SYNCLIDOPUS HOGANI, A NEW SPECIES OF SOLEID FISH FROM NORTHEASTERN QUEENSLAND, AUSTRALIA

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Johnson, J.W. & Randall, J.E. 2008 04 30: *Synclidopus hogani*, a new species of soleid fish from northeastern Queensland, Australia. *Memoirs of the Queensland Museum* **52**(2): 245–254. Brisbane. ISSN 0079-8835.

Synclidopus hogani is described as a new soleid fish from the Daintree River, northeastern Queensland. It differs from its single known congener, *S. macleayanus*, in having a lower median lateral-line scale count (87-97 versus 94-113), a distinctive colouration, which includes about 22-26 highly irregular, mostly discontinuous, transverse brown bands across the head and body, and three longitudinal rows of large dark brown spots, as well as a much smaller maximum size. The new species appears to be highly restricted in distribution and prefers tidal lower freshwater reaches of the river. It has not been recorded during numerous surveys of the Daintree estuary, surrounding coastal waters, or other estuarine or freshwater systems of northeastern Queensland. *Synclidopus* Chabanaud is redefined to include an important distinguishing feature of a free fleshy sheath that covers the anterior half of the lower jaw and the lower lip on the blind side.❒ *Pleuronectiformes, Soleidae, Synclidopus, Aseraggodes, new species, freshwater, Daintree River, Queensland.*

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Randall (2005) resurrected the soleid genus *Synclidopus* Chabanaud, 1943, from the synonomy of *Aseraggodes* Kaup, recognising the distinctiveness of the type species, *S. macleayanus* (Ramsay, 1881). He distinguished *Synclidopus* from *Aseraggodes* in having: the second lateral line on the ocular side of the head continuing dorsoanteriorly on the body, a deeper body, a shorter and more obtuse head, smaller eyes, its anus and genital papilla on the blind side, a higher number of lateral-line scales (96-113 versus 53-96), 7 dorsal pterygiophores anterior to fourth neural spine (versus 7-16; only one with 7 or 8), and the distinctive colour pattern of narrow dark bars. *Synclidopus macleayanus* commonly occupies estuarine as well as inshore marine habitats, whereas the numerous species of *Aseraggodes* are known only from marine habitats (Randall, 2005).

During a long-term monitoring program in freshwaters of the Daintree River, northeastern Queensland, evaluating populations of barramundi (*Lates calcarifer*) and associated fishes, an unusual soleid fish was collected and sent to the first author for identification. The specimen was initially identified as an undescribed species of *Aseraggodes*, however, on closer examination it was found to be more closely aligned with *Synclidopus*, as defined by Randall (2005). Comparisons revealed a previously overlooked character, a well-developed free fleshy sheath that covers the anterior half of the lower jaw and the lower lip, that is unique to this species and *S. macleayanus*. *Synclidopus* is thereby redefined to include this feature, and several proportional measurements and meristic values for the genus are revised to account for the new species and smaller specimens of *S. macleayanus* than were available for the generic diagnosis of Randall (2005). We describe herein the new species based on six specimens collected from the lower freshwater reaches of the Daintree River, northeastern Queensland, and redefine *Synclidopus* in the light of the newly recognised morphological feature and increased range of meristic and morphometric values observed in specimens of the two species.

MATERIALS AND METHODS

The holotype of the new species is deposited in Queensland Museum, Brisbane (QM); paratypes are also lodged in Australian Museum, Sydney (AMS), and Bishop Museum, Honolulu (BPBM).

Standard length (SL) is measured horizontally from anterior margin of upper lip to caudal-fin base (end of hypural plate). Body depth is maximum distance between bases of dorsal and anal fins; body width is maximum thickness midlaterally between ocular and blind surfaces (but not over abdomen). Predorsal, preanal and prepelvic lengths are point to point measurements, taken directly to snout tip. Head length (HL) is measured from anterior margin of upper lip to a vertical at fleshy posterior end of operculum. Preorbital length is the distance from front margin of upper eyeball (dark part of eye, hereafter termed only as eye) directly forward to anterior edge of head. Snout length is taken from the anterior margin of upper lip to nearest edge of upper eye. Eye diameter is the greatest diameter of lower eye (not fleshy cutaneous part). Interorbital width is the vertical distance between horizontal lines at ventral edge of upper eye and dorsal edge of lower eye. Upper-jaw length is measured on the blind side from anterior margin of upper lip to posterior edge of maxilla. Lengths of rays of median fins are measured from base of ray (not where it emerges from basal scaly sheath) in a straight line to the tip. Pelvic-fin length is taken from base of first ray to tip of longest ray.

Table 1 contains proportional measurements of the new species as percentages of standard length. Measurements expressed as ratios related to standard length, body depth or head length in the text are rounded to the nearest 0.05.

Lateral-line scales were counted on the ocular side, from caudal-fin base to branching point of lateral line on head (including scales anterior to dorsal end of gill opening). Some authors have quoted lateral-line scale counts for *S. macleayanus* to include only those to the dorsal end of the gill opening (Ogilby, 1916: 127; Munro, 1957: 17; Marshall, 1964: 464). These counts are approximately equivalent to counts presented here minus 10. Conversely, counts provided by Ramsay (1881) for *S. macleayanus* and Ramsay (1882) for *S. fluviatilis* (a junior synonym of the latter), include pored scales on caudal fin and are about equivalent to our counts plus 10. Scale counts above and below lateral line are highest obtained on ocular side in oblique row between lateral line and outer edge of scaly sheath at the base of dorsal and anal fins, respectively.

