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VERSITA

A new species of *Hysterothylacium* (Ascaridoidea, Anisakidae) parasitic in *Zenopsis conchifer* (Zeiformes, Zeidae) from Argentinean waters

María A. Rossin[1]*, Luciana L. Datri[2], Inés S. Incorvaia[2] and Juan T. Timi[1]

[1] Laboratorio de Parasitología, Facultad de Ciencias Exactas y Naturales, Universidad Nacional de Mar del Plata – Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Funes 3350, (7600) Mar del Plata, Argentina
[2] Laboratorio de Parasitología, Instituto Nacional de Investigaciones y Desarrollo Pesquero (INIDEP), Paseo Victoria Ocampo N° 1, Escollera Norte, (7600) Mar del Plata, Argentina

Abstract

A new species of parasitic nematode, *Hysterothylacium spirale* sp. nov. (Ascaridoidea, Anisakidae), is described based on specimens collected from the intestine and pyloric caeca of the silvery john dory *Zenopsis conchifer* (Lowe) (Zeiformes, Zeidae), from the Argentinean Shelf (35°05′-40°46′S, 53°03′-58°07′W). Among the 66 valid species described so far in the genus, the new species most closely resembles *H. zenis* (Baylis, 1929). Both species, apparently specific for fishes of the family Zeidae, share the shape of the dorsal lip, the long expanded lateral alae originating from subventral interlabia and the ornamentation of the tail tip, as well as general morphometry. The combination of these shared features distinguishes both species from all congeners so far known. However, the new species is distinguishable from *H. zenis* by having shorter interlabia, and consequently the lateral alae originating more posteriorly, shorter spicules, a smaller number of postcloacal papillae and the presence of two pairs of double postcloacal papillae.

Keywords

Nematoda, new species, *Hysterothylacium*, fish, *Zenopsis conchifer*, systematics, Argentine Sea

Introduction

Adult anisakid nematodes of the genus *Hysterothylacium* Ward et Magath, 1917 are common parasites in the digestive tract of fishes in marine, brackish and freshwater environments (Deardorff and Overstreet 1980, Bruce *et al*. 1994, Li *et al*. 2007). This genus currently includes 65 worldwide described species from fishes (Li *et al*. 2008) and a unique species from amphibians, recently described in the USA (Raffel and Anderson 2009).

