

Morphological study of *Eudromoxyura aspicularis* (Nematoda, Heteroxyematidae) from the tinamou *Eudromia elegans* (Aves, Tinamidae)

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Résumé

Eudromoxyura aspicularis (Boero & Led, 1971) parasite d'oiseaux Tinamidae en Argentine, et espèce-type unique du genre *Eudromoxyura* Anderson & Prestwood, 1972 est redécrite. *Eudromoxyura elonbyrdi* Anderson & Prestwood, 1972 est synonyme de cette espèce. Les caractères morphologiques et la position systématique du genre *Eudromoxyura* sont discutés. Les genres *Syphaciella* (Mönning, 1920) et *Eudromoxyura*, qui sont les seuls oxyures connus chez des Oiseaux, ont probablement des origines indépendantes.

Resumen

En este trabajo, se redescrbe a *Eudromoxyura aspicularis* (Boero & Led, 1971) parásito de un ave Tinamiforme de la República Argentina, especie típica y única del género *Eudromoxyura* Anderson & Prestwood, 1972, *E. elonbyrdi* Anderson & Prestwood 1972, es considerada su sinónimo. Los caracteres morfológicos y la posición sistemática del género *Eudromoxyura* son discutidos. Los géneros *Syphaciella* (Mönning, 1920) y *Eudromoxyura*, únicos oxyuros conocidos como parásitos de aves, tienen probablemente orígenes independientes.

Abstract

Eudromoxyura aspicularis (Boero & Led, 1971) is a parasite of a tinamid bird in Argentina. This is the type and only one known species so far described in the genus *Eudromoxyura* Anderson & Prestwood, 1972. It is here redescrbed, and *Eudromoxyura elonbyrdi* Anderson & Prestwood 1972 is considered a synonym. The morphological characters and systematic position of the genus *Eudromoxyura* are discussed. The genera *Syphaciella* (Mönning, 1920) and *Eudromoxyura*, the only oxyurids known parasitising birds, have probably arisen independently.

Introduction

In 1971 Boero & Led described *Syphaciella aspicularis* (Boero & Led, 1971) from *Eudromia elegans elegans* G. St. Hilaire (Aves: Tinamiformes), a bird endemic to the neotropical region. In 1972, Anderson and Prestwood described *Eudromoxyura elonbyrdi* Anderson & Prestwood, 1972, a parasite of *E. elegans elegans* and *E. elegans albida* G. St. Hilaire from Argentina. In 1975, Quentin proposed that both taxa should be included within the genus *Eudromoxyura* Anderson & Prestwood, 1972 and considered them as probable synonyms.

In this paper (i), the species described by Boero & Led is redescribed from new specimens: (ii) the new specimens are compared with some of those analysed by Anderson and Prestwood in their own description; and (iii) the systematic position of the genus *Eudromoxyura* is discussed.

Materials and methods

Five adult males and five adult females of *Syphaciella aspicularis* were studied. They had been collected from the caecum of a single *Eudromia elegans* G. St. Hilaire captured in the province of Buenos Aires, Argentina (Colección Helminología del Museo de la Plata, no. 1621 D = Muséum National d'Histoire Naturelle 443 KH). Several adult males and females provided by Professor Anderson were also studied. These individuals were collected from the digestive tract of *Eudromia elegans elegans* from Argentina, (Muséum National d'Histoire Naturelle, 559 SB). These specimens (no. 559 SB) were part of the material described by Anderson & Prestwood (1972). Specimens were stored in 70% ethanol and studied with a compound microscope as wet mounts, first in water and later in lactophenol. Cross-sections were studied from free-hand cuts, made with the aid of small sections of razor blade and manipulated with a small brush.

Eudromoxyura aspicularis (Boero & Led, 1971) (Figs 1–6)

Synonyms: *Syphaciella aspicularis* Boero & Led, 1971; *Eudromoxyura elonbyrdi* Anderson & Prestwood, 1972.

Description

Male (Fig. 1A). Buccal aperture surrounded by 3 thick lips, each subdivided into 5 rounded lobes (Fig. 2A,B). Amphids voluminous; cephalic papillae difficult to see, disposed at right angles to head and distant from amphids (Fig. 2A). At base of labial lobes, membranous and plaited cuticular expansion partially closes buccal aperture (Figs 2A,B,E, 5C). In apical view, delicate thickening seen, corresponding to membranous plaiting, of which anterior extremity forms two regular expansions resembling "rabbit ears" internal to each median labial lobe (Figs 2A, 5C). Further back, between posterior extremity of buccal capsule and oesophageal lumen, oesophageal lobes slightly straightened (Fig. 2A,B,E). Oesophageal bulb subspherical, voluminous with grinding cuticular structure covered by regular folds with serrate ridge (Fig. 2C,D). Head separated from rest of body by well-marked constriction (Fig. 2E) from which 2 large slightly dorsal lateral alae arise. Alae triangular in transverse section (Fig. 2C); they narrow posteriorly where progressive transformation occurs: fibres of cuticular middle fibrous layer become very loose and reorganised into a relatively dense bunch (Fig. 3B,C,D), the whole forming network which supports 2 voluminous lateral "ballasts" that provide support to caudal bursa (Figs 1A, 3A,C,D). Cloacal aperture preceded by *area rugosa* formed by a dozen well-differentiated ridges (Figs 3A,B, 6D). Four pairs of genital papillae are present: one large pair antero-lateral to cloaca; one pair slightly pedunculate, situated immediately posterior to cloacal aperture; one pair post-cloacal situated immediately anterior to small, conical tip of tail (Figs 3A,B, 6D); fourth pair double and difficult to distinguish, at entrance to cloacal aperture (Fig. 3B,E). Two globular swellings with numerous digitiform

