8–130.7 mm SL, east of Murray Isles (9°51'S, 144°09'E), Coral Sea, 464 m depth, coll. by C. Jones, 27 May 1983.

Diagnosis. A species of *Lioscorpius* with the following combination of characters: anal fin with 3 spines, 5 rays; 3 diagonal red bands on pectoral fin; red caudal-fin margin; relatively small head (38.7–42.3% SL), orbit (7.4–8.2% SL), upper jaw (19.1–20.7% SL), and maxilla depth (5.3–6.1% SL); short predorsal-fin distance (36.2–38.8% SL); and long second pelvic-fin ray (18.6–19.8% SL, 0.9–1.0 of length of upper jaw), and anal-fin spines (first 5.0–6.6% SL, second 10.4–12.7% SL).

Description. Proportional measurements of the specimens of *Lioscorpius trifasciatus* are given as percentages of SL in Table 1. Data for the holotype below are presented first, followed by ranges for 5 paratypes (if different) in parentheses.

TABLE 1. Meristic and morphometric characters of *Lioscorpius trifasciatus* (holotype, CSIRO H 601–18; and range for five paratypes, CSIRO H 601–19) and *L. longiceps* (*n*=6 for meristics and *n*=3 or 4 for morphometrics). Morphometric characters are expressed as percentages of standard length.

	L. trifasciatus			*L. longiceps*	
	Holotype	Paratypes			
		Min	Max	Min	Max
Standard length (mm)	111.8	96.5	115.2	88.6	123.6
Dorsal-fin elements	XI–I, 10	XI–I, 10	XI–I, 10	XI–I,10	XI–I,10
Anal-fin elements	III, 5	III, 5	III, 5	II, 6	II, 6
Pectoral-fin rays	i+13+ix=23	23	24	24	25
Upper unbranched caudal-fin rays	2	2	4	3	4
Branched caudal-fin rays	11	11	12	11	12
Lower unbranched caudal-fin rays	2	2	3	2	3
Lateral-line scales	24	24	25	24	25
Branchiostegal rays	–	7	7	7	7
Gill rakers (upper)	3	3	3	3	3
Gill rakers (lower)	10	10	10	9	10
Gill rakers (total)	13	13	13	12	13
Pelvic-fin elements	I, 5	I, 5	I, 5	I, 5	I, 5
Total length	122.2	118.7	124.0	124.1	124.2
Body depth	22.2	20.6	22.8	22.0	24.6
Body width	16.7	15.1	18.7	17.0	19.5
Head length	41.8	38.7	42.3	43.0	44.8
Snout length	13.1	12.4	13.2	13.3	14.6
Orbit diameter	8.0	7.4	8.2	8.8	10.0
Interorbital width (mid-eye)	5.5	5.3	5.9	6.0	6.6
Upper-jaw length	20.7	19.1	20.1	23.3	23.6
Postorbital length	20.8	19.1	21.0	20.2	22.2
Predorsal-fin length	38.8	36.2	37.9	41.1	42.1
Preanal-fin length	71.6	69.9	72.8	71.7	74.5
Prepelvic-fin length	35.4	35.5	41.7	37.3	42.8
1st dorsal-spine length	7.6	6.6	8.4	5.9	7.2
2nd dorsal-spine length	10.2	10.2	11.5	9.8	11.5
3rd dorsal-spine length	15.2	14.2	16.7	11.8	15.7
4th dorsal-spine length	16.6	16.3	17.5	13.8	16.7
5th dorsal-spine length	20.6	15.0	18.2	12.4	14.7
Soft dorsal-fin spine	9.7	8.6	10.0	8.4	9.2

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TABLE 1 (continued)

	L. trifasciatus			*L. longiceps*	
	Holotype	Paratypes			
		Min	Max	Min	Max
Longest dorsal-ray length	16.8	16.1	16.8	13.6	16.5
1st anal-spine length	5.6	5.0	6.6	3.8	4.9
2nd anal-spine length	12.1	10.4	12.7	8.7	10.3
3rd anal-spine length	13.1	11.5	13.2	–	–
Longest anal-ray length	16.5	14.0	15.2	13.8	15.7
Pectoral-ray length	34.1	35.2	36.0	32.1	35.0
Pelvic-spine length	12.5	12.0	14.4	10.2	12.7
Longest pelvic-ray length	18.6	18.7	19.8	17.6	18.0
Caudal-fin length	20.9	22.2	23.6	22.8	23.0
Caudal-peduncle length	18.9	19.0	19.7	17.2	18.8
Caudal-peduncle depth	6.9	7.1	7.4	6.7	7.4
Maxilla depth	5.9	5.3	6.1	6.5	7.0