We follow Ochiai (1963: Text-fig. 1a) for terminology of cephalic lateralis system and count of dorsal pterygiophores anterior to fourth neural spine (incorrectly stated as third spine, since he overlooked neural spine of tiny first vertebra). Counts of abdominal vertebrae include first very small vertebra, not counted by some authors.

Where different, values for paratypes are given in parentheses following those of holotype.

Use of Cyanine Blue 5R (Acid Blue 115), as demonstrated by Saruwatari et al. (1997), facilitated detection of pores, sensory papillae, and cteni of scales.

SYSTEMATICS

Synclidopus Chabanaud, 1943

TYPE SPECIES. *Solea macleayana* Ramsay, 1881.

DIAGNOSIS. As per Randall (2005), except: Dorsal rays 62-68; anal rays 48-53; lateral-line scales 87-113; vertebrae 35-38; dorsal branch of lateral-line on head sometimes with posterior and/or anterior sharply-angled projections on anterior part of body beneath dorsal fin; scales on blind side of head anterior to jaws replaced by cirri; well-developed free fleshy sheath covering anterior half of lower jaw and lower lip on blind side; stout papillae along anterior margin of snout and ventral margin of head, extending narrowly onto blind side of head; body depth 2.15-2.70 in SL; HL 4.25-5.50 in SL; eye diameter 6.90-9.75 in HL.

REMARKS

The diagnosis of *Synclidopus* provided by Randall (2005) was based on specimens of *S. macleayanus* measuring 72-149mm SL. *Synclidopus hogani* is only known from material of 48.0-61.6mm SL, so proportional measurements of additional material of *S. macleayanus* in this size range were obtained for the generic diagnosis and for direct comparison of the two species. This additional data produced significant expansion of some morphometric values for the genus, as might be expected with ontogenetic development. Small specimens of *S. macleayanus* usually lacked development of the sharply-angled posterior projection to the dorsal branch of lateral-line on the anterior part of the body, as noted in larger specimens by Randall. Also, some large specimens examined here had a short anterior horizontal projection instead of, or in addition to, a posterior one.

Synclidopus is closely related to the speciose *Aseraggodes* (see Randall, 2005), but is readily distinguished by the well-developed free fleshy sheath that covers the anterior half of the lower jaw including the lower lip (no free sheath in *Aseraggodes*), stout papillae along the anterior margin of the snout and ventral edge of the head (long slender cirri in *Aseraggodes*), and strikingly banded colouration (variously spotted, blotched

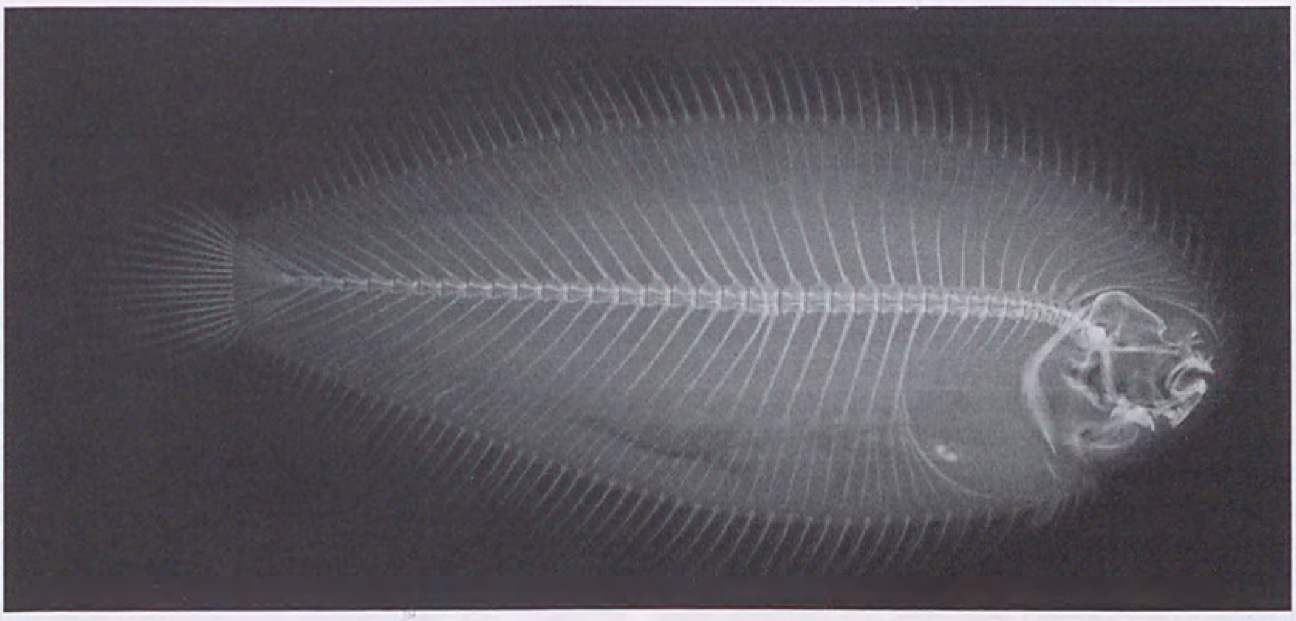

FIG. 1. Radiograph image of holotype of *Synclidopus hogani* sp. nov., QM I.38104, 61.6mm SL.

