

From the Scripps Institution of Oceanography, La Jolla, California

## Ergebnisse der Forschungsreisen des FFS „Walther Herwig“ nach Südamerika

### XXI. A New Species of *Scopelarchoides* (Myctophiformes, Scopelarchidae) from the South Atlantic Ocean

By R. K. JOHNSON\*)

with 2 figures

Received December 2, 1971

#### A. Introduction

Continuing expeditions of the FFS “Walther Herwig” operated by the Institut für Seefischerei, Bundesforschungsanstalt für Fischerei, Hamburg, under the direction of Dr. GERHARD KREFFT, have added greatly to our knowledge of the midwater fauna of the North and South Atlantic Oceans. Among the families of midwater fishes significantly represented in “Walther Herwig” material is the alepisauroid family Scopelarchidae, a group of 16 species arranged in 4 genera (JOHNSON, 1971). Nine of the 16 known species of scopelarchids occur in the Atlantic Ocean, and of these 8 are represented in “Walther Herwig” collections. The purpose of this present paper is to describe a new species of *Scopelarchoides* Parr, *S. krefftii*, known only from “Walther Herwig” collections in the South Atlantic. A complete revision of the Scopelarchidae including diagnoses and descriptions of species and genera, relationships between scopelarchid species, and an account of the zoogeography of the family will be published elsewhere.

#### B. Methods

The specimens recorded in this paper are deposited in the collections of the Institut für Seefischerei, Bundesforschungsanstalt für Fischerei, Hamburg, Germany (ISH). All were taken with the CMBT 1600 trawl. Methods for taking counts and measurements follow those given by HUBBS and LAGLER (1958). The last rays of the dorsal and anal fins are divided completely to the base and in each case were counted as one. All vertebral centra were counted, including the compound element supporting the parhypural and hypurals. Counts of vertebrae were made from radiographs. All measurements are straight line point to point measurements taken to 0.1 mm with dial calipers or needle-point dividers or to 0.01 mm with an ocular micrometer. All measurements less than 5.0 mm were made with an ocular micrometer.

#### C. *Scopelarchoides krefftii* n. sp. (Fig. 1)

Holotype. — ISH 1561/68. 159.0 mm S. L. (standard length). Western South Atlantic, 34° 01' S, 47° 39' W (CMBT 1600: 0–2000 m), Feb. 14, 1968.

Comparative Diagnosis. — A species of *Scopelarchoides* with 9 dorsal rays, 25–27 anal rays, 23–25 pectoral rays, 57–59 lateral line scales, and 55–57 vertebrae. Pelvic fin length greatly exceeding pectoral fin length. Pelvic fins in adults inserted slightly in advance of vertical through dorsal origin. Both pectoral and pelvic fins covered with dense black pigment in adults. Dense band of black pigment on midventral line from

\*) Dedicated to Dr. GERHARD KREFFT with my strongest appreciation for all his help.

170636

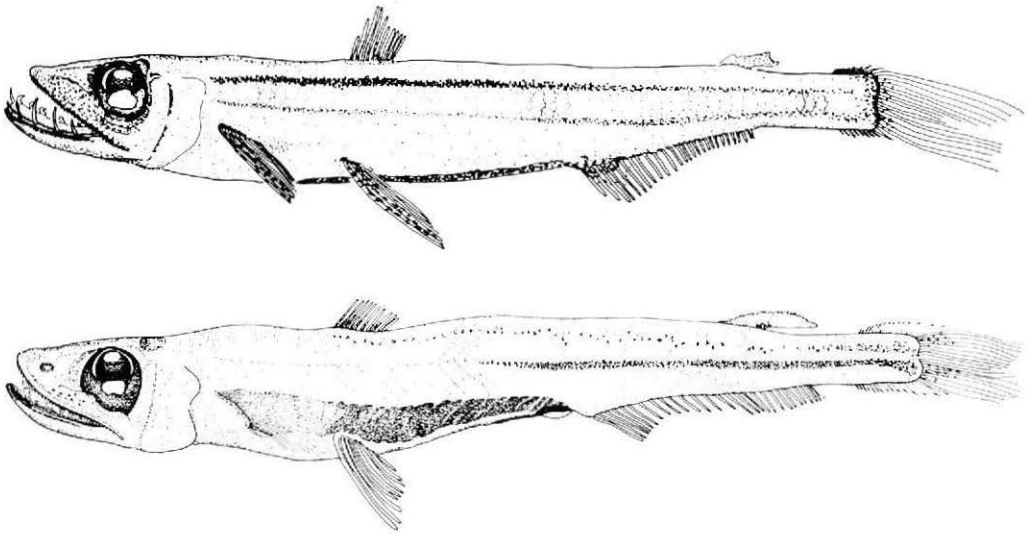


Fig. 1: *Scopelarchoides krefftii* n. sp.

