FOLIA PARASITOLOGICA 59 [4]: 264–271, 2012
ISSN 0015-5683 (print), ISSN 1803-6465 (online)

http://folia.paru.cas.cz/

Breizacanthus aznari sp. n. (Acanthocephala: Arhythmacanthidae) from the banded cusk-eel *Raneya brasiliensis* (Ophidiiformes: Ophidiidae) from the Patagonian coast in Argentina

Jesús Servando Hernández-Orts[1], **Gema Alama-Bermejo**[2], **Enrique Alberto Crespo**[3], **Néstor Aníbal García**[3], **Juan Antonio Raga**[1] and **Francisco Esteban Montero**[1]

[1]Cavanilles Institute of Biodiversity and Evolutionary Biology, Science Park, University of Valencia, C/ Catedrático José Beltrán 2, 46980, Paterna, Valencia, Spain;

[2]Laboratory of Fish Protistology, Institute of Parasitology, Biology Centre, ASCR, Branišovská 31, 370 05, České Budějovice, Czech Republic;

[3]Marine Mammal Laboratory, National Patagonic Center, CONICET and University of Patagonia, Boulevard Brown 2915 (9120), Puerto Madryn, Chubut, Argentina

Abstract: *Breizacanthus aznari* sp. n. is described from the banded cusk-eel *Raneya brasiliensis* (Kaup) (Ophidiiformes: Ophidiidae) from the Patagonian coast in Argentina. *Breizacanthus* Golvan, 1969 is currently composed of five species (including the new species) and is characterised by the absence of trunk spines, a short cylindrical proboscis with two types of hooks and lemnisci longer than the proboscis receptacle. *Breizacanthus aznari* is clearly distinguished from *B. chabaudi* Golvan, 1969 by having 12 longitudinal rows of hooks on the proboscis, instead of 16–18. The new species resembles *B. golvani* Gaevskaya et Shukhgalter, 1984, *B. irenae* Golvan, 1969, and *B. ligur* Paggi, Orecchia et Della Seta, 1975, all possessing 12 longitudinal rows of hooks. However, *B. aznari* differs from *B. golvani* in having 4–5 large hooks per row (*vs*. 8–9) and larger eggs. The new species can be distinguished from *B. irenae* by the shorter body size of females, the different range of numbers of large hooks of males (4–5 and 5–6, respectively), the smaller maximum number of small hooks of females (3 and 4, respectively), and the shorter lemnisci. *Breizacanthus aznari* differs from *B. ligur* by the smaller body length of females, the smaller maximum body length of males, the different range of numbers of large hooks of males (4–5 and 5–6, respectively), and smaller lemnisci. This is the first record of a species of *Breizacanthus* from fishes of the order Ophidiiformes and from the Southern Hemisphere. Comparative data on species of *Euzetacanthus* Golvan et Houlin, 1964 and *Breizacanthus* are also provided.

Keywords: spiny-headed worms, Palaeacanthocephala, *Euzetacanthus*, taxonomy, marine fish, southwestern Atlantic, Patagonia

The family Arhythmacanthidae Yamaguti, 1935 (Acanthocephala: Palaeacanthocephala) is currently composed of seven genera: *Acanthocephaloides* Meyer, 1932, *Breizacanthus* Golvan, 1969, *Euzetacanthus* Golvan et Houin, 1964, *Heterosentis* Van Cleave, 1931, *Hypoechinorhynchus* Yamaguti, 1939, *Paracanthocephaloides* Golvan, 1969, and *Spiracanthus* Muñoz et George-Nascimento, 2002 (see Pichelin and Cribb 1999, Muñoz and George-Nascimento 2002). All these genera are parasites of teleosts and are characterized by possessing six cement glands and by the abrupt transition on the proboscis from small basal hooks (with roots) or spines (without roots) to large, more apical hooks (Golvan 1969, Pichelin and Cribb 1999, Lanfranchi and Timi 2011).

During a survey of intestinal parasites of the banded cusk-eel *Raneya brasiliensis* (Kaup) (Ophidiiformes: Ophidiidae) from the Patagonian coast in Argentina, several specimens of an arhythmacanthid acanthocephalan were collected. After a morphological and morphometric analyses, these worms appeared to be a new species of *Breizacanthus* that are described herein.

MATERIALS AND METHODS

Sample collection

The fish were caught by commercial bottom trawling vessels along the Argentine Patagonian shelf. Sixteen specimens of *Raneya brasiliensis* 19.8–23.3 cm total length (mean ± standard deviation = 21.2 cm ± 1.4 cm) were collected in northern Patagonia (42°45'–42°59'S, 61°09'–62°58'W, November 2007). Fish were frozen in plastic bags at −20 °C for later examination. After thawing, each fish was dissected and the intestine was examined using a stereomicroscope (up to 40×). Acanthocephalan specimens were washed in saline and fixed in 70% ethanol.

