NOTA CORTA

# Eyes wide open: First record of eyeworms of genus *Oxyspirura* (Nematoda-Thelaziidae) in Argentina

# Con los ojos bien abiertos: Primer registro de gusanos oculares del género *Oxyspirura* (Nematoda-Thelaziidae) en Argentina

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**ABSTRACT:** The eyeworm, *Oxyspirura octopapillata* (Nematoda-Thelaziidae) is reported for the first time in Argentina parasitizing the eyes of the little nightjar, *Setopagis parvula* (Aves-Caprimulgidae). The host was collected in Formosa Province, Argentina, and nine specimens belonging to this nematode species were found. Its morphological characteristics and morphometric data are described, which include a divided buccal capsule, 17 male caudal papillae and a spicular ratio of 1: 2.3-2.9. These features allow us to differentiate these specimens from the other Neotropical species of the genus *Oxyspirura*. This is the first parasitological study of *S. parvula* in Argentina.

**Keywords:** Nematodes, *Oxyspirura octopapillata*, *Setopagis parvula*

**RESUMEN:** El gusano ocular, *Oxyspirura octopapillata* (Nematoda-Thelaziidae) es citado por primera vez en Argentina parasitando los ojos del atajacaminos chico, *Setopagis parvula* (Aves-Caprimulgidae). El hospedador fue colectado en la provincia de Formosa, Argentina y se encontraron nueve especímenes pertenecientes a esta especie de nematode. Se describen sus características morfológicas y sus datos morfométricos, que incluyen una cápsula bucal dividida, 17 papilas caudales en el macho y una relación espicular de 1: 2.3-2.9. Estas características permiten diferenciar a los ejemplares del presente estudio de las otras especies Neotropicales del género *Oxyspirura*. Este es el primer estudio parasitológico de *S. parvula* in Argentina.

**Palabras clave:** Nematodes, *Oxyspirura octopapillata*, *Setopagis parvula*

The little nightjar, *Setopagis parvula* (Gould) (Caprimulgiformes: Caprimulgidae) is an exclusively Neotropical bird. Its helminth fauna is scarcely known, to date it was only reported as host of three helminth species: one nematode *Oxyspirura petrowi* Skrjabin, 1929 (Thelaziidae) from Brazil, and two cestodes *Metadilepis spasskiorum* Georgiev and Vaucher, 2003 and *Mariauxilepis paraguayensis* Georgiev and Vaucher, 2003 (Metadilepididae) from Paraguay (Vicente *et al*., 1995; Georgiev and Vaucher, 2003). The goal of this work was to increase the knowledge of the parasitic helminths of *S. parvula*.

One specimen of *S. parvula* was hunted with a shotgun in September 2012 at La Marcela farm, Pirané, Formosa Province, Argentina (26°17'35" S; 59°06'38" W). The authorization was provided by Ministerio de la Producción y Ambiente of Formosa Province (N° 003516). The bird was kept frozen at -20°C, then thawed, dissected, and examined under a stereoscopic microscope in the laboratory. The parasitological examination revealed the presence of nine nematodes belonging to the genus *Oxyspirura* Drasche, 1897, found on the eyes surface, under the nictitating membranes. Helminths were removed and preserved in 70% ethanol. For examination, specimens were cleared by immersion in Amman's lactophenol. Measurements are given in millimeters (mm) unless otherwise stated, expressed as a range. The photographs were taken with a camera phone (Xiaomi MiA3). Both nematodes and the host were deposited in the Helminthological and Ornithological Collections of the Museo de La Plata, La Plata, Argentina (MLP- He 8132 and MLP-O-P 14812, respectively). Identification of nematodes was carried out following the keys proposed by Ybarra (1948), Chabaud (1975), and Oliveira-Rodrigues (1978).

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Nematoda Rudolphi, 1808

Family Thelaziidae Skrjabin, 1915

*Oxyspirura octopapillata* Caballero, 1942 (Tables 1-2, Figs. 1-2)

Description based on four males and five females. Nematodes with approximately the same width along the body, slightly attenuated at anterior end and pointed at posterior end. Males slightly shorter than females, with a spiral pointed tail. Males and females exhibited cervical alae extending approximately to the level of the nerve ring. Mouth terminal. Buccal capsule divided into an anterior part wider (0.028-0.052) than the posterior one (0.014-0.023). Esophagus slightly divided into anterior muscular and posterior glandular portions. Muscular portion 0.11-0.23 long in males and 0.2-0.31 in females. Glandular portion 0.86-0.92 long in males and 0.89-1.18 in females. Excretory pore not observed.

Males with two unequal and dissimilar spicules, both transversely striated, being the right spicule shortest, straight and robust, and the left spicule as the longest, curved and thin. Average spicular length ratio of 1: 2.6. Gubernaculum weakly sclerotized observed in only one male. Caudal papillae arranged in nine precloacal symmetrical pairs, and eight postcloacal pairs, with the first three pairs slightly asymmetrical and the remaining five symmetrical.