Top: holotype, ISH 1561/68, 159.0 mm. Bottom: paratype ISH 649/71, 68.0 mm.

just behind pectoral base to just before anus. Luminous organs probably present. The combination of these characters distinguishes *S. krefftii* from all other known scopelarchid species.

**Description.** — Based on 8 (52.6–68.0) juveniles and 2 (159.0–187.5) adults. In the description given below, the characters of the adults are given first followed by a description of the juveniles for those characters in which the juveniles differ from the adults.

**Meristic Characters.** — Values for the holotype are given in parentheses. Dorsal 9 (all). Anal 25–27 (26). Pectoral 23–25 (24). Lateral line scales 57–59 (58). Vertebrae 55–57 (56).

**Proportional Dimensions.** — Expressed as thousandths of the standard length. Values for the two adults, 159.0–187.5, given first in that order, followed by the mean and range (values in parentheses) for 6 of the juvenile paratypes (ISH 649/71: 56.5, 57.6, 59.3, 59.5, 68.0; ISH 1012/71: 60.3).

Body, depth at dorsal origin, 146, 165; 117 (106–140). Caudal peduncle: least depth, 60, 64; 58 (54–61); length, 114, 111; 128 (118–132). Adipose fin: distance from posterior end of base to base of midcaudal rays, 160, 154; 182 (176–187); length of base, 31, 22; 37 (29–42); length of fin (from posterior angle of fin with body to distal tip of fin), 47, 38; 61 (53–66). Anal fin: length of base, 208, 185; 257 (238–267); length of longest ray, 82, 90; 94 (81–103). Dorsal fin: length of base, 50, 50; 45 (38–53); length of longest ray, 69, 86; 84 (57–97); dorsal origin to anal origin (distance between verticals), 306, 311; 270 (262–275); end of dorsal base to base of midcaudal rays, 581, 557; 612 (601–624). Pectoral fin, length of longest ray, 139, 123; 117 (108–126). Pelvic fin, length of longest ray, 189, 163; 137 (108–162). Pelvic insertion to anal origin, 314, 339; 262 (248–278). Pectoral insertion to pelvic insertion, 164, 183; 147 (143–156). Anus to anal origin, 19, 27; 32 (29–34). Distance from snout to: anus,

170636

673, 693; 601 (587—616); dorsal origin, 374, 397; 346 (334—358); anal origin, 692, 714; 619 (608—640); pectoral insertion, 230, 233; 237 (223—253); pelvic insertion, 387, 407; 376 (363—406). Head length, 215, 214; 207 (200—217). Snout length, 70, 67; 74 (66—76). Postorbital head length, 70, 73; 69 (62—76). Interorbital width, 15, 12; 17 (15—18). Eye diameter: horizontal, 76, 74; 71 (64—75); vertical, 72, 71; 72 (64—75). Upper jaw length, 157, 153; 154 (143—162). Lower jaw length, 181, 179; 171 (164—176). Longest dentary tooth, 28, 31; 30 (27—35).

Body. — Body elongate, shallow, moderately compressed in adults, strongly compressed in juveniles. Body depth 6.85, 6.05; 8.65 (7.15—9.25) in S. L. Peduncle depth 3.56, 3.34; 3.60 (3.40—4.04) in H. L. (head length). Peduncle length 1.89, 1.92; 1.63 (1.51—1.77) in H. L.

Skin and Scales. — All body scales and most scale pockets absent, presumably due to damage during capture. Lateral line scales large, depth of scale above anal origin 1.53—1.71 times length of scale in holotype and adult paratype.

Head. — Dorsal profile nearly horizontal, dipping slightly to rounded snout. Snout length slightly less than horizontal eye diameter in adults. Head depth less than body depth. Head width subequal to body width. Eyes large, tubular, directed straight upward. Pearl organ a ventrally flattened oval lacking associated melanophores. Head length 4.65, 4.68; 4.81 (4.62—5.00) in S. L. Snout length 3.08, 3.21; 2.83 (2.72—3.16) in H. L. Horizontal eye diameter 2.82, 2.88; 2.94 (2.67—3.10) in H. L. Postorbital head length, 3.08, 2.94; 3.02 (2.76—3.26) in H. L. Interorbital width 14.3, 18.2; 12.5 (11.4—13.6) in H. L.

Head densely pigmented with black pigment on occiput, orbit, snout, ventral and anterior infraorbitals, and jaws. Pigmentation less dense on cheeks and gill covers. Branchiostegal membranes jet-black. Dense bands of pigment bordering anterior and posterior margins of eye.

Subopercle distinctly larger than opercle. Opercle fluted and serrate at posterior border. Pectoral insertion opposite a notch at opercle-subopercle border.