Address for correspondence: J.S. Hernández-Orts, Cavanilles Institute of Biodiversity and Evolutionary Biology, Science Park, University of Valencia, C/ Catedrático José Beltrán N. 2, 46980, Paterna, Valencia, Spain. Phone: +34 963543657; Fax: +34 963543733; E-mail: jesus.s.hernandez@uv.es

Morphological description

For examination and measurements, worms were punctured with a fine needle and stained with eosin yellowish (n = 3; 4–5 min), Mayer's hematoxylin (n = 2; 3 min), or both stains (n = 15), washed in distilled water for 1 min after each staining, dehydrated in ethanol, cleared in methyl salicylate and mounted in Canada balsam. Measurements, taken from drawings made with the aid of a drawing tube, are in micrometres unless otherwise stated and are presented as the mean followed by the standard deviation, with the range and number of structures measured in parentheses. Measurements of eggs were made from fully developed ones drawn *in situ* through the body wall of female worms.

Two specimens (one male and one female) were also studied with scanning electron microscopy (SEM). They were dehydrated through an ethanol series, critical point dried and coated with a gold-palladium alloy to a thickness of 250 nm. Specimens were examined with a Hitachi 4100 FE scanning electron microscope, operating at 20 kV, from the Central Service for the Support to Experimental Research (SCSIE) of the University of Valencia. Ecological terms follow Bush et al. (1997).

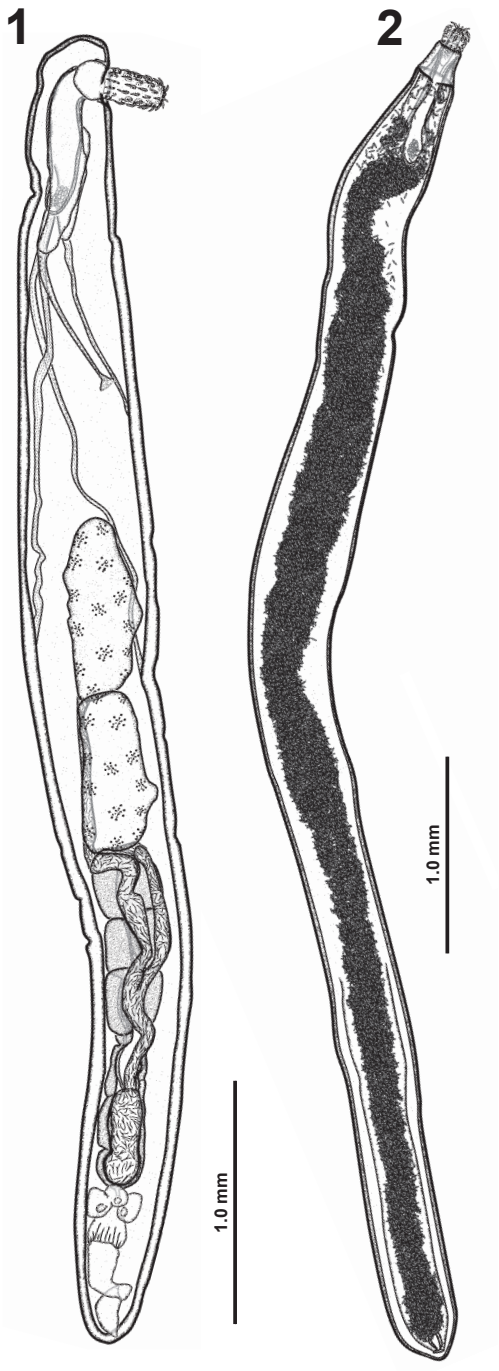
Specimens from the type series are deposited in the Natural History Museum (NHMUK), London, United Kingdom; the United States National Parasite Collection (USNPC), Beltsville, Maryland, United States; and the Helminthological Collection of the Institute of Parasitology (IPCAS), Biology Centre ASCR, České Budějovice, Czech Republic.