In the Neotropical realm, 19 species of *Oxyspirura* are known parasitizing avian hosts (Jairapuri and Siddiqi, 1967; Baruš, 1968; Guerrero, 1969; Oliveira-Rodrigues, 1978; Vicente *et al*., 1995). Among them, eight species have a buccal capsule divided into an anterior part wider than the posterior one, like the specimens here studied: *O. cephaloptera* (Molin, 1860) Stossich, 1897 reported parasitizing Coraciiformes and Passeriformes from Brazil (Oliveira-Rodrigues, 1978), *O. chauvancyi* Díaz Ungría, 1963 described parasitizing Passeriformes from French Guiana (Díaz Ungría, 1963), *O. diazungriai* Guerrero, 1969 and *O. guriensis* Guerrero, 1969 in Galliformes and Coraciiformes, respectively from Venezuela (Guerrero, 1969), the cosmopolitan species *O. mansoni* (Cobbold, 1879) Ransom, 1904 reported in numerous wild and domestic birds (Oliveira-Rodrigues, 1978), *O. navali* Caballero, 1936 described parasitizing Accipitriformes from Mexico (Caballero, 1936), *O. octopapillata* Caballero, 1942 reported parasitizing Accipitriformes, Falconiformes and Caprimulgiformes from Brazil, Mexico and Cuba (Caballero, 1942; Ybarra, 1948; Baruš, 1968; Vicente *et al*., 1995), and *O. tanasijtchuki* (Skrjabin, 1916) Oliveira-Rodrigues, 1964 reported in Passeriformes from Paraguay (Cram, 1927).

The specimens here studied can be differentiated from seven of the eight species previously mentioned in the Neotropical realm by the spicular ratio and number of caudal papillae in males. *Oxyspirura cephaloptera* possesses a spicular ratio of 1: 5, seven precloacal pairs and six postcloacal pairs of caudal papillae (Oliveira-Rodrigues, 1978). *Oxyspirura chauvancyi* has a spicular ratio of 1: 13, three precloacal pairs, one adcloacal pair, and two postcloacal pairs of caudal papillae (Díaz-Ungría, 1963). *Oxyspirura diazungriai* possesses a spicular ratio of 1: 14.5, three precloacal pairs, one adcloacal pair, and two postcloacal pairs of caudal papillae (Guerrero, 1969). *Oxyspirura guriensis* has a spicular ratio of 1: 15.5, three precloacal pairs, one adcloacal pair, and two postcloacal pairs of caudal papillae (Guerrero, 1969). *Oxyspirura navali* possesses a spicular ratio of 1: 1.85, two precloacal pairs, and six postcloacal pairs of caudal papillae (Caballero, 1936).