or uniform colouration in *Aseraggodes*). A combination of three branches of the lateral line on the ocular side of the head (the dorsal branch being long and vertical), small eyes, high number of lateral-line scales, scales on blind side of head anterior to jaws replaced by cirri, pelvic-fin rays 5 (3-4, rarely 5 in *Leptachirus*, 4-5 in *Pardachirus*); ocular-side pelvic fin broadly attached to the first anal ray (not attached in *Leptachirus* or *Pardachirus*, except in *P. poropterus*), absence of prominent pores at the base of the rays of the median fins (pores present in *Pardachirus*), 7 dorsal pterygiophores anterior to the fourth neural spine (7-16, only one with 7 or 8, in *Aseraggodes*, 7-11 in *Leptachirus*, 10-18 in *Pardachirus*), and banded colour pattern are also useful in separating it from *Aseraggodes*, *Leptachirus* and *Pardachirus* (Randall, 2005, 2007; Randall & Johnson, 2007; Randall & Desoutter-Meniger, 2007). Species of *Synclidopus* are found in shallow freshwater, estuarine, or inshore marine habitats, whereas species of *Aseraggodes* are found only in marine habitats, in various depths from shallows to over 100m. *Leptachirus* species are found in freshwater or upper estuarine conditions (Randall, 2007). Most *Pardachirus* species are marine, except the estuarine *P. rautheri* and estuarine/lower freshwater *P. poropterus* (Randall & Johnson, 2007).

Synclidopus hogani sp. nov.
(Fig. 1-4, 6; Tables 1-3)

MATERIAL. HOLOTYPE. QM I.38104, 61.6mm SL, female, Australia, Queensland, Daintree River, upstream from Daintree township, 16°14.69'S, 145°18.44'E, 0.4-0.8 m, electrofishing, A. Hogan, J. Johnson and M. Ekins, 28 November 2006. PARATYPES. AMS I.44260-001, 56.6mm; BPBM 40656, 56.0mm; QM I.38105, 2: 50.2–58.8mm, all with same data as holotype; QM I 36402, 53.0mm, Daintree River, upstream from Daintree township, 16°14.75'S, 145°18.4'E, maximum depth 50cm, electrofishing, W. Hagedoorn, 18 June 2002.

OTHER MATERIAL (NON-TYPE). QM I.38117, 48.0mm, same data as holotype, fixed in alcohol for possible future DNA analysis.

DIAGNOSIS. Dorsal-fin rays 64-68; anal-fin rays 48-52; lateral-line scales 87-97, median 94; abdominal vertebrae 10; total vertebrae 35-36; dorsal pterygiophores anterior to fourth neural spine 7; body depth 2.35-2.70 in SL; HL 4.25-4.85 in SL; eye diameter 6.90-8.25 in HL; stout papillae (not long slender cirri) on anterior edge of snout and ventral edge of head (visible from above on ocular side); scales on blind side of head replaced by cirri anterior to region just posterior to rear of jaws; straight lateral line midlaterally on both sides, forming three branches on ocular side of head: ventral preopercular branch, vertical dorsal branch nearly to base of dorsal fin, and short horizontal continuation of main lateral line; distinct free fleshy sheath on blind side, extending over front half of lower jaw, including lower lip and sometimes part of upper lip when mouth fully closed; ocular side with about 22-26 irregular, mostly discontinuous, transverse brown bands slightly wider than pale interspaces, and three longitudinal rows of 5-6 large diffuse dark brown spots.

DESCRIPTION. Dorsal-fin rays 65 (64-68); anal-fin rays 51 (48-52); dorsal- and anal-fin rays unbranched; caudal-fin rays 18, 14 branched, 3 double-branched at tips; pelvic rays 5, unbranched; lateral-line scales 94 (87-97), including about 8 extending horizontally from upper end of gill opening to point of branching; lateral line on head with vertical branch of 16 (15-17) scales, ventral branch of 8 (6-8) scales over preopercle, and terminal horizontal branch of 6 (6-8) pored scales; lateral line continuing onto caudal fin nearly to posterior end of fin; scales above lateral line in oblique row to upper edge of scaly basal sheath of dorsal fin about 38; scales below lateral line about 44; abdominal vertebrae 10, caudal vertebrae 26 (25-26, one paratype with one and another with two fused caudal vertebrae bearing multiple neural and haemal spines, each counted as two separate vertebrae); total vertebrae 36 (35-36); first two dorsal proximal pterygiophores joined to thicker bone (the erisma) and counted as one pterygiophore (branched distally to support first two dorsal-fin rays); seven dorsal pterygiophores anterior to fourth neural spine (one anterior to second neural spine, four between second and third neural spines, and two between third and fourth neural spines); ventroanterior margin of urohyal forming an angle of about 85°, inner angle well rounded (Fig. 4).

