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著者	MOTOMURA Hiroyuki, LAST Peter R., YEARSLEY Gordon K.
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***Scopelarchoides krefftii* (Actinopterygii: Aulopiformes:
Scopelarchidae) from off Tasmania, Australia:
First Records from Outside the South Atlantic Ocean**

Hiroyuki Motomura¹, Peter R. Last² and Gordon K. Yearsley²

¹ *The Kagoshima University Museum, 1-21-30 Korimoto, Kagoshima, 890-0065 Japan*

E-mail: motomura@kaum.kagoshima-u.ac.jp

² *CSIRO Marine and Atmospheric Research, GPO Box 1538, Hobart,*

Tasmania 7001, Australia

E-mail: peter.last@csiro.au (PRL); gordon.yearsley@csiro.au (GKY)

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Three specimens (146.9–190.2 mm standard length) of the scopelarchid *Scopelarchoides krefftii* Johnson, 1972, previously known only from the type series from the South Atlantic, are documented from off Tasmania, Australia (600–820 m depth). The smallest specimen represents the southernmost record (44°16'S) of the species. This range extension of approximately 10,000 km indicates that *S. krefftii* is widely distributed along the Subtropical Convergence. A photograph and the first description of the coloration of *S. krefftii* are presented.

Key Words: Teleostei, Aulopiformes, Scopelarchidae, *Scopelarchoides krefftii*, new record, Australia, Subtropical Convergence.

Introduction

The scopelarchid fish *Scopelarchoides krefftii* Johnson, 1972 was originally described from 10 specimens (holotype, 159.0 mm standard length; nine paratypes, 52.6–187.5 mm) taken at five localities in the South Atlantic Ocean bounded by 34° and 41°S, and 48° and 07°W (Johnson 1972). Subsequently, Johnson (1974b) revised the Scopelarchidae, recognizing four genera and 17 species. *Scopelarchoides krefftii* is distinguished from all other species of the family in having the pectoral fin distinctly shorter than the pelvic fin, the pelvic-fin origin anterior to a vertical through the first dorsal-fin origin, lingual teeth occurring over the basihyal and the first basibranchial, 58 or 59 lateral-line scales, and pigment stripes along the lateral line (Johnson 1974b).

Since Johnson's (1972) original description, neither additional specimens nor new records of *S. krefftii* have been reported in literature. During an ichthyological survey off northeastern Tasmania, Australia, one specimen (176.2 mm) of *S. krefftii* was collected by midwater trawl from off Cape Barren Island at a depth of 600 m. Later, two additional specimens (146.9 and 190.2 mm) were collected in the vicinity of Pedra Branca Seamount, off southern Tasmania, at depths of 773–820 m by midwater and demersal trawls. These specimens represent the first records outside the South Atlantic Ocean and the southernmost record (44°16'S) of the species. Johnson (1972) examined preserved specimens only, and the fresh coloration of the

species has until now been unknown. The first detailed color description of *S. krefftii* is provided here, based on photographs of the two Pedra Branca specimens taken before preservation. In addition, a photograph of *S. krefftii* is also presented to improve on the simple line drawings of the species provided by Johnson (1972, fig. 1; 1974b, fig. 42).

Methods

Counts and measurements follow Hubbs and Lagler (1947) and Johnson (1972). Standard length is expressed as SL. The last two soft rays of the dorsal and anal fins, being associated with a single pterygiophore, are counted in each fin as a single ray. Descriptions related to fin-ray structures and lengths are based on the two smaller specimens (CSIRO H 3165-01, 146.9 mm SL and CSIRO CA 3228, 176.2 mm SL) because all fin rays of the largest specimen (CSIRO H 2710-01, 190.2 mm SL) are damaged. Osteological characters were observed from radiographs. Color terminology follows JCE (2001). In preparing the original description of *S. krefftii*, Johnson (1972) examined two adults (holotype, 159.0 mm SL, and a paratype, 187.5 mm SL) and eight juveniles (paratypes, 52.6–68.0 mm SL). Morphometric values of the Tasmanian specimens were compared only with those of Johnson's adult specimens to avoid ontogenetic bias. The Tasmanian specimens, along with the radiographs and color transparencies, have been deposited in the Australian National Fish Collection at the Commonwealth Scientific and Industrial Research Organisation's Marine and Atmospheric Research laboratories in Hobart, Tasmania, Australia (CSIRO). Other institutional abbreviations used in this paper are: AMS, Ichthyology, Australian Museum, Sydney, Australia; and ISH, Institut fuer Seefischerei, Bundesforschungsanstalt für Fischerei, Hamburg, Germany (currently ZMH, Zoologisches Institut und Zoologisches Museum der Universität Hamburg, Hamburg, Germany).