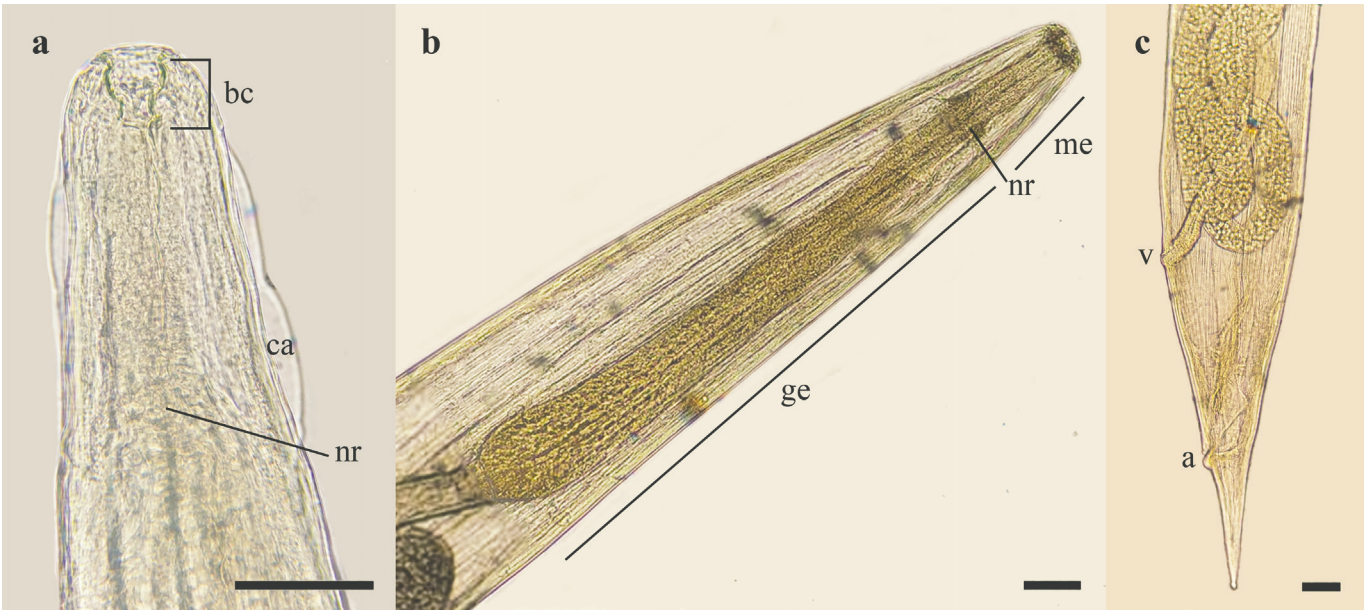


**Figure 1.** Female of *Oxyspirura octopapillata*. a) Dorsal view of anterior end showing buccal capsule (bc), nervous ring (nr) and cervical alae (ca). b) Lateral view of anterior end showing muscular esophagus (me) and glandular esophagus (ge). c) Lateral view of posterior end showing vulva (v) and anus (a). Scale bars 100 µ.

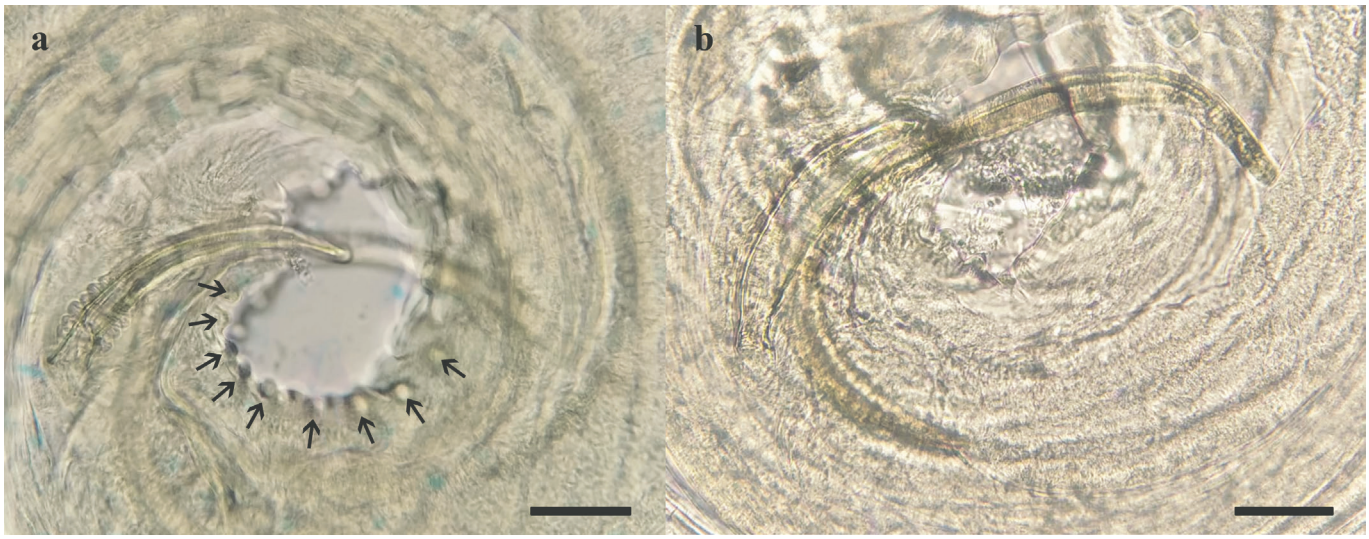


**Figure 2.** Posterior end of *Oxyspirura octopapillata* male. a) Right spicule and precloacal papillae. The arrows indicate the precloacal papillae. b) Left spicule. Scale bars 50 µ.

*Oxyspirura tanasijtchuki* has a spicular ratio similar to specimens here studied (1: 2.4), but possesses five precloacal papillae (2 symmetrical pairs and one fifth isolated papilla) and seven postcloacal caudal papillae (1 symmetrical pair and 5 asymmetrical papillae) (Cram, 1927). *Oxyspirura mansoni* possesses a spicular ratio of 1: 15, four precloacal pairs, one adcloacal pair, and four postcloacal pairs of caudal papillae (Guerrero, 1969, Oliveira-Rodrigues, 1978).

The specimens here studied have a similar spicular ratio and number of caudal papillae that the eighth species, *O. octopapillata*. Also, the specimens recovered from *S. parvula* possess morphological and morphometric characters similar to those described by Caballero (1942), Ybarra (1948), and Baruš (1969) for this species (Tables 1-2).