RESULTS

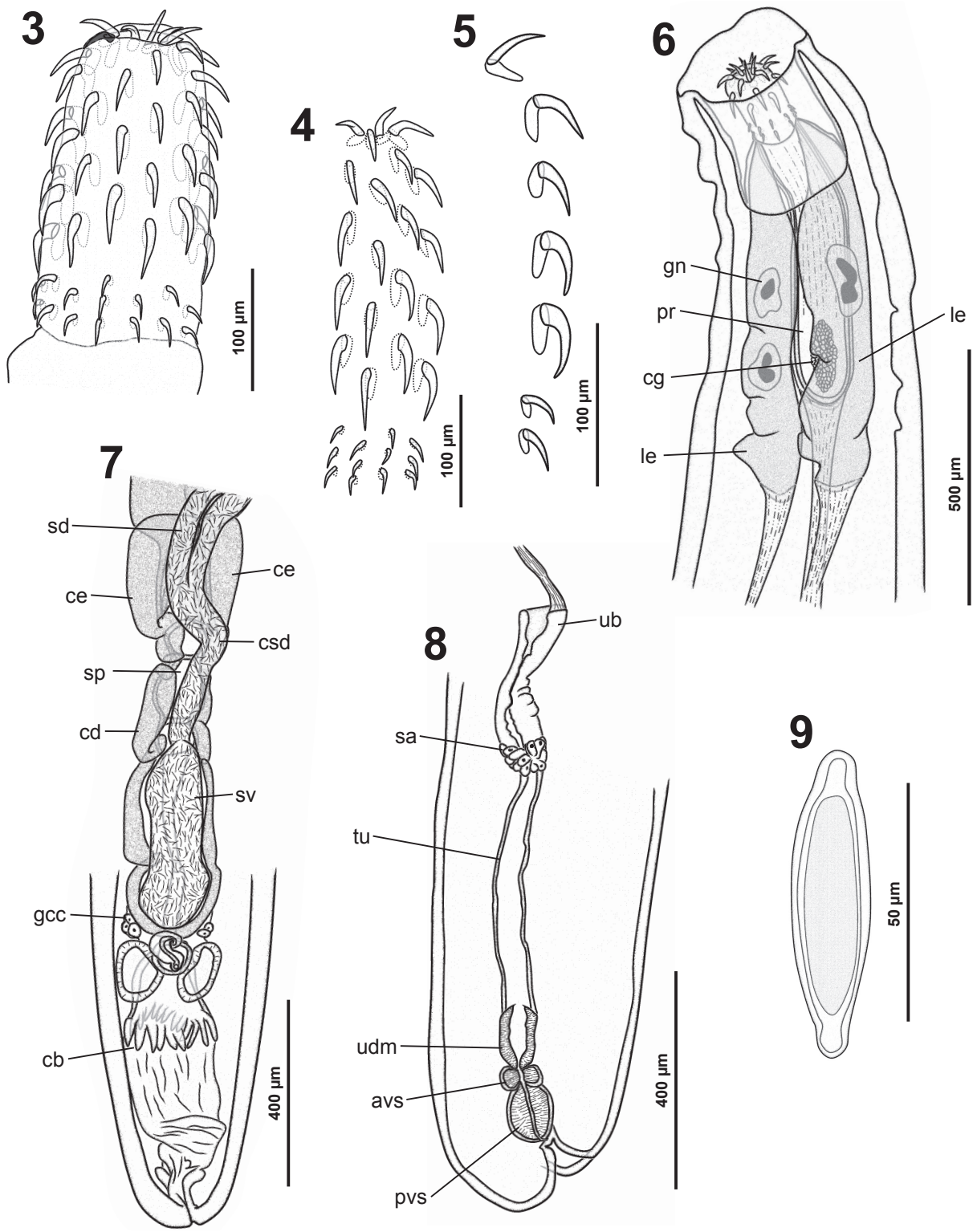
Breizacanthus aznari sp. n. Figs. 1–15

General: Arhythmacanthidae, with characters of *Breizacanthus* Golvan, 1969. Sexual dimorphism present, females larger than males (Figs. 1, 2, 10). Proboscis short and cylindrical (Figs. 1, 3, 11), armed with 12 longitudinal rows of hooks. Males with 6–7 hooks per row; each row with 4–5 large rooted hooks, and 2–3 small basal hooks with rudimentary roots (Figs. 3, 5, 11). Females with 7–8 hooks per row; each row with five large rooted hooks, and 2–3 small basal hooks with rudimentary roots (Figs. 4, 14). Neck present, unarmed (Figs. 2, 10), with a single pair of sensory pits (Figs. 11, 12). Trunk cylindrical to fusiform, thick-walled, completely unarmed (Figs. 1, 2, 6, 10, 13), slightly dilated in anterior end (Fig. 13). Proboscis receptacle double-walled (Fig. 6), 1.66 ± 0.38 (1.19–2.16, n = 7) times longer than proboscis in males, and 1.71 ± 0.35 (1.33–2.20, n = 6) times longer in females, with ellipsoidal cephalic ganglion at its posterior end (Figs. 1, 2, 6). Lemnisci digitiform, longer than proboscis receptacle when fully extended (Figs. 1, 6). Left lemniscus with one elongated giant nucleus; right lemniscus with two giant nuclei (Fig. 6). Gonopore subterminal in both sexes. Genital spines absent (Figs. 7, 8, 15).

Male (based on 11 mounted specimens and one for SEM): 5.2 ± 0.5 mm (4.7–6.0 mm, n = 6) long. Trunk elongated, slightly fusiform (Fig. 1), 4.6 ± 0.7 mm (3.4–5.5 mm, n = 10) long by 511 ± 185 (333–684, n = 10) wide. Proboscis 361 ± 101 (258–560, n = 10) long by 173 ± 52 (124–259, n = 10) wide. Measurements of hooks are presented in Table 1. Neck 138 ± 21 (107–168, n = 8) long by 179 ± 28 (143–216, n = 9) wide. Proboscis receptacle 536 ± 34 (466–586, n = 9) long by 114 ± 15 (95–134, n = 9) wide. Lemnisci 634 ± 38 (578–691, n = 7) long. Proboscis receptacle/lemnisci length ratio 1 : 0.8 (0.8–0.9). Reproductive system occupying approximately 70% ± 7 (58–77%, n = 8) of trunk length (Fig. 1). Tes-



Figs. 1, 2. *Breizacanthus aznari* sp. n. from *Raneya brasiliensis*. **1.** Male, whole mount (holotype) lateral view. **2.** Female, whole mount (allotype), lateral view.