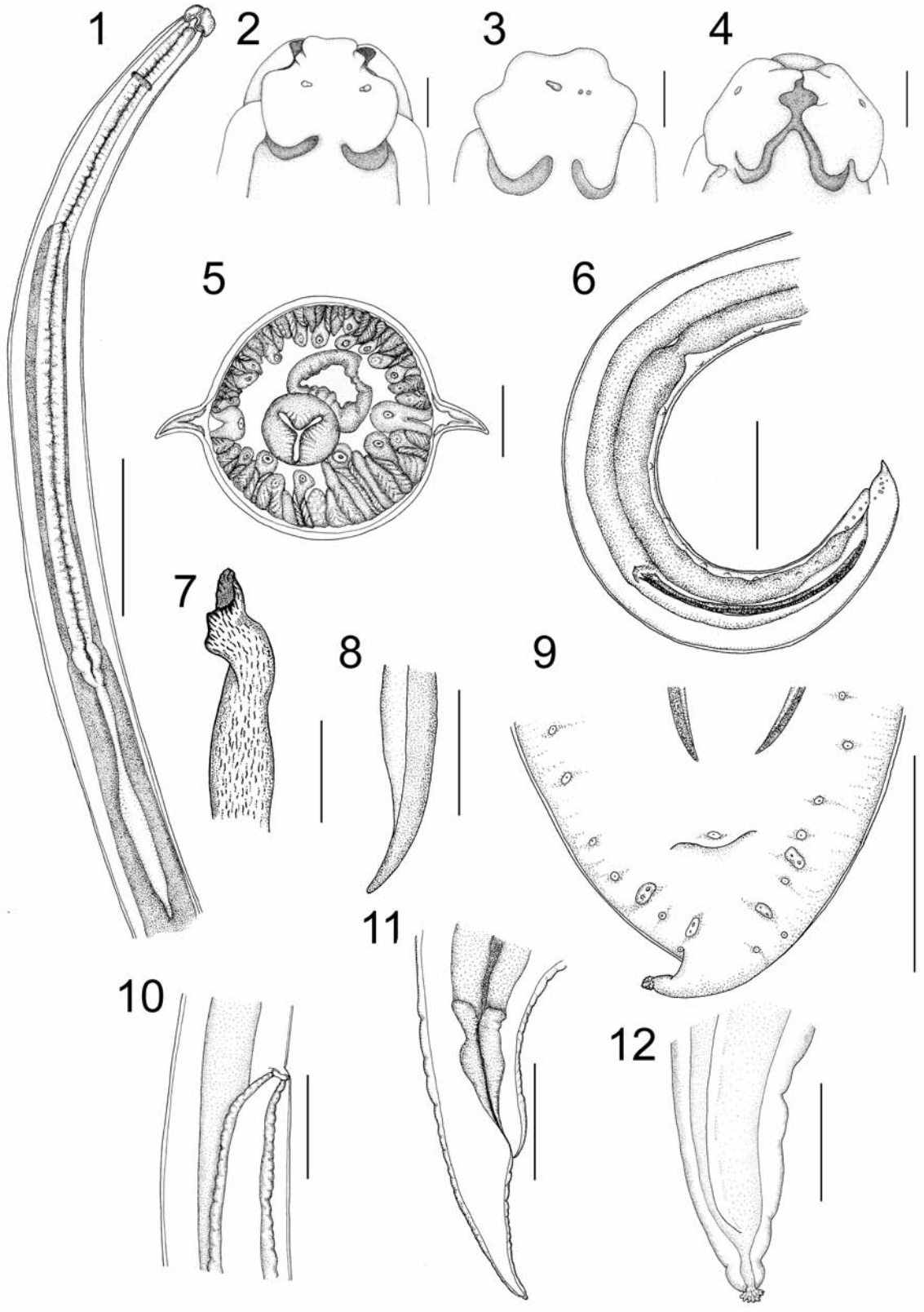
At present only two species of this genus have been reported in marine fishes from Argentina, *H. aduncum* (Rudolphi, 1802) at both larval and adult stages (Navone *et al*. 1998) and an unidentified species at larval stage broadly distributed among coastal fishes (Timi 2007).

During a parasitological survey of the silvery john dory *Zenopsis conchifer* (Lowe) (Zeidae, local name San Pedro), fish were found infected by adult nematodes referable to the genus *Hysterothylacium*. These specimens are herein described as a new species.

Materials and methods

A total of ten fresh specimens of *Zenopsis conchifer*, caught by trawl during the research cruise EH-04/09 (May 2009 between 35°05′-40°46′S and 53°03′-58°07′W, were examined for parasitic nematodes immediately after capture. Fish were dissected, and the intestines were removed and examined under a stereoscopic microscope. Worms collected were washed in marine water, fixed in hot 4% formaldehyde solution, stored in 70% ethanol, cleared in lactic acid and then studied and measured by light microscopy. Drawings were made using a drawing tube. For scanning electron microscopy (SEM), specimens were dehydrated using an ethanol gradient, dried by evaporation with hexamethyldisilazane, coated with gold pal-

*Corresponding author: mrossin@mdp.edu.ar



Figs 1–12. *Hysterothylacium spirale* sp. nov. **1.** Anterior end, ventral view. **2.** Dorsal lip. **3.** Subventral lip. **4.** Ventral interlabium. **5.** Cross section at level of oesophagus. **6.** Male, posterior end, lateral view. **7.** Basal portion of spicule. **8.** Distal end of spicule. **9.** Detail of male tail, ventral view. **10.** Region of vulva; lateral view. **11** and **12.** Female tail. Scale bars = 2 mm (1); 125 μm (2–4, 7, 8, 12); 250 μm (5, 9); 500 μm (6, 11); 1 mm (10)

ladium, and scanned in a JEOL JSM 6460-LV scanning electron microscopy. All measurements are given in micrometres, unless otherwise indicated, with mean followed by range in parentheses. Prevalence and mean intensity were calculated according to Bush *et al*. (1997). The material studied was deposited in the Helminthological Collection of the Museo de La Plata (CHMLP), La Plata, Argentina.

