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First record of the genus *Syncuaria* (Nematoda: Acuariidae) in Argentina, with description of a new species

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Abstract. The nematode genus *Syncuaria* Gilbert, 1927 (Acuariidae) is reported for the first time from Argentina with two species parasitic in Threskiornithidae. *Syncuaria plegadisi* sp. n. from the white-faced ibis, *Plegadis chihi* (Vieillot), is described and figured. The new species differs from known species of *Syncuaria* by the following characters: absence of lateral alae; cephalic cordons narrow, consisting of cuticular plates dorsally and ventrally invaginated forming a groove; presence of cephalic spines; spicules with simple, rounded distal ends; left spicule two to three times longer than right one; female tail dorsally bent and distance between vulva and anus comparable to tail length. *Syncuaria diacantha* Petter, 1961, a common parasite of the roseate spoonbill, *Platalea ajaja* L., is reported for the first time from Argentina and briefly described. SEM micrographs for both species are provided. Both *S. plegadisi* sp. n. and *S. diacantha* were found to co-occur in the same locality, but not on the same host, suggesting a high degree of host specificity.

Members of the genus *Syncuaria* Gilbert, 1927 (syn. *Skrjabinocara* Kurashvili, 1940; *Chordocephalus* Alegret, 1941; *Decorataria* Sobolev, 1949) parasitise a relatively narrow range of aquatic birds, in which they are found characteristically under the gizzard lining. Their hosts are piscivorous birds belonging to the orders Pelecaniformes, Ciconiiformes and Podicipediformes (Wong et al. 1986). A revision of *Syncuaria* was made (Wong et al. 1986), in which nine valid species were recognised and six species were regarded as *species inquirendae*. New species of *Syncuaria* have not been described since.

In this paper, members of the genus *Syncuaria*, represented by two different species, are reported for the first time from birds from Argentina. Both species are parasitic in Threskiornithidae. *Syncuaria diacantha* Petter, 1961 was found in the type host, the roseate spoonbill *Platalea ajaja* L. The second species, recovered from under the gizzard lining of the white-faced ibis, *Plegadis chihi* (Vieillot), is regarded as a new species of the genus and described as *Syncuaria plegadisi* sp. n.

MATERIALS AND METHODS

Hosts, *P. chihi* (n = 83) and *P. ajaja* (n = 1) were shot between April 1993 and December 1997 at the localities of Punta Blanca, Ramallo and Guaminí, province of Buenos Aires, Argentina, and their gizzards were examined for nematodes. Nematodes were fixed in hot 70% ethanol, preserved in 70% ethanol and cleared in lactophenol or in glycerine for further examination. Specimens intended for SEM study were dehydrated in ethanol, dried by the critical point technique, coated with gold and examined in a JEOL JSM T100 microscope. Drawings were made with a camera lucida. Measurements (minimum, maximum, followed by mean and standard deviation in parentheses) are given in micrometers, unless otherwise stated. Type specimens of the following species were re-examined: *Syncuaria diacantha* Petter, 1961, Muséum National d'Histoire Naturelle, Paris, France (MNHN) Coll. No. 247BA; *Syncuaria bressoui* Gretillat, 1970, MNHN Coll. No. 1040H and *Dispharagus calcaratus* Molin, 1860, Naturhistorisches Museum, Vienna, Austria Coll. No. 6554.

RESULTS

Family Acuariidae Raillet, Henry et Sisoff, 1912

Syncuaria plegadisi sp. n. Figs. 1-16

Description: Lateral alae absent. Oral opening laterally compressed. Pseudolabia with conical apex, T-shaped in apical view. Buccal capsule continuous with pseudolabia, bearing at the anterior end two pairs of dorsal and ventral teeth. Cephalic cordons narrow, consisting of cuticular plates dorsally and ventrally invaginated, forming a groove. Cordons arise dorsally and ventrally between pseudolabia and they anastomose on lateral sides near muscular and glandular oesophagus junction. Pair of large papillae and outlet of amphid laterally situated at the base of each pair of cordons. Pair of small spines, dorsally and ventrally situated between bases of cordons. Deirids simple, immediately posterior to the point where cordons anastomose. Excretory pore simple, at mid-length of cordons. Nerve ring at level of junction of buccal capsule and muscular portion of the oesophagus.