Eyeworms belonging to the genus *Oxyspirura* are heteroxenous nematodes found in a wide variety of wild and domestic birds. These nematodes are usually found on the eye surface, under the nictitating membrane, as well as in the lacrimal ducts and other eye glands. The adults of *Oxyspirura* spp. deposit the eggs, which together with lacrimal secretions follow the tear ducts to the mouth where they are swallowed and eliminated through the feces. The eggs are ingested by cockroaches, crickets or grasshoppers that act as intermediate hosts (Anderson, 2000; Kalyanasundaram *et al.,* 2019).

**Table 1. Comparative morphometric data for females of *Oxyspirura octopapillata* in different hosts and localities. Measurements in mm, unless otherwise stated.**

| **Source** | **Present study** | **Caballero (1942)** | **Ybarra (1948)** | **Baruš (1969)** |
|---|---|---|---|---|
| **Country** | **Argentina** | **Mexico** | **Mexico** | **Cuba** |
| **Hosts** | ***Setopagis parvula* (Gould) (Caprimulgidae)** | ***Caracara plancus cheriway* (Jacquin) (Falconidae)*** | ***Nyctidromus albicollis* (Gmelin) (Caprimulgidae)** | ***Caracara plancus audubonii* (Cassin) (Falconidae)**** |
| Body length | 15.1-18 | 18.9 | 17.5-18 | 14.77 |
| Body width | 0.400-0.484 | 0.520 | 0.380 | 0.480 |
| Buccal capsule depth | 0.040-0.053 | 0.041 | 0.045 | 0.039 |
| Buccal capsule width | 0.038-0.042 | 0.037 | 0.038 | 0.035 |
| Nerve ring (dfae) | 0.22-0.37 | 0.266 | 0.220 | 0.269 |
| Esophagus total length | 1.2-1.375 | 1.36 | 1.4 | 1.35 |
| Muscular esophagus width | 0.048-0.067 | 0.049 | 0.046 | 0.058 |
| Glandular esophagus width | 0.100-0.154 | 0.072 | 0.165 | 0.160 |
| Vulva (dfpe) | 0.532-0.992 | 1.140 | 0.980 | 0.949 |
| Anus (dfpe) | 0.107-0.410 | 0.440 | 0.460 | 0.409 |
| Eggs (µ) | 40-58 x 20-33 | 53-57 x 29-33 | 49-53 x 30-32 | 40-46 x 25-27 |

*cited as *Polyborus cheriway*, **cited as *Polyborus cheriway audubonii*. Abbreviations: dfae- distance from anterior end; dfpe- distance from posterior end.

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**Table 2. Comparative morphometric data for males of *Oxyspirura octopapillata* in different hosts and localities. Measurements in mm.**

| Source | Present study | Caballero (1942) | Ybarra (1948) |
|---|---|---|---|
| Country | Argentina | Mexico | Mexico |
| Hosts | *Setopagis parvula* (Gould) (Caprimulgidae) | *Caracara plancus cheriway* (Jacquin) (Falconidae)* | *Nyctidromus albicollis* (Gmelin) (Caprimulgidae) |
| Body length | 11.7-13.6 | 13.54 | 15.8-16.5 |
| Body width | 0.330-0.420 | 0.400 | 0.300-0.340 |
| Buccal capsule depth | 0.036-0.048 | 0.037** | 0.045 |
| Buccal capsule width | 0.028-0.052 | 0.029 | 0.035 |
| Nerve ring (dfae) | 0.100-0.257 | 0.217 | 0.250-0.260 |
| Esophagus total length | 0.970-1.15 | 1.266 | 1.35 |
| Muscular esophagus width | 0.043-0.055 | 0.053 | 0.057 |
| Glandular esophagus width | 0.106-0.120 | 0.164 | 0.180-0.190 |
| Left spicule length | 0.310-0.490 | 0.462 | 0.418 |
| Right spicule length | 0.110-0.190 | 0.195 | 0.205 |
| Spicular length ratio | 1: 2.30-1: 2.90 | 1: 2.75 | 1: 2.04 |
| Caudal papillae | 9 pairs precloacal | 9 pairs precloacal | 9 pairs precloacal |
| | 8 pairs postcloacal | 8 pairs postcloacal | 1 pair adcloacal |
| | | | 7 pairs postcloacal |

*cited as *Polyborus cheriway*. **erroneously reported as 0.37 mm. Abbreviations: dfae- distance from anterior end.

Eyeworms, such as *O. petrowi,* negatively impact ocular tissues by causing inflammation of the lacrimal ducts, keratitis and lesions on the Harderian glands. In time, the adenitis would likely result in gland atrophy and fibrosis. These conditions cause a deficiency in tear production called keratoconjuctivitis sicca, which is commonly known as “dry eye”. This condition could cause corneal lacerations, reduced vision and decreased survival (Dunham *et al.,* 2016).

This is the first report of the genus *Oxyspirura* in Argentina, and the first parasitological study of *S. parvula* in Argentina.

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