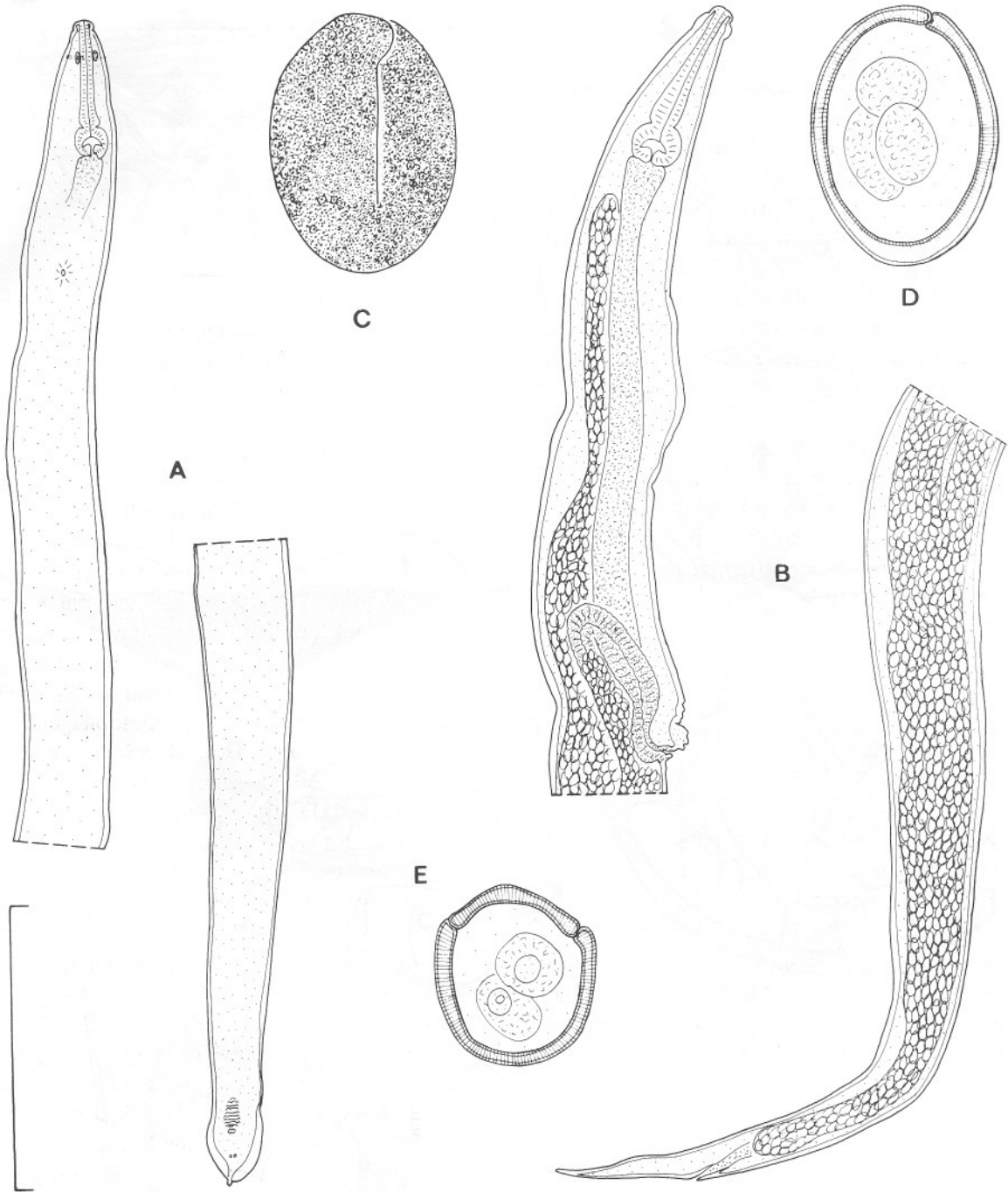


Fig. 1. *Eudromoxyura aspicularis* (Boero & Led, 1971). A, male ventral view, anterior and posterior segments; B, female, *idem* right lateral view; C, egg-shell, showing dehiscence; D, optical section through longer axis of egg; E, optical section through smallest axis of egg. Scale-bars: A, B, 2,100 μm ; C, D, E, 100 μm .

expansions present lateral to pedunculated post-cloacal papillae (Fig. 3A,B). In parasagittal section, one small oblong structure, difficult to distinguish in our specimens was observed and interpreted

as a spicule (Fig. 3E). Phasmids close to post-cloacal papillae (Figs. 3A). Walls of rectum thick and well-chitinised (Figs 3C,E).