Results

***Hysterothylacium spirale* sp. nov.** (Figs 1–20)

Description

General: Large-sized worms, body tightly coiled along its length, cuticle striated. Lateral alae originating from subventral interlabia and extending along entire body length; they are very broad, but reduced towards tail. Anterior end with three lips; dorsal lip slightly wider and shorther than subventrals, with deep postlabial grooves and prominent lateral flanges; anterior third of lip trapezoidal followed by basal region rectangular in shape. Anterior margin of each lip with four lobes. Dorsal lip with 2 lateral double papillae; subventral lips each with one amphid, one single papilla and one double papilla. Interlabia well developed, triangular, longer than wide, about 1/2 length of lips. Oesophagus representing 10–12% of body length. Ventricular appendix shorter than intestinal caecum (appendix-to-caecum ratio 1:0.45–0.80). Ventriculus longer than wide. Nerve ring encircling oesophagus at about one-tenth of its length. Excretory pore slightly posterior to end of nerve ring. Rectum straight, surrounded by 3 large spherical rectal glands. Tail tip with minute nodulose protuberances in both sexes.

Male (based on 5 specimens): Body 61.02 (33.04–78.10) mm long, maximum width 830 (440–1120). Dorsal lip 189 (105–225) long, 239 (143–325) wide. Subventral lips 203 (125–275) long, 224 (130–300) wide at base. Subventral interlabia 107 (68–133) long, 67 (43–78) wide at base; ventral interlabium 97 (58–125). Lateral alae 112 (100–140) wide at level of oesophagus. Oesophagus 70.05 (50.80–10.42) mm, representing 12 (9–15)% of body length, 352 (260–460) wide. Ventriculus 356 (200–460) long, 248 (144–340) wide. Nerve ring and excretory pore at 839 (536–1136) and 894 (624–1152) from anterior end, respectively. Ventricular appendix 2.52 (1.54–3.34) mm long, representing 36 (30–41)% of oesophagus length; intestinal caecum 4.53 (3.20–6.04) mm long, representing 65 (58–80)% of oesophagus length; ventricular appendix-intestinal caecum ratio 1:0.45–0.71. Tail 180 (126–225) long. Ejaculatory duct 3.60 (2.07–4.23) mm long. Spicules slender, alate except at its tip, with wrinkled surface more evident at base, subequal, right spicule 1435 (966–1775) long, left spicule 1550 (1197–1837) long, representing 2.60 (1.90–3.60)% of body length. Two subventral rows of 21–27 precloacal caudal papillae, changing from button to mamillate from 5–6th anterior to cloaca; 1 adcloacal and 4 postcloacal pairs of papillae, of these first and third pairs double; fourth pair lateral to second double papilla. Phasmids located at short distance from last double papilla. One inconspicuous median papilla located on anterior lip of cloaca.

Female (based on 5 gravid specimens): Body 73.97 (51.36–89.70) mm long, maximum width 1276 (740–1720). Dorsal lip 210 (138–243) long, 301 (175–350) wide. Subventral lips 242 (138–325) long, 261 (213–313) wide. Subventral interlabia 129 (88–165) long, 88 (56–125) wide at base; ventral interlabium 111 (88–138). Lateral alae 120 (110–130) wide at the level of oesophagus. Oesophagus 7.03 (5.08–10.42) mm long, representing 10 (9–11)% of body length, 193 (100–390) wide. Ventriculus 462 (230–750) long, 242 (160–400) wide. Nerve ring and excretory pore at 1040 (740–1260) and 1108 (770–1380) from anterior end, respectively. Ventricular appendix 2.70 (1.54–3.60) mm long, representing 36 (28–50)% of oesophagus length; intestinal caecum 4.71 (3.22–5.90) mm long, representing 62 (58–68)% of oesophagus length; ventricular appendix-intestinal caecum ratio 1:0.48–0.80. Tail 538 (360–670) long. Vulva without prominent lips, slightly post-equatorial, located at 40.02 (29.20–45.72) mm of anterior end (55 [51–59]% of body length). Vagina directed posteriorly from vulva, 1775 (1150–2400) long; 375 (230–570) wide. Uteri opposed. Eggs in uterus 65 (53–82) long by 54 (43–75) wide.