Dorsal fin very strongly notched, divided into two separate portions; 11 spines in anterior portion, penultimate spines very short or reduced, 1 (1–3) very short, partly embedded spines or rudiments preceding spine of hind portion; 1 spine and 10 soft rays in hind portion, all soft rays branched; length of first spine 1.4 (1.3–1.5; mean 1.4) in second spine; fifth spine longest (fourth and fifth subequal in some paratypes), its length subequal to upper-jaw length (smaller in all paratypes); becoming progressively shorter from fifth to eleventh spines; tenth spine very small, horizontal, only partly erectile; eleventh spine rudimentary (spines 9–11 rudimentary in one paratype, CSIRO H 601–19, specimen 3), barely detectable, broad based and protruding only slightly from dorsal surface; twelfth spine precedes soft portion of fin, its length less than half length of first soft ray, slightly shorter than second dorsal-fin spine; second soft ray longest (usually longest), subequal in length to fourth (third or fourth) dorsal spine; last soft ray of dorsal fin not joined to caudal peduncle by membrane. Anal fin with 3 spines and 5 soft rays; all soft rays branched; spines moderately elongate, first about half length of second, its length 0.46 (0.45–0.52; mean 0.49) length of second spine; third slightly longer than or equal to second, its length 1.1 (1–1.2; mean 1.1) times second spine; third anal-fin ray longest, slightly shorter than longest dorsal-fin ray; last soft ray of dorsal fin not joined to caudal peduncle by membrane. Pectoral fin subfalcate, angular distally, with 23 (23 or 24) rays; uppermost ray (uppermost 2 rays in two paratypes) and 9 (10 or 11 in two paratypes) lower rays unbranched; remaining 13 (11–14) rays branched, more rays branched in largest types than in smallest types); upper rays distinctly longer than lower rays; rays 5–8 usually longest,

their length slightly shorter than head length. Pelvic fin with 1 spine and 5 soft rays, all soft rays branched; second soft ray longest; subequal to upper-jaw length (jaw length 0.9–1.0 times length of longest pelvic ray); posterior branch of last soft ray joined by membrane to abdomen for about half its length. Caudal fin with 15 (15–18) segmented rays, 11 (11–12) rays branched, remaining rays unbranched; posterior margin of fin emarginate. Caudal-peduncle length 2.8 (2.6–2.7; mean 2.7) times in caudal-peduncle depth; length subequal (0.9–1.0) to upper-jaw length.

FIGURE 1. Color photograph of *Lioscorpius trifasciatus*, AMS I 20437–002, paratype, 82.4 mm SL, from northeast of North Solitary Island (29°48’S, 153°43’E), Tasman Sea, 380–390 m depth.