Taxonomic Account

Scopelarchoides krefftii Johnson, 1972
[New English name: Twin-striped Pearleye]
(Figs 1, 2)

Scopelarchoides krefftii Johnson, 1972: 37, fig. 1 (type locality: South Atlantic, 34°01'S, 47°39'W); 1974a: 453 (key only); 1974b: 133, fig. 42 (diagnosis); 1982: 165 (distribution only); 1986: 266 (key only).

Material examined. CSIRO CA 3228, 1 specimen (176.2 mm SL), southwest of Cape Barren Island, off Tasmania, Australia, 40°43'S, 148°58'E, 600 m depth, midwater trawl, CSIRO, FRV *Soela*, 17 January 1982; CSIRO H 2710-01, 1 specimen (190.2 mm SL; Fig. 1), Pedra Branca Seamount, off Tasmania, Australia, 44°15'S 147°08'E to 44°16'S 147°12'E, 773 m depth, midwater trawl, A. Graham, FRV *Southern Surveyor*, 10 July 1991; CSIRO H 3165-01, 1 specimen (146.9 mm SL), "Northern Sister Hill", southeast of Pedra Branca Seamount, off Tasmania, Australia, 44°16'S,



Fig. 1. *Scopelarchoides krefftii* Johnson, 1972, CSIRO H 2710-01, 190.2mm SL, Pedra Branca Seamount, off Tasmania, Australia.

147°14'E, 820 m depth, orange roughy trawl, D. Whennan, FRV *Barameda*, 5 September 1992.

Description. Proportional measurements of the Tasmanian specimens of *S. krefftii*, along with data for the holotype and an adult paratype of the species (from Johnson 1972), are given as percentages of SL in Table 1.

Dorsal fin with 8 or 9 rays; pectoral fin with 24 rays; pelvic fin with 9 rays; anal fin with 26 or 27 rays; caudal fin with 10 dorsal and 9 ventral segmented rays, and 13 dorsal and 14 or 15 ventral procurent rays; lateral-line scales 58 or 59; vertebrae 55.

Dorsal fin with unbranched first ray, other rays branched; length of longest ray greater than orbit diameter; fin origin slightly posterior to vertical through pelvic-fin origin. Adipose fin small, not strongly fleshy; fin base wider than any other part of fin; posterior tip of depressed fin just reaching vertical through last anal-fin ray base. Pectoral fin with thick, unbranched uppermost ray, other rays thin, branched; fifth ray longest, its posterior tip just reaching origin of first pelvic-fin ray; fin base slightly oblique, forming angle of about 20 degrees with respect to horizontal axis of head and body. Pelvic fin with branched rays; third or fourth ray longest; posterior tip of depressed fin not reaching anus; origin of first ray on ventrolateral surface of body. Anal fin with unbranched first and second rays, other rays branched; third ray longest, but still shorter than longest pectoral-fin ray. Caudal fin with unbranched uppermost and lowermost segmented rays, other rays branched. Lateral-line scales relatively large, height of each scale greater than that of pearl organ (located below eye); all scales, except several lateral-line scales, lost in specimens examined.

Body elongate, moderately compressed; body depth less than head length. Dorsal profile of head nearly straight, dipping slightly to rounded snout. Eye large, tubular, directed upward; eye diameter less than snout length; pearl organ slightly elongate anteriorly and posteriorly, smaller than pupil diameter. Interorbital space and infraorbitals exposed, not covered with skin. Interorbital space with several longitudinal ridges; its width remarkably narrow, 18.6–20.0 in head length. Posterior margin of opercle wavy; pectoral-fin insertion opposite notch at junction of opercle and subopercle.

Mouth large, slightly oblique, forming angle of about 15 degrees with respect to horizontal axis of head and body. Supramaxilla well developed, its height

Table 1. Selected proportional measurements of all known adult specimens of *Scopelarchoides kreffti*, expressed as percentages of standard length.