Body depth 2.45 (2.35-2.70) in SL; body thin, width (thickness) 4.0 (4.15-4.50) in body depth; HL 4.85 (4.25-4.85) in SL; no caudal peduncle (base of posteriormost anal-fin ray slightly posterior to base of ventral caudal-fin ray); depth of caudal-fin base 1.55 (1.45-1.75) in HL; snout not overlapping and only projecting slightly anterior to lower lip when mouth closed; snout length 3.10 (3.05-3.25) in HL; preorbital length 3.55 (3.55-4.00) in HL; eye diameter 7.45 (6.90-8.25) in HL; least vertical interorbital width 10.60 (10.90-13.45) in HL; upper eye overlapping one-third (one-third to one-half) of lower eye; horizontal line projected anteriorly from dorsal end of gill opening passing one eye diameter below lower eye.

Posterior end of mouth on ocular side slightly ventral to lower margin of orbit and slightly posterior to anterior margin of orbit, jaw angling upward to point slightly anterior to centre of lower eye, then horizontal to ventral

TABLE 1. Proportional measurements as percentage of standard length and meristic values for type specimens of *Synclidopus hogani*.

	Holotype	Paratypes				
	QM I.38104	AMS I.44260	BPBM 40656	QM I.38105	QM I.38105	QM I.36402
Standard length (mm)	61.6	57.3	56.1	60.0	50.2	53.0
Body depth	40.7	40.3	37.0	38.8	42.8	40.2
Body width	10.2	9.0	8.2	9.4	9.6	6.6+
Head length	20.6	21.4	21.3	21.1	23.5	20.7
Snout length	6.7	6.7	7.0	6.5	7.2	6.8
Preorbital length	5.8	5.5	5.4	5.3	6.6	5.8
Eye diameter	2.8	2.7	2.7	2.6	3.0	3.1
Interorbital width	1.9	1.6	1.8	1.7	1.8	1.9
Upper-jaw length	5.7	5.5	5.9	5.3	7.0	7.2
Base of caudal fin	13.1	13.1	13.0	12.8	13.3	14.2
Predorsal length	7.6	8.0	8.0	7.7	8.2	7.7
Preanal length	21.1	23.9	22.3	23.6	26.1	24.7
Prepelvic length	16.7	18.2	17.9	17.3	21.7	17.0
First dorsal ray	3.7	3.4	3.2	3.2	3.8	3.6
Longest dorsal ray	11.2	11.5	10.4	11.2	12.0	12.3
First anal ray	6.5	6.4	5.4	6.0	6.8	6.6
Longest anal ray	11.2	9.9	10.0	11.2	12.0	11.5
Caudal-fin length	20.6	21.4	19.6	19.4	23.9	23.2
Pelvic-fin length	9.9	11.0	9.3	9.7	8.2	10.6
Dorsal rays	65	68	68	67	65	63
Anal rays	51	52	52	51	48	48
Caudal rays	18	18	18	18	18	18
Lateral line	94	95	97	96	93	87
Vertebrae	10+26	10+25	10+26	10+26	10+25	10+26

flap of upper lip (which does not overlap lower lip); cleft of mouth on blind side strongly curved; free fleshy sheath profusely covered in fleshy unbranched papillae extending from chin, over anterior half of lower lip, and part of upper lip on blind side when mouth fully closed; scales covering posterior end of ocular-side maxilla to level below centre of lower eye; length of blind-side upper jaw 3.65 (2.9-4.0) in HL; curved band of villiform teeth on blind side of both jaws, broader centrally, in at least twelve rows at widest part; ocular-side anterior nostril tubular, in slight depression anterior to horizontal from dorsal third of lower eye and ventral half of interorbital space, slightly tapering, approximately one-half eye diameter in height, located above upper lip at point about one-third distance between anterior margin of lower eye to snout tip; posterior nostril of ocular side a slit in labial groove before base of dorsal part of lower eye; tubular posterior nostril of blind side flat, strongly tapering, adherent to head for most of its length, twice size of blind-side anterior nostril, in shallow depression dorsoposterior to anterior nostril, internarial distance about 1.6 times cutaneous diameter of lower eye.

Scales ctenoid on both sides of body, most on body and postorbital part of head with 6-8 moderately long ctenii that project posterior to scale margins, longest ctenii about 4-6 times in length of scale; scales on ocular-side snout small and with fewer ctenii, anteriormost without ctenii, becoming short stout papillae near and at margin of snout and ventral margin of head; scales on blind side of head altering to long fleshy cirri before posterior end of jaws, cirri profusely covering region above and below jaws on blind side, becoming stouter and more papillae-like closer to anterior margin of head and on fleshy sheath covering anterior part of lower jaw; eyes separated by 2-3 rows of scales, with 2-3 rows of scales extending onto medial margins of eyes; series of about 34 slender cirri along opercular margin of gill opening on blind side, but no cirri on ocular side; small scales in 3-4 rows extending onto bases of dorsal- and anal-fin rays; caudal-fin base with about 14 oblique rows of progressively smaller scales extending out on fin to within about one-fourth distance to posterior margin.