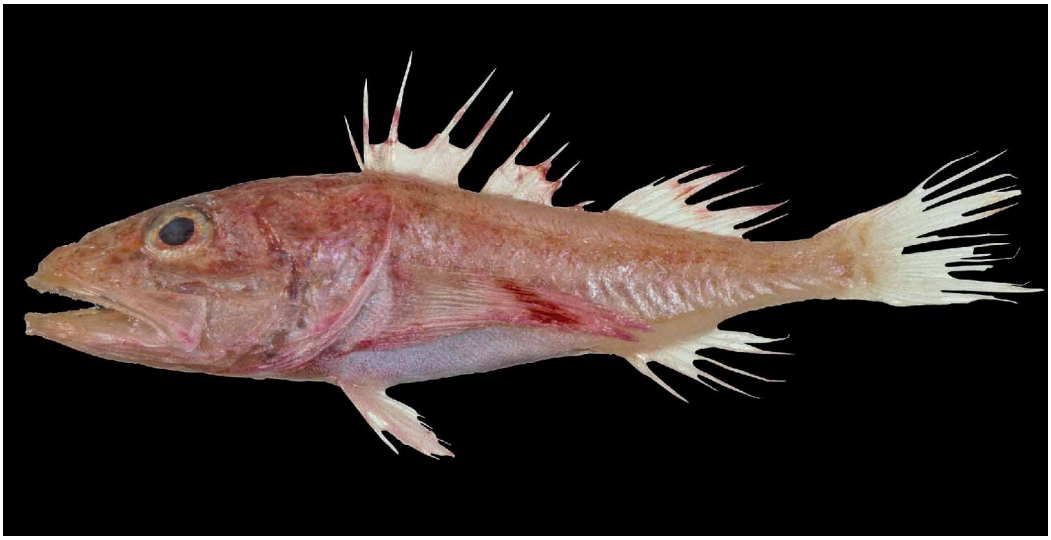

FIGURE 2. Color photograph of *Lioscorpius longiceps*, CSIRO H 4070–39, 88.6 mm SL, from northwest of Port Hedland (18°12–15’S, 118°11–15’E), eastern Indian Ocean, 266–269 m depth.

Pored lateral-line scales 24 (24 or 25, usually 25). Gill rakers on upper limb 3, lower limb 10, total gill rakers 13. Gill rakers relatively long, length of longest raker on first gill arch approximately 4 times that of gill filaments around angle of gill arch; fourth gill slit not closed by membrane. Branchiostegal rays 7 (n = 4). Swim bladder present.

Body strongly elongate, subcylindrical anteriorly; progressively more compressed posteriorly; depth exceeding width; body depth slightly exceeding length of upper jaw, 1.9 (1.7–1.9) times in head length. Nape and anterior body not arched. No tentacles on body or fins. Head mostly naked, without tentacles or papillae; cranium thin, cavernous, muciliferous canals well developed; small, deciduous cycloid scales confined to preopercle below and above suborbital ridge and on most of operculum (often lost through abrasion); snout, interorbit and occiput naked. Trunk and tail with deciduous, partly embedded, cycloid and weakly ctenoid scales with well-defined scale pockets, shape of pockets remain distinct when scales removed; scales present on pectoral-fin base, partly embedded, extending for about eye diameter onto pectoral fin, elongate oval on fin; membranes of dorsal, anal and pelvic fins naked; caudal fin naked or with basal scales over fin rays. Cycloid or weakly ctenoid scales on belly and prepelvic region, absent from isthmus and interpelvic area. Lateral line weakly sloping downward at tip of opercle, less than eye diameter from dorsal margin. Sensory pores of cephalic lateralis system very prominent, mostly covered with thin membrane. Underside of dentary with 3 sensory pores on each side; first pore well forward of anterior lacrimal spine, near dorsal margin of dentary; second pore beneath or just forward of posterior lacrimal spine, medial on dentary; third pore just forward of anterior margin of eye, near ventral margin of dentary; an additional, small, slit-like pore behind symphysial knob on inner surface of lower jaw on each side.

Mouth large, slightly oblique, forming an angle of about 20° to horizontal axis of head and body. Posterior margin of maxilla extended slightly beyond a vertical at posterior margin of pupil. Upper edge of posterior maxilla swollen laterally, forming a distinct ridge; central part of maxilla with 2 weak ridges radiating distally. Width of symphysial gap separating premaxillary tooth bands much greater than width of each band, subequal when mouth distended. Upper jaw with a dense band of minute, granular, conical teeth; some innermost teeth enlarged slightly, in a single series; band width similar anteriorly to posteriorly, broadest below posterior nostril. Tooth band of upper jaw anteriorly subequal to or slightly wider than that of lower jaw; widest portion of upper jaw much broader than any portion of lower jaw. Lower jaw with a weak symphysial knob, tooth patch slightly elevated at symphysis, widely spaced, enlarged, conical teeth in a single series extending along inner portion of posterior half of lower jaw, inner posterior teeth distinctly longer than longest teeth on upper jaw. Vomerine tooth patch V-shaped, head broadly rounded; teeth in 2 or 3 irregular rows, conical, similar in size to the largest teeth of upper jaw. Palatines narrow, elongate, subequal to eye diameter in length; teeth similar to vomerine teeth; vomer separated from palatine patch by less than half length of vomer; vomerine and palatine ridges well elevated above roof of mouth. Underside of lower jaw without ridges.