Host: *Zenopsis conchifer* (Pisces, Zeidae).

Site of infection: Intestine and pyloric caeca.

Type locality: Patagonian Shelf, South-West Atlantic Ocean (35°05′-40°46′S, 53°03′-58°07′W).

Date of collection: August 2009.

Prevalence: 100%

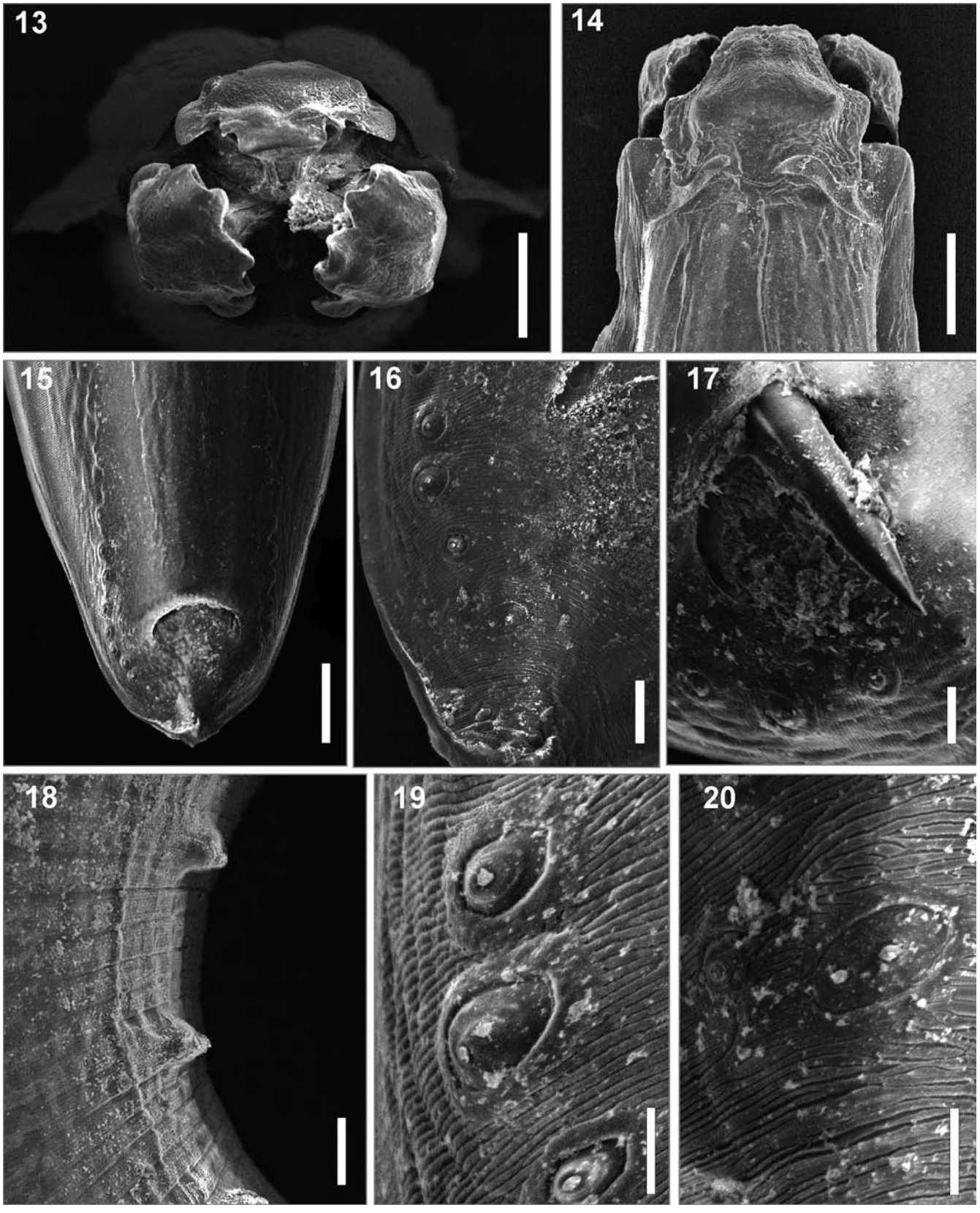
Mean intensity: 3 nematodes per infected host (range 1–10).