Lateral line straight on both sides along middle of body, forming three branches on ocular side of head: long dorsal branch extending vertically close to base of dorsal fin, short ventral preopercular branch, and straight anterior branch projecting toward dorsal margin of upper eye; cephalodorsal sensory line submarginal on ocular side of snout, mostly evident as thin groove; lateral line extending onto caudal fin dorsal to ninth ray, nearly to posterior margin of fin; lateral line of blind side extending onto head as series of sensory papillae (obscured anteriorly by cirri), and not dividing; cephalodorsal sensory line on blind side also obscure because of cirri.

Dorsal fin originating anteriorly on snout, first ray not prolonged, dorsal-fin origin anterior to horizontal through ventral margin of upper eye; predorsal length 2.70 (2.65-2.90) in HL; first dorsal-fin ray 5.50 (5.75-6.60) in HL; longest dorsal-fin ray 1.85 (1.70-2.05) in HL; anal-fin origin below base of about fourteenth dorsal-fin ray, preanal length 4.75 (3.85-4.50) in SL; first anal-fin ray 3.20 (3.15-3.95) in HL; longest anal-fin ray 1.85 (1.80-2.15) in HL; dorsal- and anal-fin rays on both sides with thin membranous ridge extending from bases to at least three-fourths distance to ray tips, ridges more well developed on blind side, first nine dorsal-fin rays on blind side with fleshy cirri on medial edges of ridges; membranous fold on blind side of each fin ray forming a pocket-like space posteriorly, membranous tissue with inner transverse fleshy ridges that are often associated with perforations through the membrane; tips of dorsal- and anal-fin rays free of membrane except for five anteriormost dorsal-fin rays; anus ventroanterior to first anal-fin ray, rimmed with fleshy papillae; genital papilla on blind side at posterior margin of anus, situated at immediate base of first anal-fin ray, not connected to anal or pelvic fins by membrane; caudal fin rounded, but slightly pointed medially, 4.85 (4.20-5.15) in SL, not broadly connected by membrane to dorsal and anal fins; ocular-side pelvic fin on ventral edge of body, the origin at gill opening, the last membrane broadly attached to first anal-fin ray; blind-side pelvic fin about one fin-ray width posterior to origin of ocular-side fin, ending short distance before anus; third and fourth pelvic-fin rays longest, fin length 2.10 (1.95-2.90) in HL.

Colour of ocular side of female holotype (Figs 2A, 3, 4A-B) pale creamy brown with numerous (about 25, but difficult to count accurately), irregular, diffuse, transverse darker brown bands about equal to eye diameter in width, many branching, most not continuous across body depth, separated by pale interspaces of lesser width; three longitudinal rows of five or six large, poorly-defined, dark brown spots, most vertically elongate, one row below base of dorsal fin, one above base of anal fin, and one along lateral line; brown streaks in dorsal- and anal-fin rays, most along every other ray and adjacent membranes; caudal fin pale with small dark spots or streaks, and three large diffuse brown spots across base; colour of blind side pale yellowish cream, becoming pale orange over abdomen. Paratypes with about 22-26 transverse bands, the latter mostly lighter in colour than in the holotype. Two paratypes have the longitudinal rows of large dark brown spots on the body more distinct than in the other type specimens.

ETYMOLOGY. Named *hogani* for Alf Hogan, Fisheries Biologist, Queensland Department of Primary Industries and Fisheries Research Station, at Walkamin, Queensland. Alf has made a major contribution to the understanding of freshwater fishes of north Queensland over the last 30 years. He has added many rare and poorly-known fishes to museum collections and his electrofishing skills were invaluable in the capture of type material of this species.

DISTRIBUTION

Known only from the type locality (Fig. 6) in tidal lower freshwater reaches of the Daintree River, upstream from the township of Daintree (approximately 16°14.7'S, 145°18.4'E).

COMPARISON

The new species is distinguished from its only known congener, *S. macleayanus* (Ramsay, 1881), primarily by its lower lateral-line scale count (87-97, median 94 versus 94-113, median 101, Table 2), colouration, and much smaller maximum size attained. *Synclidopus hogani* generally has a pattern of dark bands on a pale background, however the bands are fewer (about 22-26, but difficult to count accurately), highly irregular, diffuse, mostly discontinuous, variable in width, not strongly contrasting with the paler interspaces, and pale tan to dark chocolate brown with light creamy brown interspaces in life. *Synclidopus macleayanus*, in contrast, has more numerous bands (26-40, mode 32, smaller specimens with bands more numerous than in adults) that are regular, well-defined, some forked, but most unbroken, starkly contrasting with pale interspaces, and are dark charcoal grey-brown with whitish to pale lavender-grey interspaces in life (Fig. 5). In addition, *S. hogani* has three longitudinal rows of large poorly-defined dark brown spots that are missing in *S. macleayanus*. Morphology of the two species is very similar, however, on average *S. hogani* has a slightly longer head and larger eyes (Table 3). The two species are allopatric, with *S. macleayanus* known from the east coast of Australia between the Burnett River mouth, Qld (24°40'S) and Sydney Harbour, NSW (33°50'S), including Lord Howe Island. Hoese et al. (2006: 1843) reported the range of this species as Gulf of Carpentaria to Sydney, but the single Gulf of Carpentaria record was based on a mislabeled specimen from Moreton Bay. The Daintree River is approximately 1200km north of the northern extremity of the known range of *S. macleayanus*. The maximum reported size of *S. macleayanus* is 280mm TL (Ogilby, 1916), whereas the largest known specimen of *S. hogani* is the 74.3mm TL female holotype. The latter has a relatively large ovary (12mm in length), so is estimated to be close to maturity.

