

Digenea, Strigeidae, *Australapatemon canadensis* Dubois and Rausch, 1950: First record in South America and a new host record

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ABSTRACT: *Australapatemon canadensis* Dubois and Rausch, 1950 (Digenea, Strigeidae) is reported parasitizing to *Cygnus melancoryphus* (Molina) (Anatidae) from Lacombe Lagoon, Buenos Aires Province and Pellegrini Lake Río Negro Province, Argentina. This species is described and compared with related species. The finding of *A. canadensis* in *C. melancoryphus* in Argentina represents a new host record extending to South America the geographical distribution of this species.

The genus *Australapatemon* Sudarikov, 1959 is characterized by possessing a genital cone well delimited from parenchyma and an ejaculatory duct with internal rugae (Niewiadomska 2002). At present, this genus contains nine species, reported as parasites of birds: *A. anseris* Dubois, 1967 in Anatidae from Palaearctic region (Dubois 1968); *A. bdello cystis* (Lutz, 1921) in Anatidae, Ardeidae, Cathartidae and Laridae from Neotropical region (Szidat 1929; Dubois 1968; Boero and Led 1968; Dubois 1970; 1985; Arruda *et al.* 2001; Noronha *et al.* 2009); *A. burti* (Miller, 1923) in Anatidae from Nearctic and Andina regions (Dubois 1968; Dubois 1974; 1978; Drago *et al.* 2007); *A. canadensis* Dubois and Rausch, 1950 in Anatidae from Nearctic region (Dubois 1968; Ewart and McLaughlin 1990); *A. congolensis* Dubois and Fain, 1956 in Anatidae from Ethiopic region (Dubois 1968); *A. fuhrmanni* Dubois, 1937 in Anatidae from Palaearctic region (Dubois 1968); *A. intermedius* (Johnston, 1904) in Anatidae and Accipitridae from Australian region (Dubois 1968; Dubois and Angel 1972; Mawson *et al.* 1986); *A. magnacetabulum* Dubois, 1988 in Strigidae and Accipitridae from Neotropical region (Dubois 1988), and *A. minor* Yamaguti, 1933 in Anatidae from Oriental and Palaearctic regions (Dubois 1968; 1974).

During investigations into helminth parasites of birds from Argentina, one specimen of *Cygnus melancoryphus* (Molina) was captured by shot gun, with permission of the Ministerio de Asuntos Agrarios, in Lacombe Lagoon, Chascomús, Buenos Aires Province, Argentina. The bird was dissected in the field; the viscera were preserved in 10 % formalin and transported to the laboratory for examination according to Langeron (1942). The viscera were examined under stereoscopic microscopy. The digeneans were removed and stored in 70 % ethanol, stained with a 1:6 dilution in 96 % ethanol of hydrochloric carmine, dehydrated and mounted in Canada balsam between two microscope cover glasses in order to facilitate handling and observation. Measurements are

given in micrometers (μm) unless otherwise stated, as the range followed by mean in parentheses. This material was deposited in the Helminthological Collection of Museo de La Plata (MLP), La Plata, Argentina. In addition, we also studied 14 whole mount specimens and one set of serial sagittal sections from *C. melancoryphus* collected in Pellegrini Lake, Cinco Saltos, Río Negro Province stored in the Helminthological Collection of MLP.

Australapatemon canadensis Dubois and Rausch, 1950 (Figures 1-3, Tables 1 and 2).

Synonyms: *Apatemon gracilis ex parte* Dubois and Rausch, 1948, *nec* Rudolphi, 1819

Apatemon gracilis canadensis Dubois and Rausch, 1950
Apatemon (Australapatemon) canadensis Dubois and Rausch, 1950 in Dubois (1967).

Host: Black-necked Swan, *Cygnus melancoryphus* (Molina) (Anatidae)

Site of infection: small intestine.