Dorsal profile of snout almost straight, not elevated, forming an angle of about 40° to horizontal axis of head and body. Spines of head reduced, rudimentary or absent. Nasal spine small, low, simple, free, acute distally, directed posteriorly and slightly dorsolateral. Ascending process of premaxilla not intruding into interorbital space, its posterior margin just short of anterior nostril in dorsal view. Interorbital ridges rudimentary, low, thin; interorbital region almost flat; spines associated with dorsal head simple, weak, often indistinct or absent. Preocular spine low, directed posteriorly. Parietal ridge thin, pronounced; nuchal spine short, pungent, directed posteriorly. Suborbital bone broad; muciliferous canals well developed, distinct, pores with sharply defined margins; part of bone slightly elevated below orbit, forming 1 or 2 weak ridges, 0–2 minute spines on ridges, indistinct, often embedded, 1 located just posterior to hind margin of eye in holotype; 2 well-developed lacrimal spines, directed posteroventrally, protruding slightly; anterior lacrimal spine smaller and more elevated than posterior spine; anterior ridge of lacrimal with a short spinous tip; spine of cleithral complex very short, indistinct, directed posterodorsally, partly embedded; 5 preopercular spines, subequal in size to each other and largest lacrimal spine, almost equidistant apart, uppermost spine almost continuous with suborbital ridge; upper 3 spines largely directed posteriorly, fourth spine directed posteroventrally, lowermost preopercular spine antrorse, directed ventrally to anteroventrally and often concealed; supplemental preopercular spine usually absent; opercular spines weak, apices short and pungent; opercular ridges thin but prominent, lower ridge arched and raised slightly; upper ridge arched upwards, diverging from anterior portion of lower ridge, partially embedded. Origin of first dorsal-fin spine above apex of lower opercular spine. Posterior margin of opercular membrane reaching a vertical through third to fourth dorsal-fin spine origin. Pectoral-fin base moderately convex, its origin (upper rays) well posterior to insertion of lower rays; posterior tip of fin just reaching vertical through first anal-fin spine (back to third anal spine in some paratypes). Pelvic fin when depressed, reaching barely more than halfway along the pelvic–anal distance; fin spine originating well in advance of origin of pectoral fin; fin bases barely separated, interpelvic distance subequal to half width of base, anus separated from anal fin by more than width of base, base subequal to distance between pectoral and pelvic bases; fin joined to abdomen by membrane at slightly less than half its length. Origin of first anal-fin spine under second to fourth dorsal-fin rays.

Color when fresh (based on AMS I 20437–002 and an unregistered Queensland specimen from the 1986 CSIRO survey): Body pale, pinkish on head, back, and tail; some paler blotches along sides of trunk; abdomen whitish with dark peritoneum visible; branchiostegal membranes white; pectoral fin with strong banded pattern, base pink with 3, pronounced, broad diagonal reddish bands separated by similar white diagonal bands, posterior reddish band marginal on fin; spinous dorsal fin uniformly pink, marginal membrane darker reddish brown; soft dorsal fin pinkish with evidence of darker reddish blotch on anterior outer two-thirds of fin; caudal fin pale pink to translucent with broad reddish margin; pelvic and anal fins white or pinkish; eye yellow with black pupil.

Color of preserved specimens: Body uniformly pale; peritoneum on abdomen bluish, covered by pale skin; eyes bluish black; stomach when everted bluish black; fin membranes and rays pale or translucent.

Size: Largest type 125.9 mm SL.

Distribution and habitat: Known only from the continental slope off eastern Australia in the Coral and northern Tasman seas. Ranges between Hinchinbrook Island (18°37–39'S, 148°05–07'E) and Port Jackson (33°S, 151°E) in 250–400 m depth, and possibly north to the Murray Isles (9°51'S, 144°09'E).

Etymology: Derived from a combination of the Latin *tri* (triple) and *fascia* (band) in allusion to the 3, reddish diagonal bands on the pectoral fin.