Pseudobranchiae well-developed, numbering 16—18 in the two adults. Gill filaments short, not extending to edge of gill covers. Gill membranes united under anterior margin of eye.

Mouth. — Mouth large. Lower jaw arching upward distally and projecting slightly beyond upper jaw. Upper jaw length 1.37, 1.40; 1.34 (1.24—1.42) in H. L. Lower jaw length 1.19, 1.20; 1.20 (1.13—1.25) in H. L. Upper jaw terminates under posterior margin of eye.

Tooth counts based on 4 (56.5, 68.0, 159.0, 187.5) specimens and listed in that order. Premaxillary teeth small, uniserial, retrorse. Counts: 24, 28, 78, 86. Dentary teeth arranged in two rows with medial teeth the larger and consisting of lanceolate canines. Counts: lateral, 16, 22, 48, 51; medial, 6, 8, 12, 13. Longest dentary tooth 7.60, 6.80; 6.88 (6.25—7.60) in H. L. Palatine teeth arranged in one irregular row of large lanceolate fangs. Counts: 13, 11, 12, 11. Vomerine teeth small, one on each side. Lingual teeth essentially restricted to elongate basihyal, at most 1 or 2 small teeth above anterior end of first basibranchial. Lingual teeth arranged in one row, decreasing in size but more strongly hooked posteriorly. Counts: 8, 10, 12, 15.

Fins. — Pelvics inserted slightly in advance of dorsal origin in adults, beneath anterior dorsal rays in juveniles. Appressed pelvics not reaching anus, appressed pectorals just reaching pelvic insertion. Pelvic fins longer than pectoral fins, length of longest pelvic

170636

ray 18.9, 16.3; 13.7 (10.8–16.2) % S. L., length of longest pectoral ray 13.9, 12.3; 11.7 (10.8–12.6) % S. L. Anal origin far behind midlength.

Color. — Color in alcohol largely yellow-brown but scattered remnants of scale pockets edged with dark black pigment (in adults) may indicate a brown-black coloration in life. Two marked stripes of pigment above and below lateral line, coalescing at caudal peduncle forming a dark black bar. Dorsal pigment stripe larger and more extensive in adults but ventral pigment stripe distinctly more developed in juveniles. Pigment present on all fin rays and membranes. Adipose fin with large scattered melanophores. A distinctive black band of pigment midventral on body from just behind pectoral base to just before anus. Midventral pigment stripe just appearing in juveniles, apparently spreading forward from origin just anterior to presumed AO luminescent organ (see below). Presumed POP and AO luminous organs ensheathed dorsally with black pigmentation. Peritoneum dense black, forming a solid black tube enclosing gut in adults and largest (68.0) juvenile. Anterior and posterior sections of peritoneal pigment remain separate in smaller juveniles.

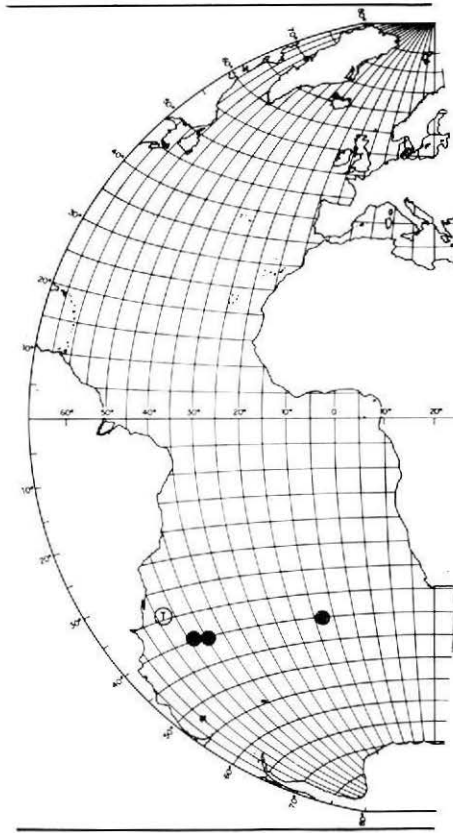


Fig. 2: Distribution of *Scopelarchoides kreffti*.  
Closed circles: paratypes; open circle: holotype

170636

Luminous Tissue. — Scopelarchids were not known to be luminescent until the recent discovery by MERRETT, BADCOCK, and HERRING (pers. comm.; Deepsea Research, in press) of ventral bioluminescent organs in *Benthalbella infans* Zugmayer. Their work has revealed luminous organs visible as paired, pearl-white blocks of tissue arranged symmetrically around the ventral midline, one just posterior to the pelvic fin base, termed the POP organ, the other just anterior to the anus, termed the AO organ. A multilayered reflector with pigment lining was said to lie internal to the photogenic tissue. *Scopelarchoides kreffti* possesses organs comparable in position and gross structure to the POP and AO organs of *B. infans*, and these organs are presumably luminescent in *S. kreffti* and are known to be luminescent in *B. infans*.