Localities and date: Lacombe Lagoon (35°51'42" S, 57°53'39" W), Lezama, Buenos Aires Province, Argentina; September 2003. Pellegrini Lake (38°42'15" S; 67°59'47" W), Cinco Saltos, Río Negro Province, Argentina; September 1980.

Material studied: 13 digenean specimens from Buenos Aires Province (MLP 6065); 15 digenean specimens from Pellegrini Lake (MLP 616-617/C).

To date, only two species of *Australapatemon* have been reported in the Neotropical Region: *A. bdello cystis* and *A. magnacetabulum*. The first species was reported in Argentina (as *Apatemon sphaerocephalus* Brandes, 1888) parasitizing the small intestine of *C. melancoryphus* from La Plata Zoological Garden, Buenos Aires Province (Boero and Led 1968); in Brazil [as *Apatemon (Australapatemon) bdello cystis* (Lutz, 1921), *Apatemon globiceps* Dubois, 1937] parasitizing *Amazonetta brasiliensis* (Gmelin)

TABLE 1. Comparative data on *Australapatemon canadensis* from Argentina and Neotropical species of the genus *Australapatemon*.

	<i>A. bdello cystis</i>		<i>A. magnacetabulum</i>	<i>A. canadensis</i>
References	Dubois (1968)	Dubois (1985)	Dubois (1988)	Present study
Locality	Brazil	Paraguay	Paraguay	Argentina
Host	<i>Cairina moschata</i>	<i>Dendrocygna viduata</i>	<i>Strix rufipes</i>	<i>Cygnus melancoryphus</i>
Body length	until 2.5 mm	0.96-1.15 mm	1.08-1.40	1.624-2.914 (2.384) mm
Forebody	800 in diameter	270-350 x 300-350	420-450 x 360-370	464-1086 x 493-971 (765 x 760)
Hindbody	--- x 800	690-800 x 280-330	660-950 x 270-310	1122-2029 x 464-793 (1631 x 646)
Oral sucker	150 in diameter	105 x 65	92-95 x 70-80	71-157 x 114-174 (115 x 133)
Ventral sucker	200 in diameter	130-136 x 151-157	130-200 x 105-170	126-251 x 126-248 (209 x 193)
Proteolytic gland	-----	-----	120-190 x 90-95	55-193 x 136-251 (132 x 189)
Pharynx	100	-----	70-73 x 55-68	48-97 x 38-97 (75 x 60)
Ovary	200 in diameter	57-70 x 100-105	63-105 x 90-115	119-169 x 198-237 (148 x 217)
Testes	round	lobed	lobed	lobed
Anterior testis	400-450 in diameter	110-130 x 140	75-165 x 105-175	238-386 x 274-444 (321 x 369)
Posterior testis	400-450 in diameter	170-175 x 190-200	75-190 x 120-235	286-459 x 251-435 (369 x 342)
Genital cone	----	200-260 x 125-140	115-165 x 115-150	167-338 x 107-222 (221 x 148)
Ringnapf	absent	absent	absent	present
Number of eggs	---	1	3-4	4-80
Eggs	-----	85 x 70	100-120 x 70-95	79-117 x 48-82 (103 x 62)

(Anatide), *Sterna* sp (Laridae), *Coragyps atratus* (Bechstein) (Cathartidae), *Tigrisoma lineatum* (Boddaert), *Nyctanassa violacea* (L.) (Ardeidae), *Cairina moschata* (L.) (Anatide), *Columba livia* Gmelin and *Columbina talpacoti* (Temminck) (Columbidae) (Dubois 1968; 1970; Arruda *et al.* 2001; Noronha *et al.* 2009); in Venezuela (as *A. globiceps*) parasitizing *A. brasiliensis* (Caballero y Caballero and Diaz-Ungria 1958), and Paraguay parasitizing *Dendrocygna viduata* (L.) (Anatidae) (Dubois 1985). *Australapatemon magnacetabulum* [as *Apatemon* (*Australapatemon*) *magnacetabulum* Dubois 1988] was reported in Paraguay parasitizing *Strix rufipes* King (Strigidae) and *Buteo magnirostris* (Gmelin) (Accipitridae) (Dubois 1988). The specimens from *A. bdello cystis* and *A. magnacetabulum* differ mainly from those here studied by the absence of a muscular ring in the genital atrium (*ringnapf*). Moreover, *A. bdello cystis* differs by having a spherical forebody and smaller eggs, whereas *A. magnacetabulum* differs in most metrical characters (Table 1).