DISCUSSION

All type material of *S. hogani* was collected on a broad shallow bank that occupies much of the southern side of the Daintree River, several kilometers upstream from the Daintree township (Fig. 6). They were taken on coarse sand and gravel substrate, which included numerous fallen

TABLE 2. Frequency of lateral-line scale numbers in material examined of *Synclidopus* species.

	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
hogani	1	-	-	-	-	-	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
macleayanus	-	-	-	-	-	-	-	1	2	2	-	2	3	5	5	3	3	2	2	1	1	1

TABLE 3. Comparison of selected relative body measurements in specimens of *Synclidopus hogani* and *S. macleayanus* of a similar size range.

Ratio	*S. hogani* (n = 6)	*S. macleayanus* (n = 5)
SL (mm)	50.2-61.6	54.5-76.0
Head length in SL	4.25-4.85 (mean 4.70)	4.70-5.30 (mean 5.00)
Body depth in SL	2.35-2.70 (mean 2.50)	2.25-2.60 (mean 2.40)
Eye diameter in HL	6.90-8.25 (mean 7.75)	7.65-9.75 (mean 8.45)

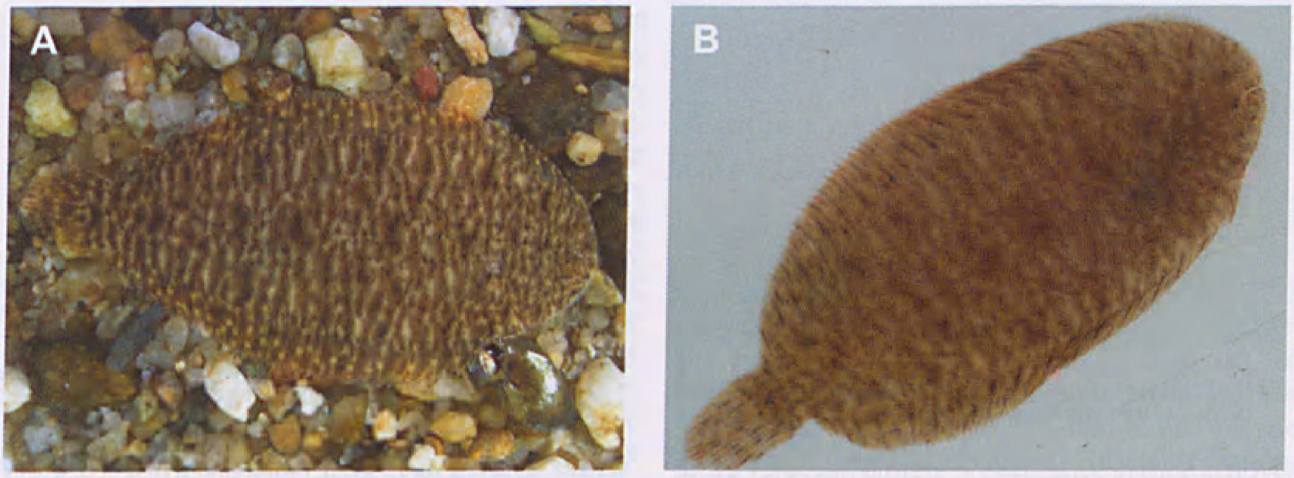

FIG. 2. Type specimens of *Synclidopus hogani* sp. nov. in life. A, Holotype, QM I.38104, 61.6mm SL; B, Paratype, QM I.38105, 50.2mm SL.

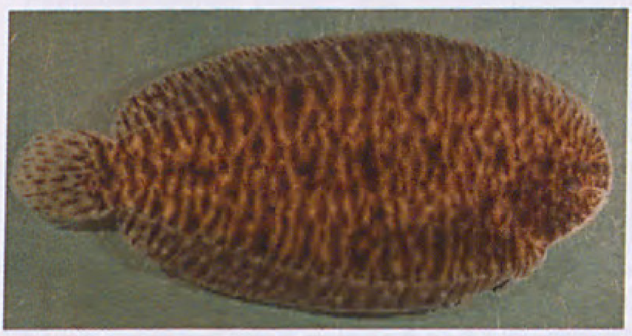

FIG. 3. Holotype of *Synclidopus hogani* sp. nov., QM I.38104, 61.6mm SL, preserved.