Figs. 3–9. *Breizacanthus aznari* sp. n. from *Raneya brasiliensis.* **3.** Male proboscis armature (holotype), lateral view. Missing large sub-apical hook have been reconstructed with a black shadowed area. **4.** Rows of hooks of female proboscis (paratype), ventral view; **5** – Male row of hooks (holotype), lateral view. **6.** Female anterior body end, with detail of the proboscis receptacle and lemnisci (paratype), ventral view. **7.** Detail of male genitalia (holotype), lateral view. **8.** Female reproductive system (paratype), lateral view. **9.** Immature egg (acanthor not illustrated). *Abbreviations*: avs – anterior vaginal sphincter; cb – copulatory bursa; cd – cement duct; ce – cement gland; cg – cephalic ganglion; csd – common sperm duct; gcc – glandular cellular cluster; gn – giant nucleus; le – lemniscus; pr – proboscis receptacle; pvs – posterior vaginal sphincter; sa – selector apparatus; sd – sperm duct; sp – Säeftingen's pouch; sv – seminal vesicle; tu – tubular uterus; ub – uterine bell; udm – uterus distal muscular region.

Table 1. Morphometric data on the proboscis hooks of *Breizacanthus aznari* sp. n. from the banded cusk-eel *Raneya brasiliensis* from Patagonia, Argentina. Measurements in micrometres.

	Male			Female		
	n	Blade	Root	n	Blade	Root
Apical	3	38 ± 2 (36–40)	26 ± 1 (25–26)	1	42	23
Subapical I	10	41 ± 3 (37–47)	26 ± 3 (21–31)	2	37 (33–40)	25 (23–27)
Subapical II	8	45 ± 5(36–50)	27 ± 10 (23–31)	4	43 ± 3 (39–46)	28 ± 1 (27–28)
Subapical III	16	45 ± 5 (34–52)	29 ± 10 (23–35)	9	45 ± 4 (39–52)	28 ± 4 (23–34)
Subapical IV	10	48 ± 4 (39–52)	29 ± 9 (25–33)	30	49 ± 4 (40–54)	30 ± 4 (23–42)
Basal I	8	24 ± 3 (18–27)	12 ± 2 (9–15)	10	20 ± 3 (15–23)	8 ± 3 (6–10)
Basal II	8	22 ± 4 (18–30)	12 ± 2 (9–15)	10	21 ± 2 (17–23)	10 ± 5 (8–14)
Basal III	2	22 (18–25)	10 (9–11)	3	24 ± 4 (21–29)	10 ± 5 (8–15)

tes two, subellipsoidal, in tandem (Fig. 1). Anterior testis 621 ± 174 (368–926, n = 10) long by 261 ± 51 (168–358, n = 10) wide. Posterior testis 604 ± 145 (442–889, n = 10) long by 265 ± 68 (189–432, n = 10) wide. Cement glands six (Fig. 1), 280 ± 89 (155–466, n = 24) long by 149 ± 41 (112–250, n = 25) wide, in three tandem pairs. Sperm ducts joining into common sperm duct at approximately level of distal pair of cement glands (Figs. 1, 7). Common sperm duct joining posteriorly to seminal vesicle (Figs. 1, 7). Seminal vesicle 340 ± 121 (167–547, n = 9) long, slightly constricted at mid-level (Fig. 7). Säefftingen's pouch dorsal to common sperm duct and seminal vesicle (Fig. 7), 379 ± 70 (297–526, n = 9) long. Cement ducts join with common sperm duct and Säeftingen's pouch anterior to copulatory bursa. Glandular cellular cluster observed at posterior junction of cement ducts, common sperm duct and Säeftingen's pouch (Fig. 7). Copulatory bursa with digital rays or papillae (Fig. 7), in all specimens inverted.

Female (based on 13 gravid mounted specimens and one for SEM): 6.9 ± 1.2 mm (5.2–8.4 mm, n = 6) long. Trunk elongated, slightly fusiform (Fig. 2), 6.8 ± 1.1 mm (4.9–8.3 mm, n = 12) long by 517 ± 58 (421–611, n = 12) wide. Proboscis 323 ± 36 (272–375, n = 9) long by 122 ± 27 (96–184, n = 10) wide. Measurements of hooks in Table 1. Neck 143 ± 29 (94–181, n = 7) long by 224 ± 76 (129–353, n = 7) wide. Proboscis receptacle 536 ± 109 (414–724, n = 10) long by 98 ± 15 (78–129, n = 10) wide. Lemnisci 666 ± 142 (466–905, n = 8) long. Proboscis receptacle/lemnisci length ratio 1 : 0.8 (0.7–0.9). Reproductive system 1 123 ± 165 (985–1 379, n = 5) long (Fig. 8), post-equatorial, occupying 17% ± 1 (16–18%, n = 5) of trunk length. Uterine bell 331 ± 92 (259–483, n = 7) long; selector apparatus present; tubular uterus 546 ± 138 (328–707, n = 7) long; uterus distal muscular region, 117 ± 13 (93–129, n = 7) long; anterior vaginal sphincter 56 ± 19 (36–86, n = 7) long; posterior vaginal sphincter 75 ± 22 (52–116, n = 6) long. Mature eggs, containing a fully developed acanthor, fusiform (Fig. 9), 63 ± 5 (53–73, n = 40) long by 14 ± 1 (11–17, n = 40) wide.