Female (Fig. 1B). Buccal aperture surrounded

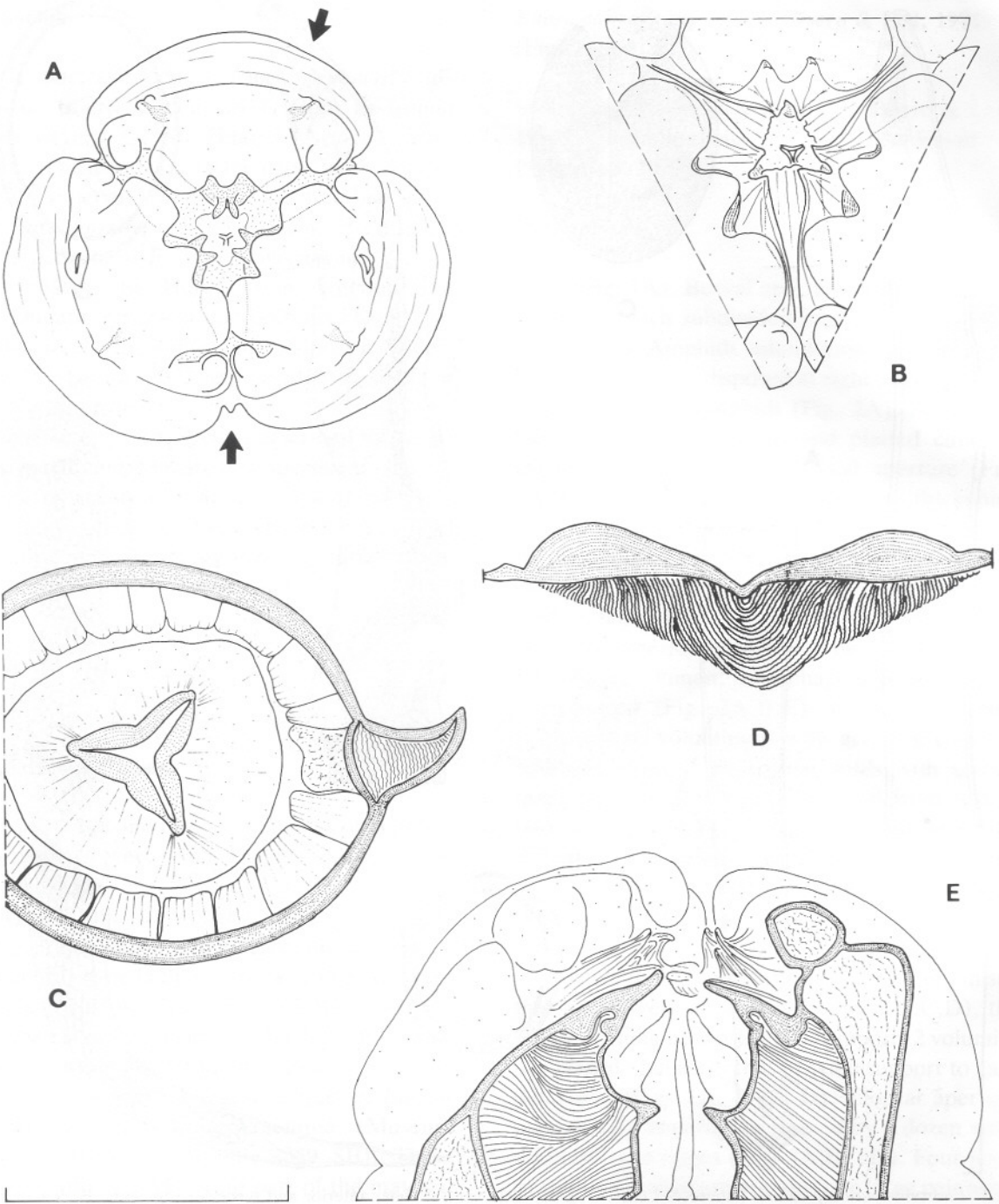


Fig. 2. *Eudromoxyura aspicularis* (Boero & Led, 1971). Male. A, head, apical view; B, *idem*, detail of buccal aperture; C, transverse section at level of oesophageal bulb; D, *idem* detail of cuticular lining; E, head, lateral view in parasagittal section, as indicated by arrows in A (the left ventral lip and a portion of the right ventral lip are avoided). Scale-bars: A, 100 μ m; B, D, E, 65 μ m; C, 250 μ m.