leaves and the open shells of freshwater bivalve molluscs. The riverine environment at the type locality is flowing, clear and fresh (being about five or six kilometres upstream from the brackish zone), but is clearly subject to tidal influence, with about a 75cm rise and fall. Physical data taken with the holotype on 28 November 2006 included: conductivity 59.6-60.6 μS/cm (approximately 30 ppm), pH 6.8, temperature 29°C, dissolved oxygen 6.5 ppm, and turbidity 0.8 NTU. Salinity at the type locality was similarly low when paratype QM I.36402 was collected in June, 2002 (conductivity was 75 μS/cm, or 37.5 ppm). Other fishes recorded within about 300m of the type locality on 28 November 2006 included *Anguilla reinhardtii*, *Megalops cyprinoides*, *Nematalosa erebi*, *Chanos chanos*, *Neosilurus ater*, *Arrhamphus sclerolepis*, *Melanotaenia splendida splendida*, *Pseudomugil signifer*, *Notesthes robusta*, *Lates calcarifer*, *Ambassis agassizii*, *Ambassis miops*, *Hephaestus fuliginosus*, *Mesopristes argenteus*, *Glossamia aprion*, *Caranx sexfasciatus*, *Leiognathus equulus*, *Lutjanus argentimaculatus*, *Gerres filamentosus*, *Acanthopagrus australis*, *Toxotes chatareus*, *Mugil cephalus*, *Awaous acritosus*, *Glossogobius* sp. 1 (of Allen et al., 2002: 269), *Redigobius bikolanus*, *Giuris margaritacea* and

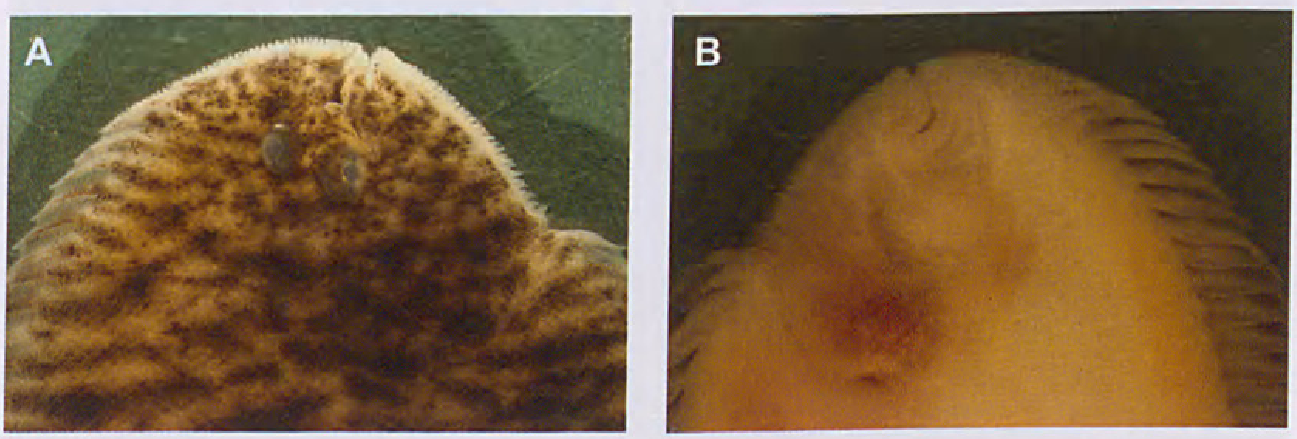

FIG. 4. Holotype of *Synclidopus hogani* sp. nov., QM I.38104, 61.6mm SL. A, Dorsal view of head, showing robust papillae; B, Ventral view of head, showing numerous papillae and fleshy sheath covering anterior part of lower jaw.

FIG. 5. *Synclidopus macleayanus*, BPBM 39454, 149mm SL, off Sydney, NSW.

Hypseleotris compressa. Estuarine crocodiles, *Crocodylus porosus*, are also well known from the area.

The gut contents of one paratype of *S. hogani* included fragments of insect larvae and numerous sand grains.

Some soles of the genus *Aseraggodes*, and more particularly *Pardachirus*, are known to repel predators and possibly stun potential prey items using a powerful crinotoxin exuded from the skin or specialised pores at the bases of rays of the median fins (e.g. Clark & Chao, 1973; Randall, 2002; Randall & Meléndez, 1987). The toxin is reported as having a milky white appearance, bitter taste, and lethal effect on small fishes if they are confined with it in a small body of water. Experiments to determine whether *S. hogani* had this capacity were conducted in the field shortly after collection of the type specimens. All were landed alive and well, and to minimise stress they were retained in a large, shaded and well-aerated container before the tests. Attempts were made to induce production of the toxin by gently and repeatedly massaging the body and median fins of two specimens, however, no milky exudate was visibly evident, and clear mucus from the body and fins had no bitter taste. These fish were then immediately introduced to a vessel containing about one litre of water, eight small empire gudgeons (*Hypseleotris compressa*), and four small Pacific blue-eyes (*Pseudomugil signifer*). After one hour all fish were healthy and showing no signs of stress. In case electric shock from the electrofishing gear had caused the *S. hogani* to discharge and exhaust their reserves of toxin, we repeated the process after two days, but the same results were obtained. We therefore conclude that *S. hogani* produces no significant amounts of toxin externally through the skin or pores, or at least none of a similar nature to that reported for *Pardachirus* or some *Aseraggodes* species.

FIG. 6. Daintree River, looking downstream to type locality of *Synclidopus hogani*.