Type host: banded cusk-eel, *Raneya brasiliensis* (Kaup) (Ophidiiformes: Ophidiidae).

Type locality: Chubut, Argentina (42°45'–42°59'S, 61°09'–62°58'W).

Site in host: Intestine.

Type specimens: Holotype, male whole mount (NHMUK 2012.7.24.1); allotype, female whole mount (NHMUK 2012.7.24.2); paratypes, whole mounts of two males and two females (NHMUK 2012.7.24. 3–6); paratypes, whole mounts of two males and two females (USNPC 105889, 105890); and paratypes, whole mounts of two males and two females (IPCAS A-84).

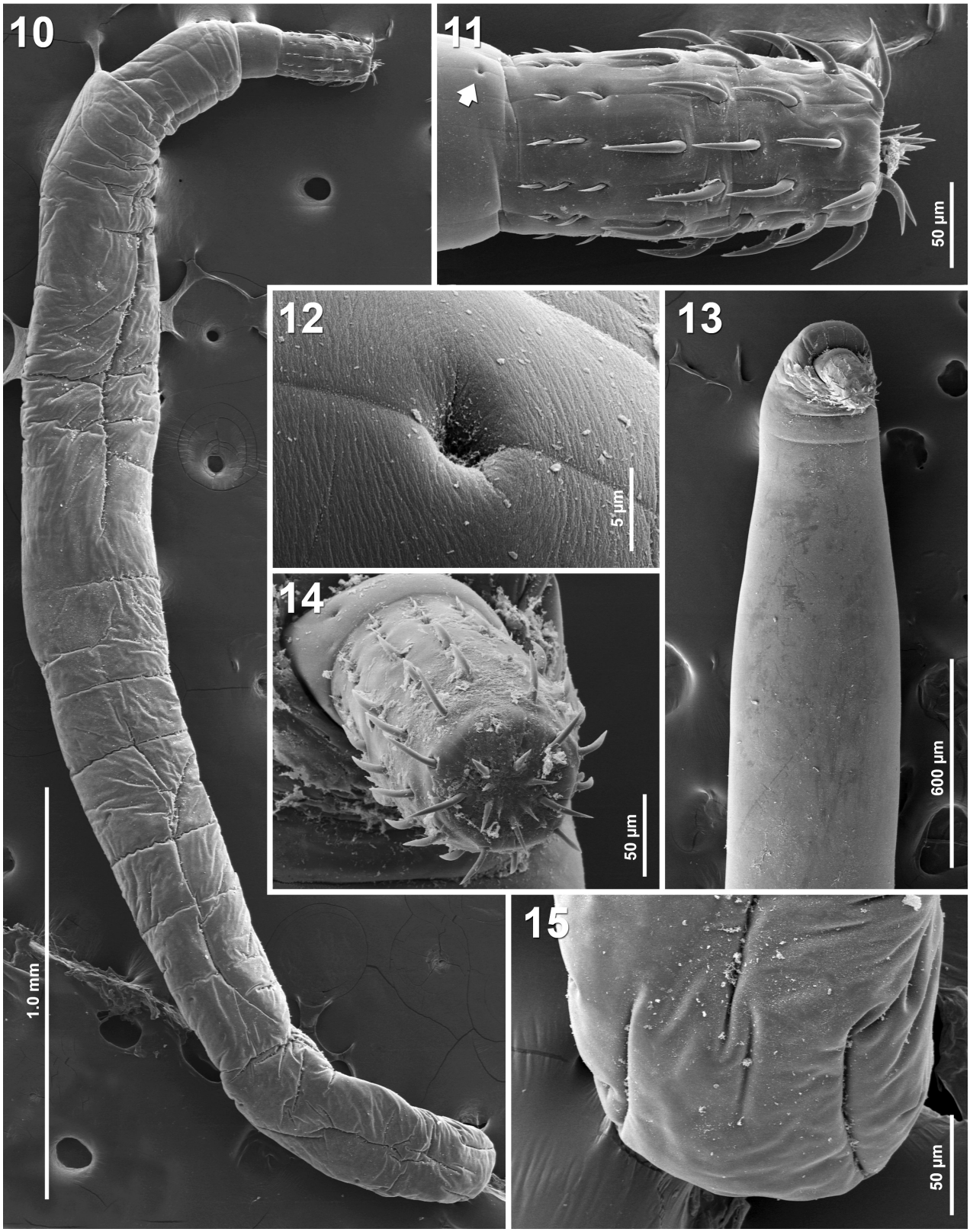
Infection parameters: Prevalence 25% (n = 16); abundance = 3.6; mean intensity = 14.5; intensity = 1–35 acanthocephalans per fish.

Etymology: The new species is named for Dr. Francisco Javier Aznar of the University of Valencia in recognition of his contribution to the knowledge of the acanthocephalans.