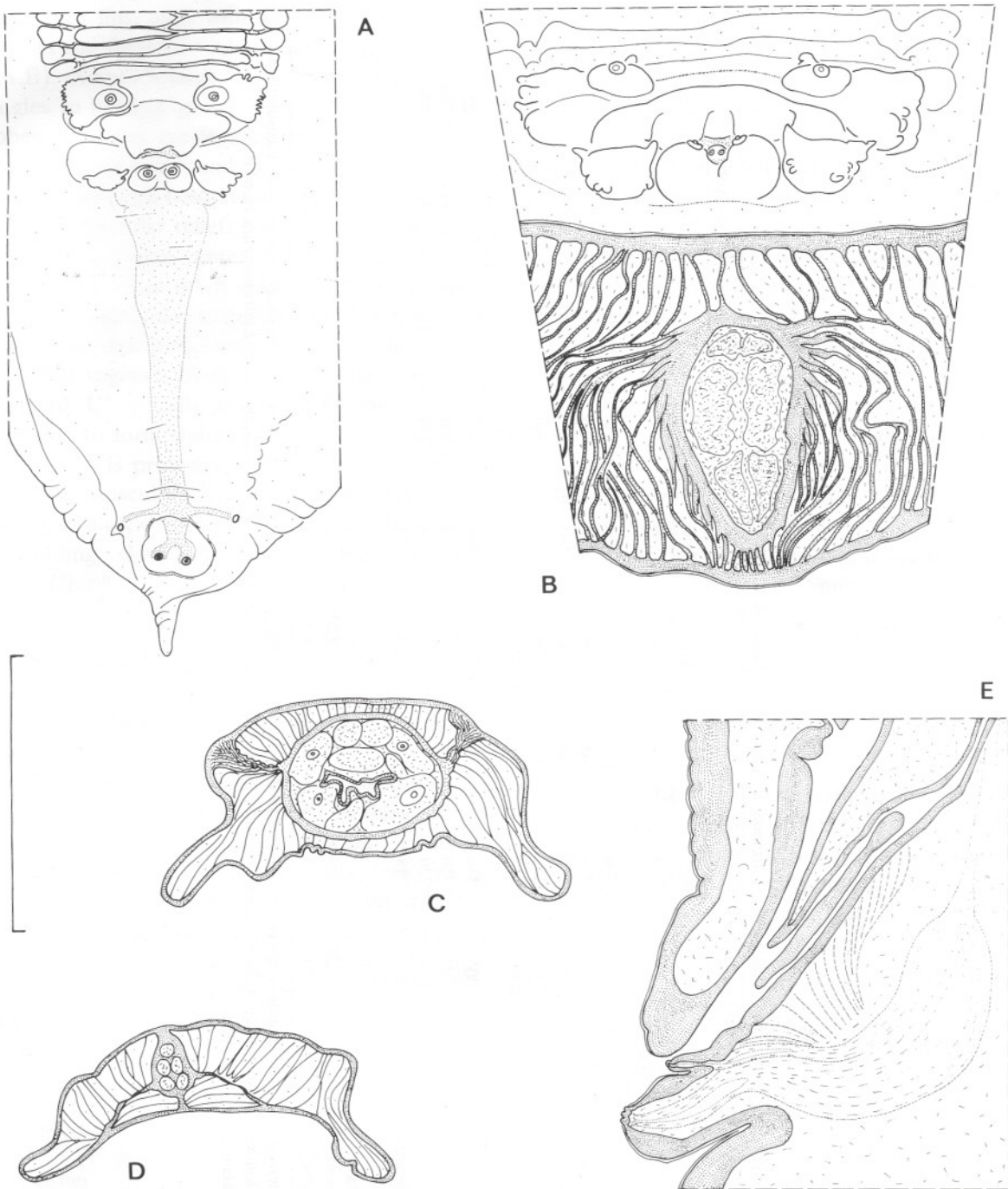


Fig. 3. *Eudromoxyura aspicularis* (Boero & Led, 1971). Male. A, caudal bursa, ventral view; B, *idem*, detail of the former in transverse section immediately after cloaca; C, D, two transverse body sections, first (C) at level of *area rugosa*, second (D) between cloaca and post-cloacal papillae; E, left lateral view of cloacal region in a parasagittal section. Scale-bars: A, 135 μ m; B, E, 65 μ m; C, D, 200 μ m.

Table 1. Measurements (in micrometres) of males of *Eudromoxyura aspicularis* (Boero & Led, 1971).

	443 KH						Anderson & Prestwood (1972)		
	Male 1	Male 2	Male 3	Male 4	Male 5	M/5	Male 1	Male 2	M/20
Head diameter	150	150	150	150	150	150	-	176*	-
Amphidial gap	120	-	-	-	-	-	-	112*	-
Body length	8,800	9,300	9,000	9,050	8,500	8,930	7,400	9,190	8,420
Body width (maximum)	700	700	700	700	700	700	440	560	490
Total oesophagus length	1,200	1,100	1,050	1,000	1,100	1,090	800	1,030	950
Bulb length	300	250	250	250	250	260	180	230	200
Bulb width	260	250	250	250	250	252	210	290	240
Distance from apex to:									
nerve-ring	330	350	350	350	300	336	200	240	220
excretory pore	1,770	1,750	1,800	1,900	-	1,805	1,550	1,930	1,750
Tail length	235	220	-	263	-	239	120	300	230
Caudal appendix length	25	18	22	20	21	-	-	-	-
Spicule length	55	-	-	-	-	-	-	-	-
Gubernaculum length	-	-	-	-	-	-	-	-	-
L. of body/L. of oesophagus	7.33	8.45	8.57	9.05	7.73	8.23	9.25	8.92	8.86
L. of body/D. apex-excretory pore	4.97	5.31	5.00	4.76	-	5.01	4.77	4.76	4.81