Distribution (Fig. 2). — *S. kreffti* is known from a total of 5 hauls in the western and central South Atlantic, between 34°–41° S, and 48°–07° W. With only one specimen, GIBBS (1968) suggested *Photoneustes munificus* Gibbs as a member of a distinctive Subtropical Convergence Fauna. With not quite ten times as much confidence I would add *S. kreffti*, known only from the Subtropical Convergence region of the South Atlantic, to that fauna, which apparently includes *Bathophilus ater*, *Eustomias trewavasae*, *Photoneustes munificus*, *Stomias boa boa*, and a number of other stomiatoid and no doubt myctophid fishes (GIBBS 1968: 4–6).

Etymology. — *Scopelarchoides kreffti* is named for Dr. GERHARD KREFFT of the Institut für Seefischerei, Bundesforschungsanstalt für Fischerei, whose efforts in the Atlantic Ocean, especially upon the research vessel “Walther Herwig”, have contributed greatly to our knowledge of the midwater fauna of that ocean.

#### D. Material Examined

A total of 10 (52.6–187.5) specimens (including the holotype listed above) from 5 collections. ISH 630/71. W. H. Station 358—III/71: 39° 47' S, 43° 40' W (CMBT 1600: 0–1015 m), March 7, 1971. 1 (187.5). ISH 649/71. W. H. Station 363—I/71: 40° 18' S, 39° 22' W (CMBT 1600: 0–110 m), March 8, 1971. 6 (56.5–68.0). ISH 666/71. W. H. Station 363—II/71: 40° 18' S, 39° 12' W (CMBT 1600: 0–328 m), March 8, 1971. 1 (52.6). ISH 1012/71. W. H. Station 402—I/71: 40° 03' S, 07° 30' W (CMBT 1600: 0–105 m), March 18, 1971. 1 (60.3).

#### E. Acknowledgements

I am grateful to Dr. GERHARD KREFFT for allowing me to study the “Walther Herwig” scopelarchids. Dr. RICHARD H. ROSENBLATT has provided advice, aid, encouragement, and useful criticism throughout my study of the Scopelarchidae. Much of this work was completed during the tenure of a National Science Foundation National Graduate Fellowship made to ROBERT K. JOHNSON. Most of this work was completed at the Scripps Institution of Oceanography, La Jolla, California, but portions of the work were done at the National Museum of Natural History, Washington D. C. and the Chesapeake Biological Laboratory, University of Maryland, Solomons, Maryland, and I am grateful to all three institutions and their personnel for providing me with working space and material aid.

#### F. Abstract

A new species of *Scopelarchoides* Parr, *S. kreffti*, is described from 10 specimens from the South Atlantic Ocean. *S. kreffti* appears to be a member of the Subtropical Convergence Fauna proposed by GIBBS (1968: 4–6).

170036

### G. Zusammenfassung

Eine neue Art der Gattung *Scopelarchoides* Parr, *S. krefftii*, wird an Hand von 10 Exemplaren aus dem Südatlantik beschrieben. Sie unterscheidet sich von allen übrigen bisher bekannten Scopelarchidae in der Kombination der folgenden Merkmale: D 9, A 25–27, P 23–25, Ll 57–59, VS 55–57. V viel länger als P; V bei ausgewachsenen Fischen etwas vor der Senkrechten durch den Ursprung D inserierend. Brust- und Bauchflossen bei adulten Stücken mit dickem schwarzen Pigment bedeckt. Ein Band schwarzen Pigments zieht sich auf der Mittellinie der Ventralseite entlang; es beginnt eben hinter der P-Basis und endet gerade vor dem Anus. Leuchtorgane sind vermutlich vorhanden.

*Scopelarchoides krefftii* wurde in 5 Hols im westlichen und mittleren Südatlantik gefangen, wo die Art auf die Region der Subtropischen Konvergenz beschränkt zu sein scheint.

### H. Literature

- (1) GIBBS, R. H., Jr.: *Photoneustes munificus*, a new species of melanostomiid fish from the South Pacific Subtropical Convergence, with remarks on the convergence fauna. Contr. Sci., Los Angeles County Mus. No. 149: 1–6, Los Angeles 1968
- (2) HUBBS, C. L. & LAGLER, K. F.: Fishes of the Great Lakes Region. Rev. ed. 213 pp., 44 pls., 251 figs., Bloomfield Hills 1958.
- (3) JOHNSON, R. K.: A revision of the Alepisauroid family Scopelarchidae (Pisces: Myctophiformes). Ph. D. dissert., Univ. Calif., San Diego 1971.

170636