Remarks: According to the genus diagnosis in Golvan (1969) and Pichelin and Cribb (1999), the acanthocephalans collected in the present study are assigned to the genus *Breizacanthus*, based on the absence of trunk spines, short cylindrical proboscis with two types of hooks and lemnisci longer than the proboscis receptacle. To date, four species are recognized in this genus: *B. chabaudi* Golvan, 1969; *B. irenae* Golvan, 1969; *B. ligur* Paggi, Orecchia et Della Seta, 1975; and *B. golvani* Gaevskaya et Shukhgalter, 1984 (Golvan 1969, Paggi et al. 1975, Gaevskaya and Shukhgalter 1984). Taxonomic data for each species within the genus *Breizacanthus* are presented in Table 2.

Breizacanthus aznari sp. n. differs from *B. chabaudi* by having a smaller body size (5.2–8.4 mm *vs*. 15.0–20.0 mm in females and 4.7–6.0 mm *vs*. 9–11 mm in males), a proboscis with 12 longitudinal rows, instead of 16–18, and shorter lemnisci (466–905 μm *vs*. 2.1–2.2 mm in females and 534–691 μm *vs*. 1.8–2.4 mm in males).

Considering the number of longitudinal rows of hooks on the proboscis, the new species mostly closely resembles the other three species of the genus, each with 12 longitudinal rows. However, in contrast to the new species, *B. golvani* possesses 8–9 large hooks instead of 4–5 large hooks in each longitudinal row, and smaller eggs (25–27 μm × 7–9 μm *vs*. 53–73 μm × 11–17 μm). *Breizacanthus aznari* differs from *B. irenae* by the shorter body length of females (5.2–8.4 mm *vs*. 16.7 mm), the different



Figs. 10–15. Scanning electron micrographs of *Breizacanthus aznari* sp. n. from *Raneya brasiliensis*. **10.** Male, whole worm, lateral view. **11.** Male proboscis, lateral view showing longitudinal rows of 2–3 small basal hooks, 3–4 large subapical hooks and large apical hooks slightly invaginated. Arrow points to a sensory pit. **12.** Male, detail of a sensory pit of the neck. **13.** Female, anterior region of the body, ventral view. **14.** Female proboscis, subapical view, distal large subapical hooks and apical large hooks invaginated. **15.** Male, posterior body end, lateral view.

Table 2. Biometrical data of males and females of species *Breizacanthus*. Measurements in micrometres, unless otherwise indicated.

Species	*B. chabaudi*	*B. irenae*	*B. ligur*	*B. golvani*	***B. aznari* sp. n.**
Reference	Golvan 1969	Golvan 1969	Paggi et al. 1975	Gaevskaya and Shukhgalter 1984	Present study
Hosts	*Mullus surmuletus*	*M. surmuletus*	*Argentina sphyraena*, *Chlorophthalmus agassizi***, *Gadiculus argenteus*, *Phycis blennoides*, *Coelorinchus caelorhincus*, *Capros aper*, *Synchiropus phaeton*, *Helicolenus dactylopterus*	*Argentina sphyraena*	*Raneya brasiliensis*
Locality	Bay of Biscay	Algerian coast	Ligurian Sea	Bay of Biscay	Argentine coast
Female					
Body length (mm)	15.0–20.0	16.7	10.3–24.7	4.5–13.4	5.2–8.4
Proboscis	430 × 180	400 × 140	250–380 × 130–170	380–580 × 110–140	272–375 × 96–184
No. longitudinal rows of hooks	16–18	12	12	12	12
No. large hooks per row	6–7	5–6	5–6	8–9	5
No. small hooks per row	3–4	3–4	2–3	2–3	2–3
Proboscis receptacle	1 100 × 130	1 020 × 150	600–830 × 150–200	440–480	414–724 × 78–129
Lemniscus length	2 115–2 187*	1 875–2 062*	780–1 340	520–900	466–905
Egg size	60–22	55 × 11	50–60 × 18–21	25–27 × 7–9	53–73 × 11–17
Male					
Body length (mm)	9–11	6.2	5.8–11.5	3.1–5.6	4.7–6.0
Proboscis	430 × 180	400 × 140	200–350 × 120–180	240–370 × 90–120	288–560 × 124–259
No. longitudinal rows of hooks	16–18	12	12	12	12
No. large hooks per row	6–7	6	5–6	8–9	4–5
No. small hooks per row	3–4	3	2–3	2–3	2–3
Proboscis receptacle	900 × 130	550 × 90	630–810 × 100–160	220–480 × 80–110	466–586 × 95–134
Lemniscus length	1 762–2 408*	1123*	830–1 130	440–840	534–691
Testis size	1 050–1 250 × 250	620–800 × 200–220	500–1 050 × 300–520	260–660 × 120–280	368–926 × 168–432

*Calculated from figures. ** Since type host was not explicitly designated in the original description by Paggi et al. 1975, *Chlorophthalmus agassizi* is considered to be type host because acanthocephalans from this host were used for the original description of *B. lingur*.

range of numbers of large hooks per row of males (4–5 and 5–6, respectively), the smaller maximum number of small hooks per row of females (3 and 4, respectively), and shorter lemnisci (466–905 μm *vs*. 1.9–2.1 mm in females and 534–691 μm *vs*. 1.1 mm in males). The new species is distinguishable from *B. ligur* by the shorter body length of females (5.2–8.4 mm *vs*. 10.3–24.7 mm), the shorter maximum body length of males (6.0 mm *vs*. 11.5 mm), the different range of numbers of large hooks in each row of males (4–5 and 5–6, respectively), and shorter lemnisci (534–691 μm *vs*. 830–1 130 μm).