The first five columns give measurements of specimens studied in this study, the sixth gives their mean. The next three columns represent the measurements of two specimens followed by the mean of 20 specimens, as given by Anderson & Prestwood (1972) in the description of *Eudromoxyura elonbyrdi*.

* Measurements taken from illustrations.

by 6 thick lips, each with internal double expansion in the form of "rabbit ears" (Figs 4A,B,D, 5A,B). Amphids large; cephalic papillae at right angles to head (Figs 4A, 5A). At base of labial lobes, cuticular membranous expansion present analogous to that found in males (Figs 4A,B,D, 5A). Three large oesophageal lobes present, with saw-like cuticular relief, producing narrow space at union between posterior buccal capsule and oesophagus (Figs 4A,B,C,D, 5A). Oesophageal bulb and lateral alae as in male (Fig. 5A). Genital apparatus didelphic, with subequatorial vulva: muscular vagina with thick walls in the form of an inverted 'U', initially passing anteriorly and then reflexing to form short, posteriorly oriented section which is prolonged by short, poorly differentiated musculo-glandular section (Fig. 1B). Eggs globular, with thick shell, pierced by fissure, resembling closed horse-shoe (Figs 1C,D,E, 6A,B,C).

Measurements

See tables. Table I gives measurements of males; Table II those of females.

The characters and measurements of the specimens that we studied correspond to those of *Syphaciella aspicularis* as well as to those of *Eudromoxyura elonbyrdi*. Consequently, we place *Eudromoxyura elonbyrdi* into synonymy with *Syphaciella aspicularis*. Following Quentin (1975) and for the reasons given above, we propose that the taxon described by Boero & Led (1971) be included in the genus *Eudromoxyura* Anderson & Prestwood, 1972.

Discussion

Genus Eudromoxyura Anderson & Prestwood, 1972

The genus *Eudromoxyura* shows the following:

(1) characters in common with all heteroxyneematids: (i) sexual dimorphism especially with regard

to the buccal structures; (ii) male with highly developed lateral "ballasts" in the caudal region; (iii) female with strong and well-developed vestibule (muscular segment of ovejector) which is anteriorly orientated;

(2) morphological characters interpreted herein as plesiomorphic within the Heteroxyneematidae: (iv) short *area rugosa*; (v) post-cloacal papillae situated very posteriorly; (vi) absence of a second pair of conical cuticular projections within the posterior part of the tail; (vii) muscular glandular sphincter short; (3) characters that we interpret as apomorphic in the genus *Eudromoxyura*: (viii) morphology of buccal relief in both sexes; (ix) development and particular morphological organization of "ballasts"; (x) disposition of genital papillae that combines the primitive position of post-cloacal papillae together with a double cloacal papilla which is atrophied and invaginated within the cloaca; (xi) particular morphology of the dehiscent fissure of the egg.

Systematics

Boero & Led (1971) described their specimens within the genus *Syphaciella* (Mønning, 1920), a parasite of birds of the family Pteroclididae from the Palaearctic region. Quentin (1975) and Petter & Quentin (1975) accepted the validity of the genus *Eudromoxyura*, placing it near the genus *Syphaciella* in the subfamily Heteroxyneematinae Skrjabin & Schikhobalova, 1948. In a previous paper Hugot (1989) redescribed the genus *Syphaciella*, finding no synapomorphic characters that unite the genera *Eudromoxyura* and *Syphaciella*.

In conclusion: (i) this paper confirms the validity of the genus described by Anderson & Prestwood (1972); (ii) it shows that the lineages represented by the genera *Syphaciella* and *Eudromoxyura* (the only nematodes of the Oxyuroidea known to occur in birds) probably result from independent invasions of, and subsequent limited diversifications in, birds of both the Neotropical and Palaearctic regions.