Four other species of the genus, *A. canadensis*, *A. anseris*, *A. fuhrmanni* and *A. congolensis*, shares the presence of *ringnapf*. Among these species, only the specimens of *A. canadensis* have morphological characters in full agreement with those described in the present paper. Since the morphology of this species has been well described by Dubois (1968), only the measurements of the specimens here studied are presented (Table 2).

The strigeid, *A. canadensis* was originally described as *Apatemon gracilis* Dubois and Rausch, 1948 parasitizing *Branta canadensis* (L.) (Anatidae) from Alaska. Later, it was reported parasitizing other anatids, *Anas acuta* L., *Anas americana* Gmelin, *Anas carolinensis* Gmelin, *Clangula hyemalis* (L.), *Melanitta deglandi* (Bonaparte) and *Polysticta stelleri* (Pallas) from Alaska and *Bucephala albeola* (L.) from Canada (Dubois and Rausch 1950; Dubois 1967; 1968; Ewart and McLaughlin 1990).

The finding of *A. canadensis* in *C. melancoryphus* from Argentina represents a new host record extending to South America the geographical distribution of this species.

The life cycles of *Australapatemon* species include leeches as second intermediate hosts (Niewiadomska

2002). No full life cycle have been studied in the Neotropical region, however, *A. bdello cystis* was reported in *Planorbis* sp. (Gastropoda- Planorbidae) and *Clepsine* sp. (Hirudinea-Glossiphoniidae) from Brazil by Noronha *et al.* (2009). Given that the diet of the Black-necked Swan consists mainly of submerged aquatic plants, and occasionally algae, fish spawn, aquatic insects and other aquatic invertebrates (Carboneras 1992), probably the infected leeches are ingested together with the vegetation.

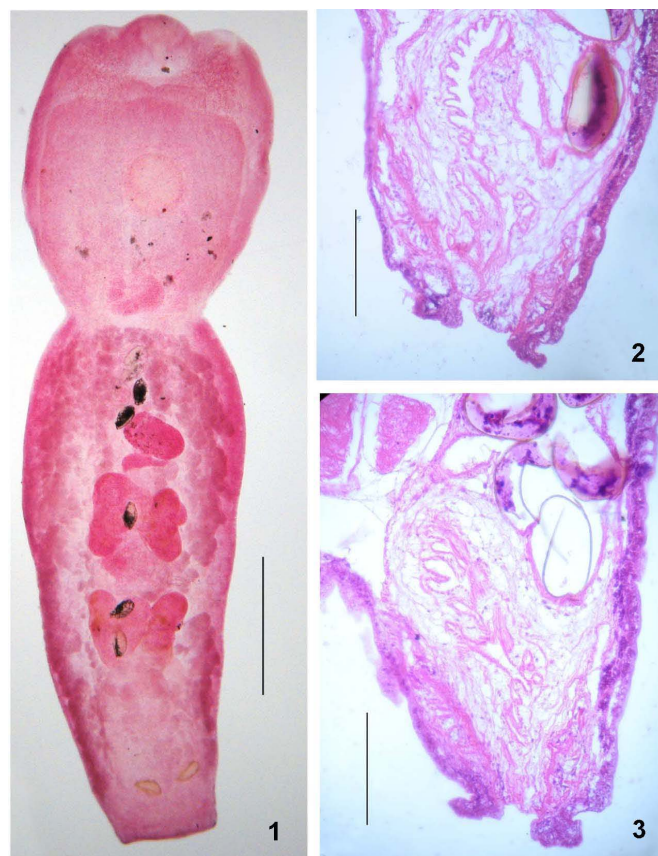


FIGURE 1-3. *Australapatemon canadensis* from *C. melancoryphus* from Cinco Saltos, Argentina. 1. Entire worm, ventral view. Bar = 500µm. 2-3. Sagittal section of the genital cone showing the ejaculatory duct with internal rugae. Bar = 100µm.