Breizacanthus aznari is the only known species of the genus infecting the intestine of a fish of the order Ophidiiformes. The other species have been recorded from the intestine of fishes of the orders Aulopiformes (Chlorophthalmidae), Gadiformes (Gadidae, Macrouridae, Phycidae), Osmeriformes (Argentinidae), Perciformes (Callionymidae, Caproidae, Mullidae), and Scorpaeniformes (Sebastidae). Finally, the new species is the first species in this genus found in the Southern Hemisphere (along the southwestern Atlantic coast of Argentina). The other species have been reported from the Northern Hemisphere: *B. chabaudi* and *B. golvani* were found in the northeastern Atlantic (both species from the Bay of Biscay), whereas *B. irenae* and *B. ligur* were described from the Mediterranean Sea (Algerian coast and Ligurian Sea, respectively).

DISCUSSION

According to the revision of the family Arhythmacanthidae by Pichelin and Cribb (1999), only three genera have a trunk completely devoid of spines, namely *Breizacanthus*, *Euzetacanthus* Golvan et Houlin, 1964, and *Paracanthocephaloides* Golvan, 1969. In the key to the arhythmacanthid genera provided by these authors, *Paracanthocephaloides* differs from the two other genera by the globular or claviform shape of the proboscis, whereas the proboscis is cylindrical in *Euzetacanthus* and *Breizacanthus*. Pichelin and Cribb (1999) distinguished *Euzetacanthus* from *Breizacanthus* by the shorter lemnisci compared to the proboscis receptacle and by the dilatations of the anterior and posterior end of the trunk, whereas the lemnisci are longer than the receptacle in *Breizacanthus*, and only the anterior end of the trunk is dilated. Nevertheless, we have observed some inconsistencies in these morphological characters in some species of both genera, according to their descriptions: (i) the lemnisci are slightly larger than the receptacle in *Euzetacanthus simplex* Golvan et Houin, 1964 (see Figs. 132 and 133 in Golvan 1969); (ii) in *E. chorinemusi* Gupta et Naqvi, 1984 and in *E. golvani* Gupta et Fatma, 1983, only the anterior body end is dilated (Gupta and Naqvi 1982, Gupta and Fatma 1983); and (iii) in *B. golvani* only the posterior body end is dilated (Gaevskaya and Shukhgalter 1984).

Table 3. Comparison of selected morphological data between *Euzetacanthus* and *Breizacanthus* obtained from the descriptions (or figures) of all species in both genera.

	Euzetacanthus Golvan et Houlin, 1964	*Breizacanthus* Golvan, 1969
References	Golvan (1969), Gupta and Naqvi (1982), Gupta and Fatma (1983)	Golvan (1969), Paggi et al. (1975), Gaevskaya and Shukhgalter (1984); present study
Species	*E. chorinemusi*, *E. golvani** and *E. simplex*	*B. aznari* sp. n., *B. chabaudi*, *B. golvani*, *B. irenae* and *B. ligur*
Host Family	Ariidae, Carangidae and Mullidae	Argentinidae, Callionymidae Caproidae, Chlorophthalmidae, Gadidae, Macrouridae, Mulidae, Ophidiidae, Phycidae and Sebastidae
Locality	Denmark coast, Indian Ocean, western Mediterranean	northeastern Atlantic, southwestern Atlantic, western Mediterranean
Female		
Body length (mm)	7.0–26.0	5.2–24.7
No. longitudinal rows of hooks	14	12, 16–18
No. large hooks per row	6–8	5–9
No. small hooks per row	2–3	2–4
Proboscis receptacle / lemnisci length ratio	1 : 0.9–1.1	1 : 0.5–0.8
Male		
Body length (mm)	6.4–16.0	3.2–11.5
No. longitudinal rows of hooks	14	12, 16–18
No. large hooks per row	5–8	4–9
No. small hooks per row	2–3	2–4
Proboscis receptacle / lemnisci length ratio	1 : 1.0–1.2	1 : 0.4–0.8

*Measurements from a single male specimen.

In Table 3, we present a comparison of biometrical data between *Euzetacanthus* and *Breizacanthus* based on the description of all species of each genus. In view of these data, we agree with Pichelin and Cribb (1999) in their advice that there are few morphological characters to separate both genera. Further study, based on molecular analyses and/or detailed morphological descriptions of type and new specimens of the species of *Euzetacanthus* and *Breizacanthus* must be performed to properly explore the validity of these genera. However, accepting the current taxonomy, we suggest that the extension of the lemnisci compared to the proboscis receptacle seems to be the most useful morphological character to distinguish both genera: lemnisci are shorter, equal or slightly longer than the receptacle in *Euzetacanthus*, whereas the lemnisci are always clearly longer in *Breizacanthus* (see Table 3).