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Male (n = 10): Total length 4.25-5.70 mm (4.98, 0.50). Maximum width 142-228 (197, 22.2). Cordons 17-24 (21.5, 2.3) wide. Nerve ring and excretory pore at 130-213 (163, 23.1) and 189-313 (242, 42.4), respectively, from anterior end. Deirids at 349-620 (428, 88.3) from anterior end. Buccal capsule 125-175 (156, 16.5) long. Length of muscular oesophagus 0.27-0.50 mm (0.40, 0.06). Glandular oesophagus 2.02-2.82 mm (2.27, 0.23). Total oesophagus 2.43-3.19 mm (2.67, 0.23). Posterior end more or less curved. Four pairs of precloacal and five pairs of postcloacal subventral pedunculate papillae. Sixth pair of postcloacal papillae sessile, smaller, internal to fifth pair. Left spicule long, with simple distal end, 230-300 (262, 22.3) long. Right spicule short, wide and spatulate, with deep median groove and rounded, simple distal end, 85-140 (107, 16.1) long. Spicule ratio: 1 : 2.1-2.9. Tail 110-150 (125, 12.2) long.

Female (n = 10): Total length 7.60-12.30 mm (10.03, 1.55). Maximum width 285-342 (308, 22.4). Cordons 36-46 (40.6, 5.0) wide. Nerve ring and excretory pore at 141-283 (212, 50.7) and 230-427 (312, 81.8), respectively, from anterior end. Deirids at 421-869 (633, 148.3) from anterior end. Buccal capsule 180-250 (215, 20.4) long. Muscular oesophagus 0.39-0.77 mm (0.59, 0.10). Glandular oesophagus (n = 2) 2.89-3.48 mm (3.19, 0.41). Monodelphic. Ovijector consisting of two parts, a proximal long and muscular one, continuous with uterus, and a short distal one, not muscular. Vulva with anterior cuticular inflation, at 110-160 (129, 18.6) from posterior end. Tail very short, 55-80 (69, 8.4), dorsally reflexed at a right angle with the body, the anus easily perceived as terminal. Phasmids sessile, ventrolateral, very near to posterior end. Eggs oval, thick-shelled, embryonated, 30.7-35.5 long and 18.2-20.1 wide.

Type host: *Plegadis chihi* (Vieillot) (Ciconiiformes, Threskiornithidae).

Type locality: Punta Blanca (34°56'S; 57°41'W), province of Buenos Aires, Argentina.

Other localities: Guaminí lagoon (37°00'S; 62°29'W) and Ramallo (33°28'S; 60°2'W) province of Buenos Aires, Argentina.

Date of collection of holotype: July 1994.

Site: Gizzard.

Prevalence: 60.2 % (50 of 83 hosts examined).

Intensity of infection: 1-15 (mean = 3.4) per infected host.