TABLE 2. Comparative data for *Australapatemon canadensis*. References: BL/E: body length to egg length; HI/FO: hindbody length to forebody length ratio; OSW/PHW: oral sucker width to pharynx width; VSW/OSW: sucker-width ratio. * Calculated from descriptions given by Dubois (1968).

References	Dubois (1968)	Present study	
Locality	USA, Alaska	Río Negro Province	Buenos Aires Province
Body length	until 3.2 mm	2.4-2.9 (2.75) mm	1.6-2.4 (2.02) mm
Forebody	510-960 x 370-770	696-1086 x 696-971 (915 x 824)	464-774 x 493-774 (620 x 664)
Hindbody	870-2270 x 420-900	1700-2030 x 609-793 (1.84 x 690)	1120-1690 x 464-716 (1400 x 589)
Oral sucker	120-200 x 105-170	83-106 x 119-143 (95 x 131)	71-157 x 114-174 (130 x 133)
Ventral sucker	140-245 x 160-235	195-251 x 193-233 (218 x 217)	126-238 x 126-248 (202 x 175)
Proteolytic gland	70-105 x 140-190	145-251 x 95-193 (197 x 143)	55-98 x 136-155 (79 x 145)
Pharynx	60-85	64-71 x 50-60 (68 x 55)	48-97 x 38-97 (73 x 59)
Ovary	105-190 x 125-210	135-169 x 198-237 (150 x 216)	119 x 224
Anterior testis	250-470 x 235-440	275-362 x 353-444 (324 x 380)	238-386 x 274-396 (312 x 331)
Posterior testis	335-640 x 240-475	290-372 x 251-415 (335 x 336)	286-459 x 262-435 (389 x 327)
Genital cone	235-470 x 180-330	167-214 x 119-167 (194 x 147)	238-338 x 107-222 (295 x 149)
Eggs number	20	13-80 (45)	4-25 (11)
Eggs	95-125 x 65-80	100-114 x 50-67 (107 x 56)	79-117 x 48-82 (101 x 68)
Ratios			
HI/FO	1.2-2.8 (2.1)	1.68-2.5 (2.05)	1.9-3.0 (2.3)
VSW/OSW	1.52-1.38*	1.38-1.83 (1.66)	0.8-1.6 (1.3)
OSW/PHW	2-2.3*	1.35-1.65 (1.5)	1.5-2.2 (1.7)
BL/E	26-34*	23-28 (25.7)	15-23 (20)