	Tasmanian specimens			South Atlantic specimens*	
	CSIRO H 3165-01	CSIRO CA 3228	CSIRO H 2710-01	Holotype ISH 1561/68	Paratype ISH 630/71
Standard length (mm)	146.9	176.2	190.2	159.0	187.5
Body depth at 1st D origin	16.4	17.2	16.9	14.6	16.5
Head L	21.6	21.3	22.1	21.5	21.4
Snout L	6.5	6.8	6.5	7.0	6.7
Postorbital L	7.8	7.7	8.5	7.0	7.3
Horizontal eye diameter	6.9	6.9	7.1	7.6	7.4
Vertical eye diameter	7.4	7.4	7.8	7.2	7.1
Interorbital width	1.2	1.1	1.1	1.5	1.2
Upper-jaw L	16.3	14.8	15.7	15.7	15.3
Lower-jaw L	19.3	17.9	18.5	18.1	17.9
Longest dentary tooth L	3.3	3.0	2.9	2.8	3.1
DB snout and D origin	39.0	38.9	37.7	37.4	39.7
DB snout and pectoral-fin origin	22.5	23.1	22.3	23.0	23.3
DB snout and pelvic-fin origin	39.7	39.5	39.6	38.7	40.7
DB snout and anus	67.6	66.7	66.7	67.3	69.3
DB snout and A origin	70.0	70.9	67.7	69.2	71.4
D base L	5.4	5.7	5.6	5.0	5.0
Longest D ray L	–	–	–	6.9	8.6
DB verticals through D and A origins	31.5	31.2	30.7	30.6	31.1
DB end of D base and C base	57.7	57.0	56.5	58.1	55.7
Adipose fin base L	3.2	3.0	2.9	3.1	2.2
DB end of adipose fin and C base	15.6	14.6	14.9	16.0	15.4
DB end of adipose fin base and fin tip	4.4	4.8	4.1	4.7	3.8
Longest pectoral-fin ray L	16.5	16.0	–	13.9	12.3
Longest pelvic-fin ray L	21.5	21.6	–	18.9	16.3
DB pectoral- and pelvic-fin origins	18.1	16.5	18.0	16.4	18.3
DB pelvic-fin and A origins	28.9	31.6	32.2	31.4	33.9
DB anus and A origin	–	2.1	1.2	1.9	2.7
A base L	20.1	20.3	21.0	20.8	18.5
Longest A ray L	12.0	–	–	8.2	9.0
C peduncle depth	6.1	6.3	6.0	6.0	6.4
C peduncle L	10.8	10.7	10.1	11.4	11.1

* Data from Johnson (1972) (thousandths of SL converted here into percentages of SL).

Abbreviations: A, anal fin; C, caudal fin; D, dorsal fin; DB, distance between; L, length; –, damaged.

greater than that of deepest portion of dentary. Posterior margin of maxilla just reaching vertical through posterior margin of orbit; posterior tip of maxilla pointed. Lips poorly developed or absent. Lower jaw upcurved anteriorly in lateral view and its anterior tip projecting slightly beyond that of upper jaw when viewed from above. Premaxilla with row of small teeth; no teeth around symphysis. Vomer with pair of small teeth, these longer than premaxillary teeth. Each palatine with row of 7–15 teeth, including tiny teeth interspersed between large teeth; longest tooth shorter than longest dentary tooth. Dentary with 2 rows of teeth; numerous small teeth in outer row, similar in size to those on premaxilla; 6–16 much larger teeth in inner row, second or third tooth longest. Lingua with row of 14 teeth; 11 or 12 teeth on basihyal and 2 or 3 teeth on first basibranchial (9 teeth on basihyal and none on first basibranchial in CSIRO H 3165-01); teeth progressively shorter posteriorly.

Fresh coloration. Based on color transparencies of CSIRO H 2710-01 and CSIRO H 3165-01. Upper half of head pale grayish-brown, blackish dorsally; upper and lower jaws pale grayish-brown, mottled with black (entire lower jaw black in CSIRO H 3165-01); lower half of head bright greenish-blue, suborbital region darker; pearl organ bright greenish-blue. Black stripe extending from behind eye to base of caudal fin above lateral line; stripe darkest near midlength, paler anteriorly and posteriorly; width of this stripe below first dorsal fin subequal to height of pearl organ; additional faint blackish stripe extending from above base of pelvic fin to base of caudal fin below lateral line (very faint in CSIRO H 3165-01), width subequal to that of stripe above lateral line; remaining trunk pale grayish-brown anteriorly, becoming beige posteriorly; abdominal area (bordered by posterior tip of opercle, inner base of pectoral fin, pelvic-fin base, and anal-fin origin) bright greenish-blue; anterior half of ventral abdomen dark greenish-blue; posterior half of ventral abdomen silver, with dense black stripe on ventral margin; bases of first dorsal and caudal fins blackish; base of pectoral fin bluish white; anterior part of anal-fin base blackish. Fin membranes transparent, without distinct markings.