Type specimens: Holotype: 1 male (HCMLP coll. no. 6336). Allotype: 1 female (HCMLP coll. no. 6337). Paratypes: 2 males and 2 females (HCMLP coll. no. 6338).

Etymology: The specific Latin name *spirale* (= spiral) is an adjective of the neuter gender and refers to the tightly coiled condition of this nematode.

Discussion

Among the 66 know species in the genus (Li *et al*. 2008, Raffel and Anderson 2009), the new species closely resembles *H. zenis* (Baylis, 1929), described originally as *Contracaecum zenis* from the zeid host *Zeus capensis* Valenciennes from South Africa (Baylis 1929) and redescribed from specimens from *Zenopsis nebulosa* (Temminck et Schlegel) from eastern Australia (Bruce 1990). The latter author also regarded *H. zenopsis* described from *Z. nebulosa* from Japan by Yamaguti (1941) as a junior synonym of *H. zenis*. This species was included in the key by Li *et al*. (2007) as lacking ornamentation on the tail tip. However, whereas the ornamentation is not evident as in other species, its tail tip is provided with a small



Figs 13–20. *Hysterothyacium spirale* sp. nov. **13.** Anterior end, apical view. **14.** Anterior end, dorsal view. **15–16.** Male posterior end, ventral. **17.** Spicule tip. **18.** Male, mamillate precloacal papillae, lateral view. **19.** Male, anterior double postcloacal papilla. **20.** Male, posterior double postcloacal papilla. Scale bars = 100 μm (13–15); 20 μm (16, 17); 50 μm (18); 10 μm (19, 20)

finely nodulose nipple like process, as described by Yamaguti (1941) and Bruce (1990). *Hysterothylacium zenis*, apparently specific for fishes of the family Zeidae, shares with the new species the shape of the dorsal lip, the long expanded lateral alae originating from subventral interlabia and the ornamentation of the tail tip, as well as general morphometry, especially when the specimens described by Yamaguti (1941) are concerned, because measurements provided by Bruce (1990) correspond to smaller specimens. The combination of these shared features distinguishes both species from all congeners so far known (Li *et al*. 2007, Raffel and Anderson 2009). However, the new species is distinguishable from the *H. zenis* by having (1) shorter interlabia, and consequently the lateral alae originating more posteriorly (at the midlength of rectangular flanges in the dorsal lip, rather than at level of the anterior margin of rectangular flanges); (2) shorter spicules, representing 1.91–2.92% of body length, instead of 4.67–7.08%; (3) a smaller number of postcloacal papillae (4 instead of 5–7), although phasmids were probably included in the count by both Yamaguti (1941) and Bruce (1990); and (4) the presence of two pairs of double postcloacal papillae rather than only one pair; although Bruce (1990) found an extra double papillae on the right side of a male tail. On the basis of the differences listed above, a new species, *Hysterothylacium spirale*, is proposed.

A striking feature of the new species is the tightly coiled condition of living specimens, which were impossible to stretch, even when using hot fixatives. Although this condition was not described by Bruce (1990) for *H. zenis*, the author refers to that "most specimens were tightly coiled" when described male papillae.

The new species represents the second species of *Hysterothylacium* described in the Argentine Sea, with only *H. aduncum* known previously in several fish species (Navone *et al*. 1998).

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