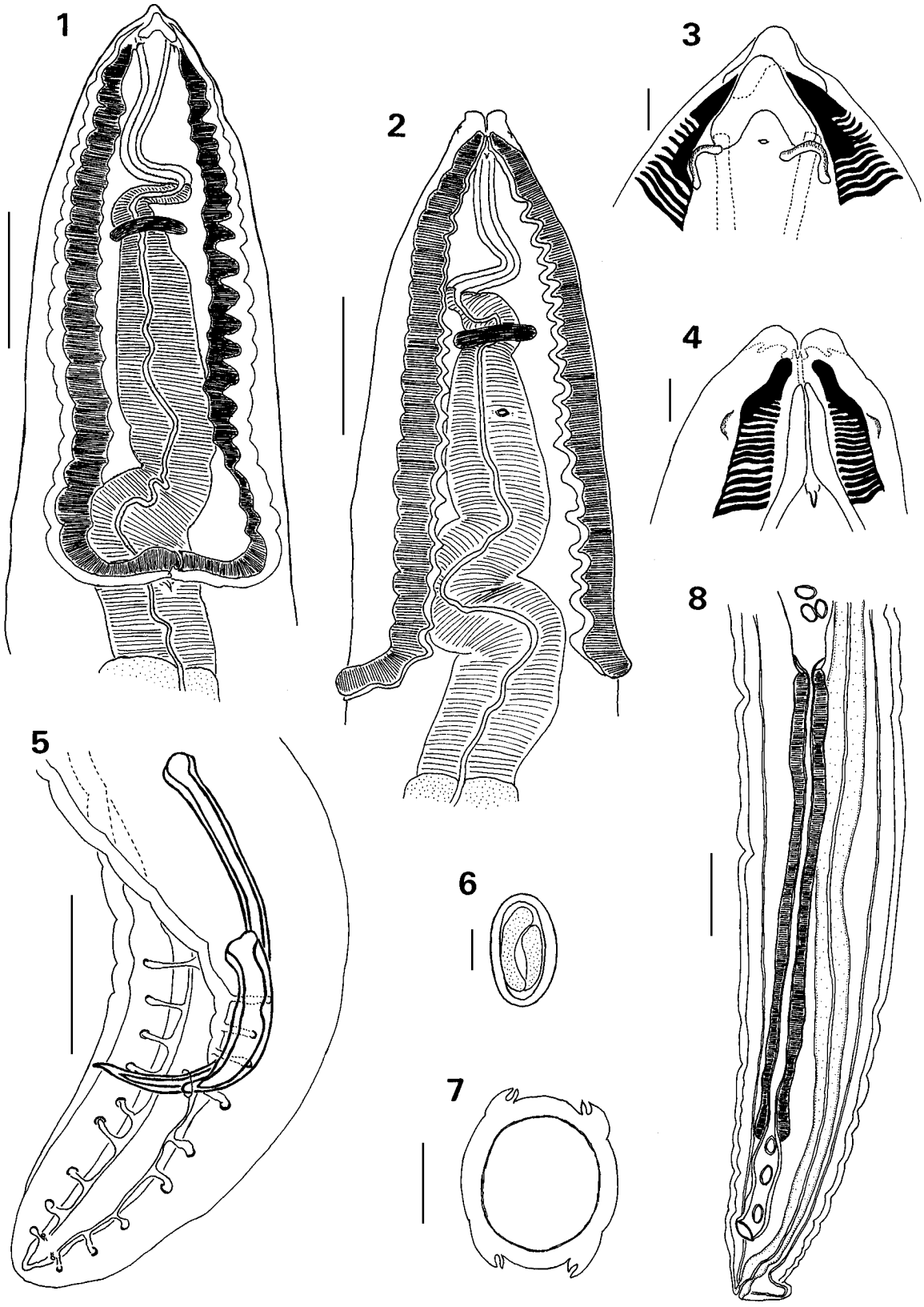
Etymology: The species is named after its host.

Type material: Deposited in the Helminthological Collection of La Plata Museum. Holotype (male) No. 3714/3; allotype (female) No. 3702/4. Paratypes: No. 3701/4 (4 males, 8 females); No. 3741/5 (1 female); No. 3713/5 (3 males); No. 3734/5 (2 males). Two paratypes (1 male, 1 female) in the Institute of Parasitology, České Budějovice, Czech Republic, No. N-749.