Remarks: *Lioscorpius trifasciatus* becomes the second known member of a former monotypic setarchid genus. It differs from its widely distributed Indo–West Pacific congener, *L. longiceps* (Figure 2), in having 3 anal-fin spines (rather than 2) and 5 rays (rather than 6), 13 gill rakers (rather than mainly 12), 3 diagonal red bands across the pectoral fin (rather than 1 band), and a strongly contrasted reddish caudal-fin margin (rather than a faint or indistinct margin). *Lioscorpius trifasciatus* also appears to differ morphometrically from *L. longiceps* ($n = 4$) of a similar size (89–124 versus 97–115 mm SL for the measured types) from Australian seas. These specimens of *L. longiceps* were collected off western Australia in the general geographic vicinity of the Ki Islands, the locality of the lectotype (Eschmeyer and Collette, 1966). The species are possibly sympatric in the northern Coral Sea (ca. 9–11°S) off northeastern Australia. *Lioscorpius trifasciatus* has smaller head dimensions (i.e. head length 38.7–42.3 versus 43.0–44.8% SL; orbit 7.4–8.2 versus 8.8–10.0% SL; upper jaw 19.1–20.7 versus 23.3–23.6% SL; and maxilla depth 5.3–6.1 versus 6.5–7.0% SL), a shorter predorsal-fin distance (36.2–38.8 versus 41.1–42.1% SL), a slightly longer caudal peduncle (length usually 18.9–19.7 versus 17.2–18.8% SL), some longer fin elements (i.e. longest pelvic-fin ray 18.6–19.8 versus 17.6–18.0% SL; first anal-fin spine 5.0–6.6 versus 3.8–4.9% SL; second anal-fin spine 10.4–12.7 and mainly exceeding 10.8 versus 8.7–10.3% SL). Two specimens of *L. trifasciatus* (AMS I 20437–002 and I 30094–001), collected from off New South Wales and with some darkish areas along the upper body, were considered to be conspecific with forms from central and southern Queensland. However, three specimens (QM I 20670) from the extreme northern end of its range, from near the Australia/New Guinea border (off the Murray Isles), differed from typical *L. trifasciatus* in having a stronger head spination, larger eye (orbit diameter 8.4–9.0 versus 7.4–8.2% SL in southern material), a white dorsal fin margin (rather than pale pinkish), and a white peritoneal cavity (rather than dark). These specimens were excluded from the type series, and additional fresh material from the northern Coral Sea is needed to assess their status.

Eschmeyer and Collette (1966) provided a diagnosis of the genus, and measurements, counts and a discussion of the synonymy of *L. longiceps*. They reported that the species is known widely from the Indo–Pacific, including the Philippines, Japan, Borneo, and the

Arafura Sea in depths of about 180–410 m. Meristics for their material (*n* = 27), based mainly on Philippine specimens, agree well with our smaller sample (*n* = 6): dorsal spine (XII) and anal-fin (II, 6) counts identical; 4 of their specimens had 23 pectoral-fin rays (rather than 24 or 25) and one had 9 soft dorsal-fin rays (rather than 10). Morphometric data varied more extensively, although the means were often similar (e.g. body depth given as 21–28 versus 22–24.6% SL, means 23.4 versus 23.7% SL; snout length given as 12–15 versus 13.3–14.6% SL, means 13.2 versus 13.9% SL; interorbital width given as 6–7 versus 6–6.6% SL, both means 6.4% SL). Five specimens from the Philippines (type specimens of *Macroscorpius pallidus* Fowler 1938) were measured to obtain values for the eight diagnostic ratios used to distinguish Australian *Lioscorpius* species. The longer predorsal distances observed in Australian *L. longicep*s (length 41.1–42.1% SL, mean 41.5% SL), compared to Eschmeyer and Collette's material (length given as 36–41% SL, mean 38.9% SL), were initially thought to be attributable to different methodologies (respective uses of horizontal versus point-to-point measurements). However, our data confirm that Philippine *L. longiceps* do have a shorter predorsal distance (length 38.8–40.3% SL, mean 39.3% SL) than populations from the western Indian Ocean. In addition, Philippine forms appear to have a relatively shorter head (length 41.5–43.7 versus 43–44.8% SL) and upper jaw (length 21.8–22.6 versus 23.3–23.6% SL), a smaller eye (orbit 8.5–9.1 versus 8.8–10% SL), and a narrower maxilla (depth 6.1–6.5 versus 6.5–7% SL). Clearly, more than a single species referable to *L. longiceps* may exist in the Indo–West Pacific.