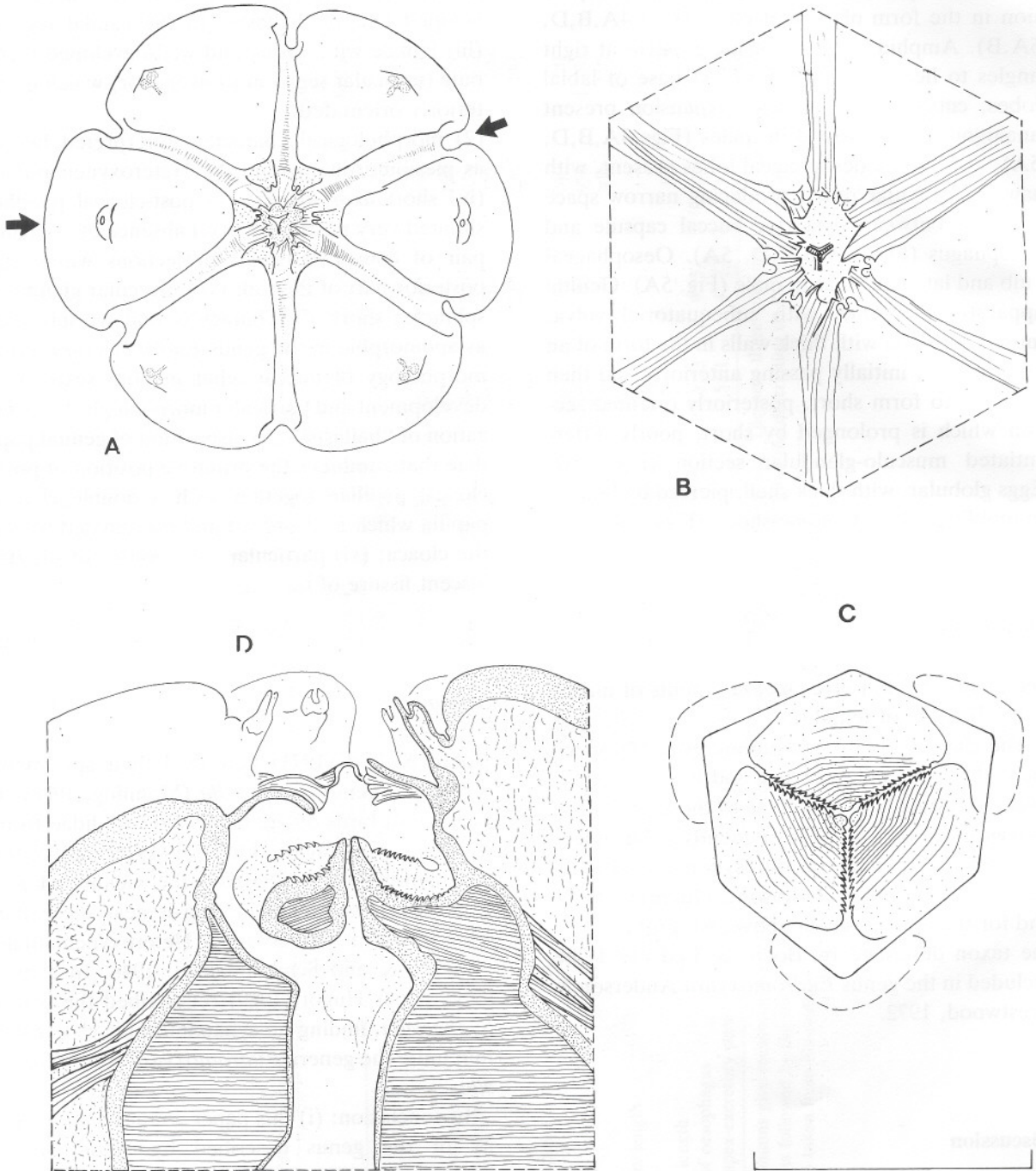


Fig. 4. *Eudromoxyura aspicularis* (Boero & Led, 1971). Female. A, head, apical view; B, *idem*, detail of buccal aperture; C, *idem*, optical section between cuticular membranous plaits and oesophageal lobes; D, head, ventral view, in section as indicated by arrows in A (ventral lips, left lateral lip and portion of right lateral lip are avoided). Scale-bars: A, 100 μ m; B, C, D, E, 50 μ m.

Table II. Measurements (in micrometres) of females of *Eudromoxyura aspicularis* (Boero & Led, 1971).

	443 KH						Anderson & Prestwood (1972)			Boero &
	Female 1	Female 2	Female 3	Female 4	Female 5	M/5	Female 1	Female 2	M/20	Led (1971)
Head diameter	200	180	165	180	150	175	—	192*	—	—
Amphidial gap	—	—	125	—	—	—	—	150*	—	—
Body length	15,000	13,900	12,120	14,400	13,800	13,844	10,400	14,320	13,050	11,000
Body width (maximum)	1100	900	900	800	750	890	520	840	660	—
Total oesophagus length	1,150	1,200	1,250	1,250	1,200	1,210	1,080	1,520	1,220	1,013
Bulb length	380	350	350	350	250	336	210	320	270	250
Bulb width	250	300	200	350	280	276	260	350	290	250
Distance from apex to:										
nerve-ring	—	350	300	320	350	330	240	290	260	—
excretory pore	—	—	2,000	—	—	2,000	2,020	2,440	2,220	—
vulva	6,700	5,500	4,080	6,500	6,600	5,876	4,300	5,960	5,290	4,890
Tail length	1,020	1,080	1,100	1,250	1,300	1,150	970	1,350	1,180	—
Egg length	—	95	110	110	—	105	60	110	90	96
Egg width	—	60	70	65	—	65	40	80	60	60
L. of body/L. of oesophagus	13.04	11.58	9.70	11.52	11.50	11.47	11.05	11.38	11.35	11.31
L. of body/D. apex-excr. pore	—	—	6.06	—	—	—	5.15	5.87	5.88	—
L. of body/D. apex-vulva	2.24	2.53	2.97	2.22	2.09	2.41	2.42	2.28	2.30	2.35
Egg length/egg width	—	1.58	1.57	1.69	—	1.62	1.50	1.38	1.50	1.60