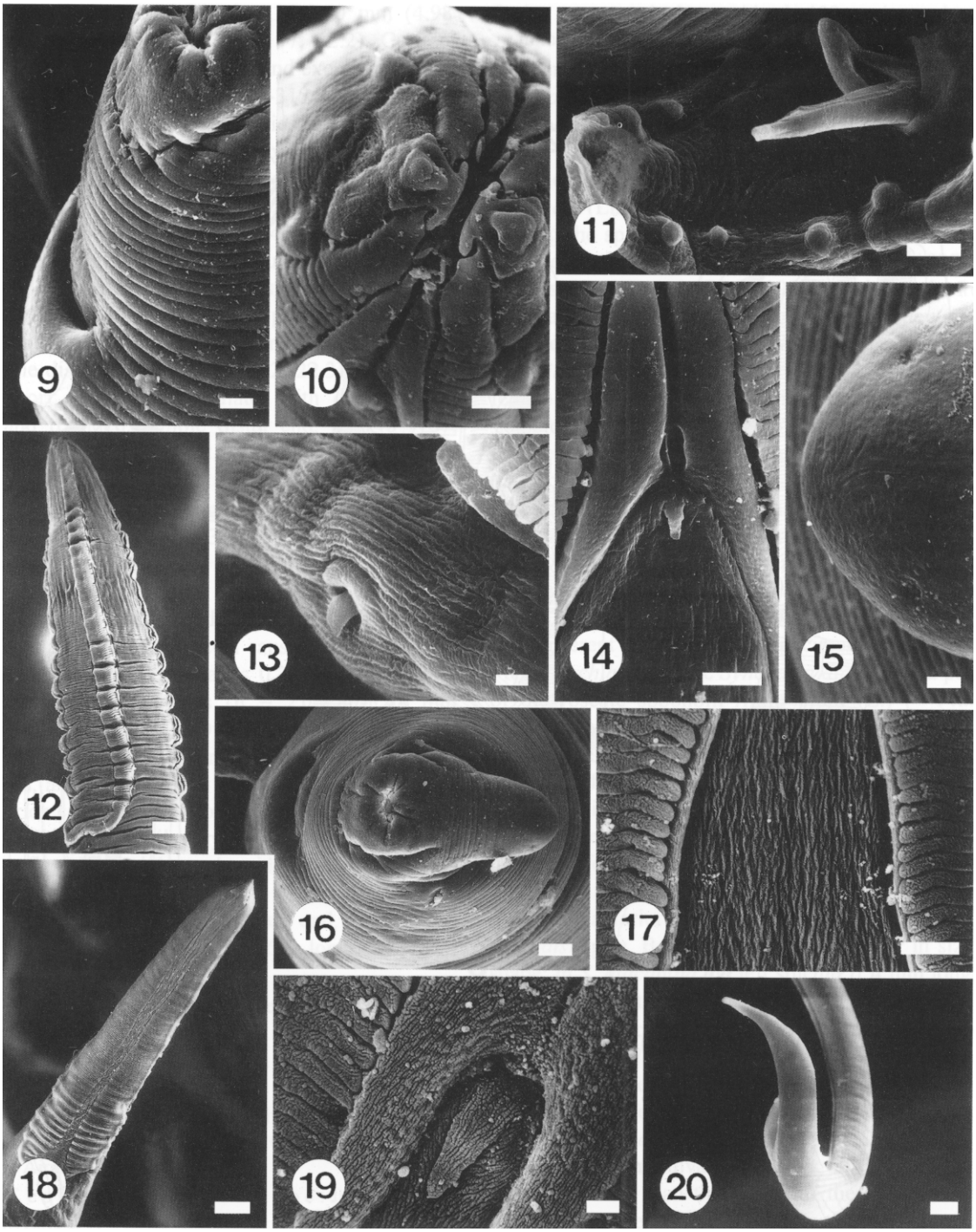
Other material studied: 130 specimens deposited in the Helminthological Collection of La Plata Museum.