Comparative material examined: *Lioscorpius longiceps*. AMS I 22821–025, 5 spec., 84.3–113.6 mm SL, northwest of Port Hedland (18°16'S, 118°12'E), eastern Indian Ocean, 298–320 m depth, coll. by FRV *Soela*, 11 Apr. 1982; CSIRO B 3306, 2 spec., 100.9–111.2 mm SL, southwest of Imperieuse Reef (18°7–11'S, 118°03–09'E), eastern Indian Ocean, 400–404 m depth, coll. by FRV *Soela*, 5 Feb. 1983; CSIRO CA 350, 96.8 mm SL, northwest of Port Hedland (18°21–24'S, 118°03'E), eastern Indian Ocean, 258–270 m depth, coll. by FRV *Courageous*, 20 May 1978; CSIRO CA 363, 69.4 mm SL, same data as CSIRO CA 350; CSIRO CA 364, 108.3 mm SL, same data as CSIRO CA 350; CSIRO CA 365, 101 mm SL, same data as CSIRO CA 350; CSIRO CA 4436, 102.3 mm SL, Scott Plateau (14°36–37'S, 121°47–49'E), eastern Indian Ocean, 300–304 m depth, coll. by FRV *Soela*, 16 Feb. 1984; CSIRO H 1700–03, 2 of 3 spec., 108.7–212.4 mm SL, northeast of Rowley Shoals (16°54'S, 120°22'E), eastern Indian Ocean, 405 m depth, coll. by FV *Striker*, 4 Apr. 1989; CSIRO H 2058–01, 99.3 mm SL, near Rowley Shoals (16°54'S, 120°22'E), eastern Indian Ocean, 405 m depth, coll. by FV *Striker*, 4 Apr. 1989; CSIRO H 4031–59, 3 spec., 78.2–95.2 mm SL, north of Cape Lambert (18°58'S, 117°12–15'E), eastern Indian Ocean, 248–253 m depth, coll. by FRV *Southern Surveyor*, 30 Aug. 1995; CSIRO H 4070–39, 88.6 mm SL, northwest of Port Hedland (18°12–15'S, 118°11–15'E), eastern Indian Ocean, 266–269 m depth, coll. by FRV *Southern Surveyor*, 8 Sep. 1995; CSIRO H 4071–09, 101 mm SL, southwest of Rowley Shoals (18°02–06'S, 118°11–15'E), eastern Indian Ocean, 388–392 m depth, coll. by FRV *Southern Surveyor*, 8

Sep. 1995; CSIRO H 4664–25, 119.4 mm SL, near Rowley Shoals (17°37–39'S, 119°E), eastern Indian Ocean, 310 m depth, coll. by FRV *Southern Surveyor*, 31 Aug. 1997; CSIRO H 5640–01, 123.7 mm SL, north of Exmouth Gulf (21°01–02'S, 114°20'E), eastern Indian Ocean, 394 m depth, coll. by FV *Comet*, 12 Oct. 1999; QM I 33899, 79.6 mm SL, northeast of Dampier (18°58'S, 117°12'E), eastern Indian Ocean, 248–253 m depth, coll. by S. Cook, 30 Aug. 1995. AMS I 20919–024, 105.2 mm SL, northeast of Raine Island (11°35'S, 144°4'E), Coral Sea, 400–420 m depth, coll. by AMS and AIMS party, 12 Feb. 1979; QM I 20652, 3 spec., 109.9–124.8 mm SL, east of Murray Isles (9°53'S, 144°23'E), western Pacific Ocean, 480 m depth, coll. by C. Jones, 28 May 1983.

Macroscorpius pallidus. Holotype—USNM 98890, 130.4 mm SL, Off Point Tagolo Light, northern Mindanao (8°48'N, 123°31'E), Philippines, 365 m depth, coll. by *Albatross*, 9 Aug. 1909; paratypes—USNM 98993, 4 of 14 spec., 94.0–117.8 mm SL, off Macabalan Pt. Light, northern Mindanao (8°38'N, 124°35'E), Philippines, 390 m depth, coll. by *Albatross*, 4 Aug. 1909.

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