The first five columns give measurements of specimens studied in this study, and the sixth gives their mean. The next three columns represent the measurements of two specimens followed by the mean of 20 specimens, as given by Anderson & Prestwood (1972) in their description of *Eudromoxyura elonbyrdi*. The last column gives the measurements of specimens described by Boero & Led (1971).

*Measurements taken from illustrations.

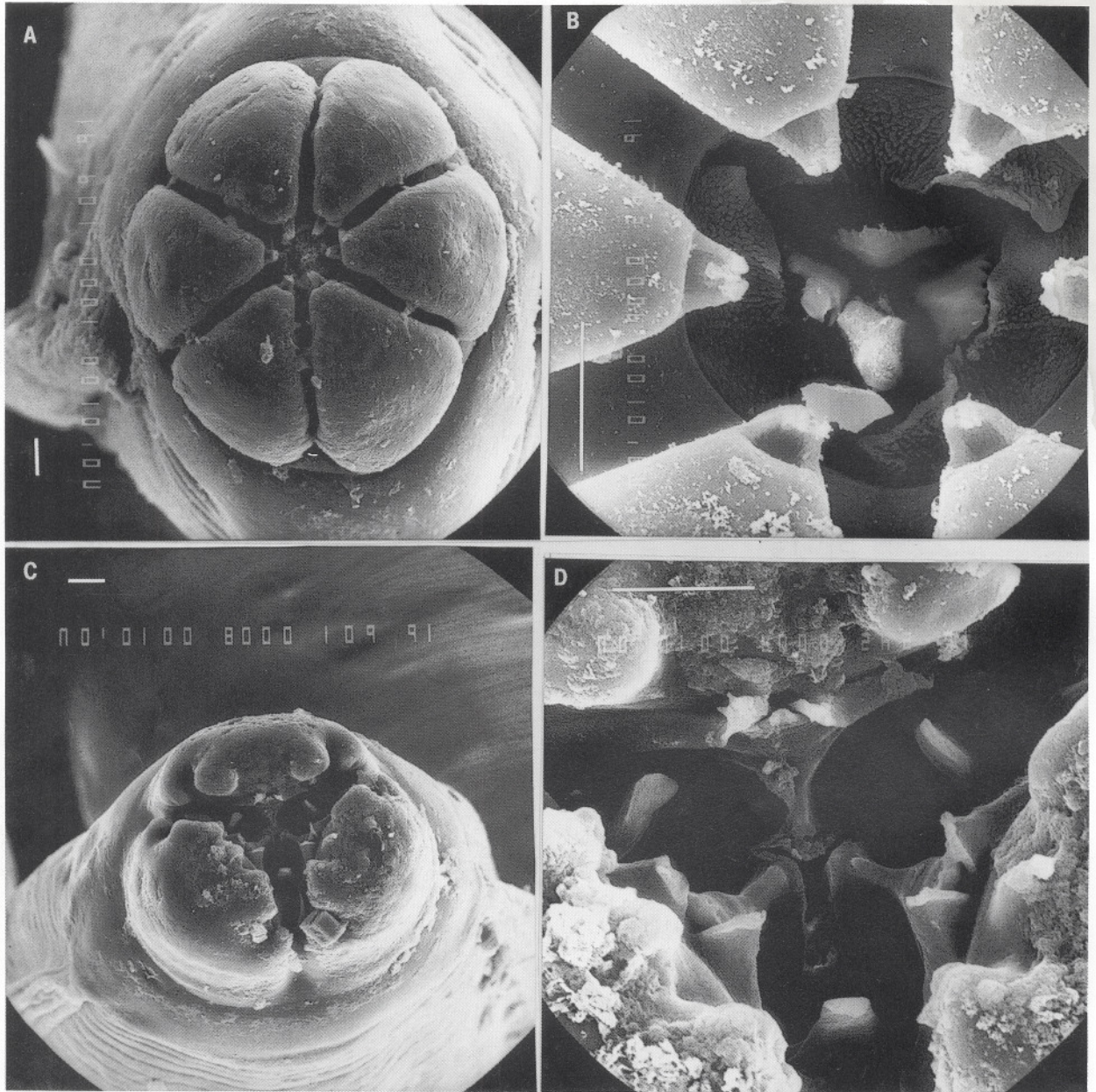


Fig. 5. *Eudromoxyura aspiculuris* (Boero & Led, 1971). A, head of female, apical view; B, *idem*, detail of buccal aperture; C, head of male, apical view; D, *idem*, detail of buccal aperture. Scale-bars: 10 μ m.