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LITERATURE CITED

- Arruda, V.S., R.M. Pinto and L.C. Muniz-Pereira. 2001. New host and geographical records for helminths parasites of Ardeidae (Aves, Ciconiiformes) in Brazil. *Revista Brasileira de Zoologia* 18(Supl. 1): 225-232.
- Boero, J.J. and J.E. Led. 1968. El parasitismo de la fauna autóctona. III. Los parásitos de las aves argentinas. *Revista de la Facultad de Ciencias Veterinarias, La Plata* 10(22): 97-129.
- Caballero y Caballero, E. and C. Díaz-Ungria. 1958. Intento de un Catálogo de los Tremátodos Digéneos registrados en territorio Venezolano. *Memoria de la Sociedad de Ciencias Naturales La Salle* 18(49): 19-36.
- Carboneras, C. 1992. Family Anatidae; p. 536-628 In J. del Hoyo, A. Elliott and J. Sargatal (eds.). *Handbook of the Birds of the World. Vol. 1*. Barcelona: Lynx Edicions.
- Drago, F.B., L.I. Lunaschi, A.C. Hinojosa-Saez and D. González-Acuña. 2007. First record of *Australapatemon burti* and *Paramonostomum pseudalveatum* (Digenea) from *Anas georgica* (Aves, Anseriformes) in Chile. *Acta Parasitologica* 52(3): 201-205.
- Dubois, G. 1967. Notes Helminthologiques I: Strigeidae Railliet (Trematoda). *Revue Suisse de Zoologie* 74(32): 693-700.
- Dubois, G. 1968. Synopsis des Strigeidae et des Diplostomatidae (Trematoda). *Mémoires de la Société Neuchâteloise des Sciences Naturelles* 10: 1-258.
- Dubois, G. 1970. Les Strigeata (Trematoda) de la collection A. Lutz. *Memórias do Instituto Oswaldo Cruz* 68(1): 169-196.
- Dubois, G. 1974. Notes Helminthologiques III: Strigeidae Railliet, Diplostomidae Poirier et Brauninidae Bosma (Trematoda). *Revue Suisse de Zoologie* 81(1): 29-39.
- Dubois, G. 1978. Notes Helminthologiques IV: Strigeidae Railliet, Diplostomidae Poirier, Proterodiplostomidae Dubois et Cyathocotylidae Poche (Trematoda). *Revue Suisse de Zoologie* 85(3): 607-615.
- Dubois, G. 1985. Quelques Strigeoidea (Trematoda) récoltés chez des oiseaux du Paraguay par la Mission Claude Weber, automne 1983, du Muséum d'Histoire Naturelle de Genève. *Revue Suisse de Zoologie* 92(3): 641-648.
- Dubois, G. 1988. Quelques Strigeoidea (Trematoda) récoltés au Paraguay par les expéditions du Muséum d'Histoire Naturelle de Genève, au cours des années 1979, 1982 et 1985. *Revue Suisse de Zoologie* 95(2): 521-532.
- Dubois, G. and M. Angel. 1972. Strigeata of Australian birds and mammals from the Helminthological Collection of the University of Adelaide. *Transactions of the Royal Society of South Australia* 96(4): 197-215.
- Dubois, G. and R. Rausch. 1950. Troisième contribution à l'étude des Strigeides (Trematoda) Nord-Américains. *Bulletin de la Société Neuchâteloise des Sciences Naturelles* 73: 19-50.
- Ewart, M.J. and J.D. McLaughlin. 1990. Helminths from spring and fall migrant bufflehead ducks (*Bucephala albeola*) at Delta, Manitoba, Canada. *Canadian Journal of Zoology* 68(10): 2230-2233.
- Langeron, M. 1942. *Précis de Microscopie*. Paris: Masson et Cie., Ed. 1340 p.
- Mawson, P.M., M. Angel and S.J. Edmonds. 1986. A checklist of helminths from Australian birds. *Records of the South Australian Museum* 19(15): 119-325.
- Niewiadomska, K. 2002. Family Strigeidae Railliet, 1919; p. 231-241 In D.I. Gibson, A. Jones and R.A. Bray (eds.). *Keys to the Trematoda* Wallingford: CABI Publishing and The Natural History Museum.
- Noronha, D., M.R. Sá, M. Knoff, L.C. Muniz-Pereira and R.M. Pinto. 2009. *Adolpho Lutz e a Coleção Helminológica do Instituto Oswaldo Cruz, Rio de Janeiro*. Rio de Janeiro: Museu Nacional, Série Livros 37. 154 p.
- Szidat L. 1929: Beiträge zur Kenntnis der Gattung *Strigea* (Abildg.). II. Spezieller Teil: Revision der Gattung *Strigea* nebst Beschreibung einer Anzahl neuer Gattungen und Arten. *Zeitschrift für Parasitenkunde* 1: 688-764.

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