Coloration of preserved specimens. Anterior part of head blackish; underside of lower jaw and opercle yellowish brown. Trunk yellowish brown with two longitudinal blackish stripes above and below lateral line coalescing at base of caudal fin, forming vertical band there; stripe above lateral line thicker than stripe below lateral line (latter poorly developed in CSIRO CA 3228 and CSIRO H 3165-01);

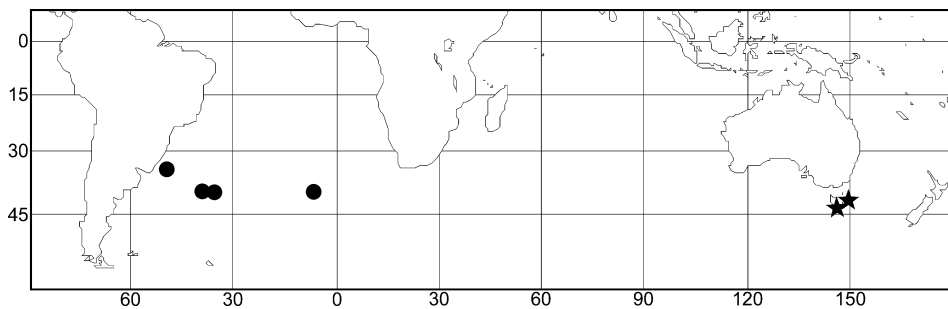


Fig. 2. Collection sites of type series (circles) and additional specimens (stars) of *Scopelarchoides kreffti* Johnson, 1972. Some symbols represent more than one specimen.

stripe above lateral line extending from behind opercle to base of caudal fin, thicker and more extensive anteriorly; lower stripe extending from above base of pelvic fin (dorsoposterior to posterior tip of depressed pelvic fin in CSIRO H 3165-01) to base of caudal fin. Dark band running obliquely from behind pectoral-fin base to anus; band broader than stripes above and below lateral line. Large, black blotch on ventral surface of abdomen below pectoral-fin bases and anterior to posterior end of pelvic-fin bases. All fin rays with scattered melanophores.

Remarks. The Tasmanian specimens are identified herein as *Scopelarchoides kreffti* since both of them share all the diagnostic characters given by Johnson (1974b) (see also Introduction). Other characters of these specimens were also consistent with those of the 10 type specimens (based on meristics) and, in particular, the two adult specimens (including the holotype; based on morphometrics) of *S. kreffti*, with minor variations noted in some counts and measurements: e.g., eight or nine dorsal-fin rays (vs. nine in the latter), 7–15 teeth on the palatine (vs. 11–13), and longer pectoral-, pelvic- and anal-fin rays (see Table 1). These small differences may simply reflect the limited number of specimens collected so far and are inadequate to assess geographic variability of the species.

Johnson (1972, 1974b) presumed that *Scopelarchoides kreffti* occurs primarily at the Subtropical Convergence. More recent studies of the Subtropical Convergence ichthyofauna (e.g., Paulin *et al.* 1989; Paxton and Hanley 1989; Post 1990; Duhamel *et al.* 2005) have not included *S. kreffti*; however, the Tasmanian records support Johnson's hypothesis and extend the range of the species approximately 10,000 km to the east (Fig. 2).

Paxton and Hanley (1989) reported *Scopelarchoides danae* Johnson, 1974 from Australian waters, making *S. kreffti* the second species of the genus reported from that region. *Scopelarchoides kreffti* differs from *S. danae* in having the pelvic-fin origin anterior to a vertical through the first dorsal-fin origin (vs. posterior to it), 23–25 pectoral-fin rays (vs. 20–22), 58 or 59 lateral-line scales (vs. 50–52), 0–3 teeth on the basibranchial (vs. 6–11), and pigment stripes along the lateral line (vs. stripes absent or poorly developed) (Johnson 1974b; this study).

Comparative material examined. *Scopelarchoides danae*: AMS I. 17811-003, 1 specimen (122.2 mm SL), 32 km west of Tontouta, New Caledonia, 22°05'S, 165°50'E, 400 m capture depth (1500 m bottom depth), pelagic trawl, J. Paxton *et al.*, ORSTOM RV *Coriolis*, 28 April 1971; AMS I. 19754-019, 1 specimen (58.0 mm SL), off New Caledonia, 21°05'S, 166°45'E, 925 m capture depth (2125–2175 m bottom depth), Isaacs-Kidd midwater trawl, J. Paxton and P. Colman, HMAS *Kimbla*, 9 May 1971; AMS I. 20309-001, 1 specimen (50.7 mm SL), 90 km east of Tuggerah Lake, New South Wales, Australia, 33°25'S, 152°32'E, 450 m capture depth (2500 m bottom depth), engel mid-water trawl, J. Paxton *et al.*, FRV *Kapala*, 13 December 1977.

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