To our knowledge, *B. aznari* is the fifth species of arhythmacanthid reported along the southwestern Atlantic coast of Argentina. The four other species recorded are: (i) *Heterosentis heteracanthus* (Linstow, 1896) from the nototheniids *Patagonotothen longipes* (Steindachner) and *P. tessellata* (Richardson) and from the channichthyid *Champsocephalus esox* (Günther) in the eastern mouth of the Beagle Channel (Laskowski and Zdzitowiecki 2009); (ii) *Heterosentis martini* Lanfranchi et Timi, 2011 from the pinguipedids *Pseudopercis semifasciata* (Cuvier) and *Pinguipes brasilianus* (Cuvier) from the coast of Miramar, Necochea, Villa Gesell, and offshore of Península Valdés (Lanfranchi and Timi 2011); (iii) *Hypoechinorhynchus magellanicus* Szidat, 1950 from the eleginopidid *Eleginops maclovinus* (Cuvier, 1830) and from the channichthyid *C. esox* in Tierra del Fuego and the eastern mouth of the Beagle Channel (Szidat 1950, Laskowski and Zdzitowiecki 2009); and (iv) *Hypoechinorhynchus* sp. from the atherinopsidids *Odontesthes smitti* (Lahille) and *Odontesthes nigricans* (Richardson), in the Patagonian coast (Carballo et al. 2011).

Acknowledgements. We are indebted to R. Míguez-Lozano, A. Juan-García, N. Vera, M. Ferrer-Montell, S. Leonardi and V. Barraza for their technical assistance. Thanks are also given to Prefectura Naval Argentina and ALPESCA S.A. for allowing us to collect our material on the hake trawlers. This study was supported by the following projects: BBVA project n. BIOCON 04, AGL2010-20892 from the Spanish Government, PROMETEO 2011-040 of the Valencian Government and the Czech Science Foundation (No. P505/12/G112). J.S.H.O. received a PhD student grant from the National Council on Science and Technology (CONACyT) of the Mexican Government for the PhD program in Biodiversity and Evolutionary Biology of the Cavanilles Institute of Biodiversity and Evolutionary Biology, of the University of Valencia (scholarship number 197266). Institutional support was given by the Centro Nacional Patagónico (CONICET, Argentina) and the Institute of Parasitology (RVO:60077344).

REFERENCES

Bush A.O., Lafferty K.D., Lotz J.M., Shostak A.W. 1997: Parasitology meets ecology on its own terms: Margolis et al. revisited. J. Parasitol. 83: 575–583.

Carballo M.C., Navone G.T., Cremonte F. 2011: Parasites of the silversides *Odontesthes smitti* and *Odontesthes nigricans* (Pisces: Atherinopsidae) from Argentinean Patagonia. Comp. Parasitol. 78: 95–103.

Gaevskaya A.V., Shukhgalter O.A. 1984: [Species composition, ecological-geographical peculiarities and formation of the acanthocephalan fauna of the North-East Atlantic.] Biol. Morya 3: 349–375. (In Russian.)

Golvan Y.J. 1969: Systematique des acanthocéphales (Acanthocephala Rudolphi, 1801). L'ordre des Palaeacanthocephala Meyer 1931. I. La super-famille des Echinorhynchoidea (Cobbold, 1876) Golvan et Houin 1963. Mem. Mus. Natl. Hist. Nat. 57: 1–373.

Gupta V., Fatma S. 1983: On some acanthocephalan parasites of fishes. Ind. J. Helminthol. 35: 137–154.

Gupta V., Naqvi M. 1982: On some acanthocephalan parasites of marine fishes from India and Pakistan. Ind. J. Helminthol. 34: 61–84.

Lanfranchi A.L., Timi J.T. 2011: A new species of *Heterosentis* Van Cleave, 1931 (Acanthocephala, Arhythmacanthidae), a parasite of pinguipedid fishes in the southwest Atlantic. J. Parasitol. 97: 111–115.

Laskowski Z., Zdzitowiecki K. 2009: Occurrence of acanthocephalans in notothenioid fishes in the Beagle Channel (Magellanic sub-region, sub-Antarctic). Pol. Polar Res. 30: 179–186.

Muñoz G., George-Nascimento M. 2002: *Spiracanthus bovichthys* n. gen. n. sp. (Acanthocephala: Arhythmacanthidae), a parasite of littoral fishes of the central south coast of Chile. J. Parasitol. 88: 141–145.

Paggi L., Orecchia P., Della Seta G. 1975: Su di un nuovo acantocefalo *Breizacanthus ligur* sp. n. (Palaeacanthocephala: Arhythmacanthidae Yamaguti, 1935) parassita di alcune specie di pesci bentonici del Mar Ligure. Parassitologia 17: 8–94.

Pichelin S., Cribb H. 1999: A review of the Arhythmacanthidae (Acanthocephala) with a description of *Heterosentis hirsutus* n. sp. from *Cnidoglanis macrocephala* (Plotosidae) in Australia. Parasite 6: 293–302.

Szidat L. 1950: Los parásitos del róbalo ("*Eleginops maclovinus*" Cuv. & Val.). Primer Congreso Nacional de Pesquería Marítimas e Industrias Derivadas. Mar del Plata, Buenos Aires, October 1949, 2: 235–270.

Received 27 April 2012

Accepted 29 August 2012