Comments: When compared with known species of *Syncuaria*, specimens obtained from *Plegadis chihi* can be readily distinguished from *S. leptoptili* (Gedoelst, 1916), *S. bressoui* Gretillat, 1970, *S. hargilae* (Baylis et Daubney, 1923), *S. buckleyi* (Ali, 1957) and *S. squamata* (Linstow, 1883) by the absence of lateral alae. Among the species lacking lateral alae the new species may be compared with *S. ciconiae* Gilbert, 1927 (type species), *S. decorata* (Cram, 1927), *S. diacantha* Petter, 1961 and *S. longialula* Wang, 1976. The new species can be distinguished from *S. ciconiae*, parasitic in *Ciconia nigra* L. from Europe by the dorsally reflexed female tail, shorter spicules, different spicule ratio and shape of the deirids, which in *S. ciconiae* are bifurcated. It differs from *S. decorata*, parasitic in *Podiceps auritus* (L.) from North America by the smaller body size, shorter spicules, shape of female tail and morphology and size of the cordons, which are narrower and of the same width throughout their length. It also differs from *S. longialula*, parasitic in *Podiceps nigricollis* Brehm from China, by the shape of female tail, shorter spicules and different spicule ratio. Specimens obtained from *Plegadis chihi* resemble *Syncuaria diacantha*, a parasite of the roseate spoonbill *Ajaia ajaja* (L.) (= *Platalea ajaja* L.), as they share not only the lack of lateral alae, but the presence of cephalic spines and the female tail dorsally reflexed. In addition, they are both parasitic in Threskiornithidae. However, compared with *S. diacantha*, specimens from *P. chihi* are observed to have many differences. Cephalic cordons, which in *S. diacantha* are characteristically wide, covering nearly the whole anterior end, are consistently narrower in *S. plegadisi* sp. n. Both spicules are dissimilar in size and shape: in *S. diacantha* the left spicule, 1.4 mm long, has a small outgrowth at distal end and the right spicule, 280 μm long, has a characteristic shape, the distal end being double. In *S. plegadisi* both spicules are much shorter and with rounded, simple distal ends. Spicule ratio is also different, being about 1 : 5 in *S. diacantha* and 1 : 2.1-2.9 in *S. plegadisi.* In females of *S. plegadisi*, the distance between vulva and anus is only slightly longer, or even shorter than the length of the tail (ratio = 1 : 0.37-1.28), whereas in *S. diacantha* the distance is considerably longer than the tail (ratio = 1 : 2.33-3.20).

Other South American species of *Syncuaria*: *S. calcarata* (Molin, 1860) Sobolev, 1943 from *Aramus guarauna* (L.) and *S. longeornata* (Molin, 1860) Skrjabin et al., 1965 from *Ciconia maguari* Gmelin, both from Brazil, have been regarded as *species inquirendae* as they were inadequately or incompletely described, and they will only be validated on the basis of material from the type hosts and localities (Wong et al. 1986). Wong et al. (1986) provided a redescription of *S. calcarata* based on three females, stating that in all of



Figs. 1-8. *Syncuaria plegadisi* sp. n. from *Plegadis chihi*. **Fig. 1.** Anterior end, lateral view. **Fig. 2.** Anterior end, ventral view. **Fig. 3.** Cephalic extremity, lateral view. **Fig. 4.** Cephalic extremity, ventral view. **Fig. 5.** Posterior end of male. **Fig. 6.** Egg. **Fig. 7.** Schematic cross section of cordons. **Fig. 8.** Posterior end of female. Scale bars: Figs. 1, 2, 5, 8 = 0.1 mm; Figs. 3, 4, 6 = 0.01 mm; Fig. 7 = 0.05 mm.



Figs. 9-16. *Syncuaria plegadisi* sp. n. from *Plegadis chihi*. **Fig. 9.** Vulvar aperture of female. **Fig. 10.** Anterior end, apical view. **Fig. 11.** Posterior end of male. **Fig. 12.** Anterior end. **Fig. 13.** Deirid. **Fig. 14.** Spine. **Fig. 15.** Phasmids of female. **Fig. 16.** Posterior end of female, apical view. **Figs. 17-20.** *Syncuaria diacantha* Petter, 1961 from *Platalea ajaja.* **Fig. 17.** Ventral view of cordons. **Fig. 18.** Anterior end, lateral view. **Fig. 19.** Spine. **Fig. 20.** Distal end of left spicule. Scale bars: Figs. 9, 10, 14, 17 = 5 μm; Figs. 11, 16, 20 = 10 μm; Figs. 12, 18 = 50 μm; Figs. 13, 15, 19 = 2 μm.

them the tail was dorsally reflexed. However, some doubt arises when examining the figure, which does not agree with the description in the text. In view of that, types of *S. calcarata* were re-examined in order to compare them with the specimens from *Plegadis chihi*. As originally stated in the text, the female tail is indeed dorsally reflexed (figure erroneous). However, no cephalic spines at the anterior end comparable to those of *S. diacantha* or *S. plegadisi* were observed. Types of the second South American species, *S. longeornata*, from *Ciconia maguari* from Brazil, are unfortunately lost (H. Sattmann, pers. comm.).