Synclidopus hogani has been collected in mid June, early in the dry season, in August, and at the end of November, which usually immediately precedes the wet season. Attempts to survey the type locality in April and other wet season periods were unsuccessful due to high river levels and strong flows. Having been found in the same reach of the river at widely separated times of the year, the species obviously occupies the tidal lower freshwater reaches for much if not all of the year, and thus seems to prefer freshwater rather than brackish habitats. The estuary and beaches adjacent to the Daintree River mouth were also targeted for flatfishes by dragging heavily weighted seines with large cod ends. While these were effective in producing numerous specimens of other small flatfishes (*Paraplagusia bilineata*, *Pseudorhombus arsius* and *P. elevatus*) and flatheads (*Platycephalus endrachtensis* and *P. fuscus*), no additional specimens of *S. hogani* or other soleids were taken. Other surveys of the Daintree River estuary (Russell et al., 1998) and other estuarine systems of northeastern Queensland (e.g. Blaber, 1980; Coles et al., 1993; Russell & Hales, 1993; Russell et al., 1996; Russell et al., 2000) using beam trawl and small-meshed seines have captured various soleids, including *Brachirus orientalis*, *B. muelleri*, *Paradicula setifer*, *Pardachirus rautheri* and *Soleichthys heterorhinos*, but have been similarly unsuccessful in collecting *S. hogani*. Surveys and regular long-term monitoring programs in freshwater reaches of all other rivers in the wet tropics region of northeastern Queensland using electrofishing gear have also failed to produce any specimens of this species.

OTHER MATERIAL.*Synclidopus macleayanus*. 33 specimens, 54-168mm SL. New South Wales: BPBM 39454, 149mm, off Sydney. Queensland: QM I.621, 2: 65-76mm, Brisbane River; QM I.1664, 135mm, Moreton Bay; QM I.1665, 121mm, Moreton Bay; QM I.1666, 100mm, Moreton Bay; QM I.2504, 92mm, Cowan Cowan, Moreton Bay; QM I.3344 121mm, S Qld coast; QM I.3367 143mm, S Qld coast; QM I.5050, 93mm, Clontarf, Moreton Bay; QM I.9484, 106mm, Gneering Shoals, off Mooloolaba; QM I.9485, 58mm, Brisbane River; QM I.9788, 112mm, E of Burleigh Heads; QM I.9789, 100mm, E of Burleigh Heads; QM I.10596, 3: 100-118mm, Moreton Bay; QM I.12360, 113mm, Moreton Bay; QM I.12361, 105mm, Moreton Bay; QM I.12987, 2: 107-108m, Moreton Bay, off Redcliffe; QM I.13089, 99mm, NE of Cape Moreton lighthouse; QM I.14514, 2: 90-93mm, Moreton Bay, off Redcliffe; QM I.19382, 101mm, Moreton Bay, off Brisbane River mouth; QM I.23877, 135.5mm, Burnett River mouth; QM I.25336, 54mm, Brisbane River mouth; QM I.26373, 2: 88-94.5mm, Deception Bay, Moreton Bay; QM I.30669, 105mm, Moreton Bay, N end of Western Banks; QM I.30687, 69.5m, Moreton Bay, shell banks S of Bribie Island; QM I.34194, 108mm, E of Southport; QM I.38114, 168mm, 13 miles E of Kolan River mouth, 24°40'S 152°25'E.

ACKNOWLEDGEMENTS

We thank Alf Hogan and Terry Vallance, Walkamin Fisheries Research Station, for assistance in collecting most of the type material, for advice on habitats in the Daintree River and for loan of field equipment. We also thank Wayne Hagedoorn, Northern Fisheries Research Station, Cairns, for advice on unpublished results of electrofishing surveys in the Daintree River and for sending the first specimen of the new species for identification. Merrick Ekins assisted with field surveys of the Daintree River and adjacent coastal waters. Mark McGrouther and Amanda Hay, Australian Museum, kindly x-rayed some of the type specimens.

LITERATURE CITED

ALLEN, G.R., MIDGLEY, S.H. & ALLEN, M. 2002. Freshwater fishes of Australia. Western Australian Museum, Perth. 394 pp.

BLABER, S.J.M. 1980. Fish of the Trinity Inlet system of north Queensland with notes on the ecology of fish faunas of tropical Indo-Pacific estuaries. Australian Journal of Marine and Freshwater Research 31: 137-146.

CHABANAUD, P. 1943. Notules ichthyologiques (Sixieme serie). Bulletin du Museum National d'Histoire Naturelle 15: 289-293.

CLARK, E. & CHAO, S. 1973. A toxic secretion from the Red Sea flatfish *Pardachirus* marmoratus (Lacépède). Bulletin of the Sea Fisheries Research Station (Haifa) 60: 53-56.

COLES, R.G., LEE LONG, W.J., WATSON, R.A. & DERBYSHIRE, K.J. 1993. Distribution of seagrasses, and their fish and penaeid prawn communities, in Cairns Harbour, a tropical estuary, northern Queensland, Australia. Australian Journal of Marine and Freshwater Research 44: 193-210.

HOESE, D.F., BRAY, D.J., PAXTON, J.R., & ALLEN, G.R. 2006. Fishes. In: Beesley, P.L. & Wells, A. (eds) Zoological Catalogue of Australia. Volume 35, Parts 1-3. ABRS & CSIRO Publishing, Australia.

MARSHALL, 1964. Fishes of the Great Barrier Reef and coastal waters of Queensland. Angus & Robertson, Brisbane. 566 pp.

MUNRO, I.S.R. 1957. Handbook of Australian fishes. No. 18: 73-76. Fisheries Newsletter, December 1957: 17.