Distribution

At the present time the genus *Eudromoxyura* includes only one species: *Eudromoxyura aspiculuris* (Boero & Led, 1971) [= *Syphaciella aspiculuris* Boero & Led, 1971; = *Eudromoxyura elonbyrdi* Anderson & Prestwood, 1972], a para-

site of the tinamid bird, *Eudromia elegans* G. St. Hilaire, from several provinces of Argentina.

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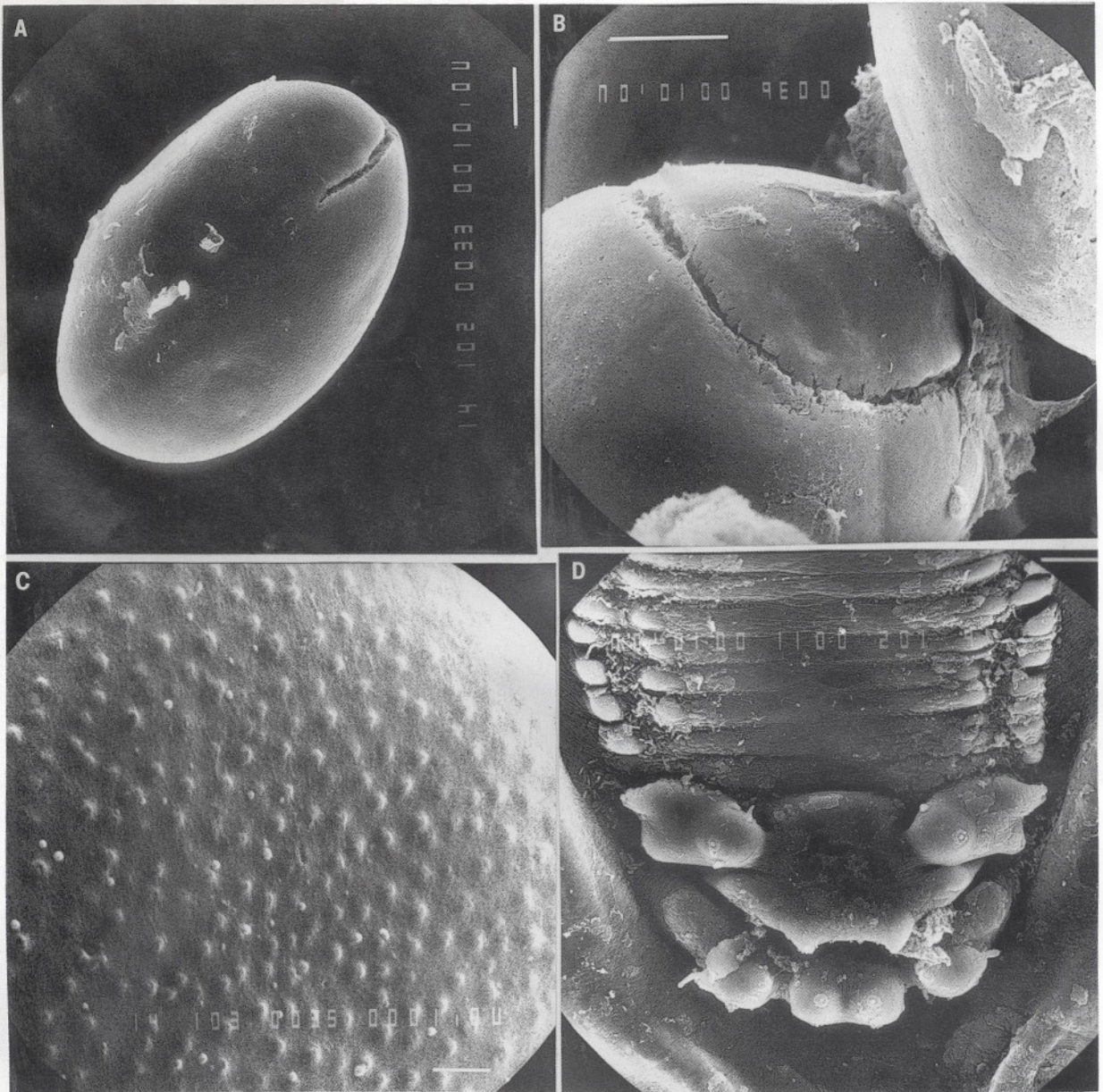


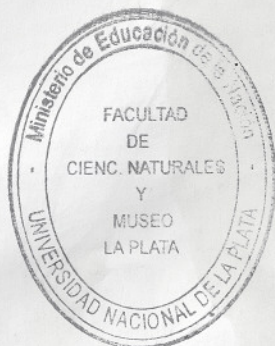
Fig. 6. *Eudromoxyura aspicularis* (Boero & Led, 1971). A, egg-shell, showing dehiscence; B, dehiscence, detail; C, surface of shell, detail; D, caudal bursa of male, cloacal aperture. Scale-bars: A, B, D, 10 μ m; C, 1 μ m.

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