Syncuaria diacantha Petter, 1961 Figs. 17-20

New geographic record. All morphological features coincide with the original description of Petter (1961). Measurements (based on two male specimens): Total length 7.50-7.60 mm. Maximum width 242-260. Cordons 600-613 long by 60-72 wide. Space between cordons of the same pair: 20. Cephalic spines and deirids at 33-37 and 620-623 from anterior end, respectively. Nerve ring at 210 from anterior end. Excretory pore not seen. Length of muscular oesophagus 0.26-0.27 mm. Glandular oesophagus 3.60-3.75 mm. Left spicule 930-1140. Right spicule 155-160. Tail 210-225.

H o s t : *Platalea ajaja* L. (Type host).

L o c a l i t y : Guaminí, province of Buenos Aires, Argentina.

S i t e : Gizzard.

M a t e r i a l e x a m i n e d : Three males deposited in the Helminthological Collection of La Plata Museum, No. 4301/4.

Comments: *S. diacantha* was originally described from a bird held in captivity at the Jardin des Plantes, Paris, France (exact provenance unknown). Since the description, the species was reported from the same host from Cuba (Baruš 1966) and Florida, USA (Sepúlveda et al. 1994). The present report of *S. diacantha* in South America, in the southern boundary of *P. ajaja* distribution, confirms the presence of the parasite throughout the distribution range of its host.

DISCUSSION

The cephalic spines between bases of cordons seem to be a part of the differential diagnosis in species of *Syncuaria*, as they can be present (*S. squamata*, *S. diacantha*, *S. plegadisi* sp. n.) or absent (*S. calcarata, S. bressoui*). Their absence is assumed for the remaining species of the genus, as they have not been mentioned by the different authors. It is interesting to take into account that, while redescribing *S. squamata* and *S. diacantha*, Wong et al. (1986) neither figured nor mentioned cephalic spines, although *S. diacantha* was named after the strong development of such spines (Petter 1961), and similar structures are seen in a SEM micrograph of *S. squamata* (Wong and Anderson 1987). It is thought that the presence of cephalic spines, as well as the shape of the female tail are also useful characters to differentiate species of *Syncuaria*, together with cordon morphology and size, length and morphology of spicules and presence or absence of lateral alae (Wong et al. 1986).

The transmission mechanism for *S. plegadisi* is unknown. Life cycle and development within species of *Syncuaria* are well known for *S. squamata*, parasitic in cormorants from Europe (Kurochkin 1958, Moravec and Scholz 1994) and North America (Wong and Anderson 1987). In both cases ostracods are known to be the intermediate host, and fishes were demonstrated to act as paratenic hosts in the former (Moravec and Scholz 1994). Two other species of Acuarioidea belonging to the genus *Desportesius*, *D. invaginatus* and *D. brevicaudatus*, are known to utilise different groups of invertebrates, i.e. ostracods and dragonfly larvae, respectively, as intermediate hosts (see Moravec and Scholz 1994).

Food habits of *Plegadis chihi* are relatively unspecialised, the bird preying mainly on invertebrates (adult insects and larvae, snails, crustaceans), but also marginally on small fishes (Navas 1995, Matheu and del Hoyo 1992). The proventricular content of the examined *P. chihi* was composed mainly of snails of the genus *Pomacea*, terrestrial isopods, coleopterans, and, to a lesser extent, of crabs and dragonfly larvae, showing a very low proportion of fish in their diet. The high prevalence of *S. plegadisi* suggests that the first intermediate hosts might be some common food item like dragonfly larvae, aquatic coleopterans or crabs, although this aspect needs further study.

For *S. diacantha*, the source of infection is also unknown. The food content of the host consisted mainly of juvenile fish, *Odontesthes bonariensis* (Cuvier et Valenciennes) (Atherinidae) (D. Colautti, pers. comm.). This indicates a relatively specialised, piscivorous diet, suggesting that the infection might mainly proceed through a paratenic fish host.

Syncuaria plegadisi sp. n. and *S. diacantha* were found to co-occur in Guaminí lagoon, province of Buenos Aires. The wider food range of *Plegadis chihi* probably gives this host a greater chance to acquire an infection with both species. However, no specimens of *P. chihi* were infected with *S. diacantha*. A high degree of host specificity of both species of *Syncuaria* is then suggested.

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