

Research Note

Some Digeneans from Olrog's Gull *Larus atlanticus* Olrog, 1958 (Aves: Laridae) from the Bahía Blanca Estuary, Argentina

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ABSTRACT: Five species of digeneans (4 Microphallidae, 1 Echinostomatidae) were recovered from a total of 85 Olrog's gulls, *Larus atlanticus* (dead chicks). Birds were collected from a breeding colony in the Bahía Blanca estuary, Argentina, during breeding seasons 2003 ($n = 6$), 2005 ($n = 66$), and 2006 ($n = 13$). Digeneans were identified as *Maritrema bonaerensis*, *Maritrema orensensis*, *Odhneria odhneri*, *Levinseniella cruzi*, and *Himasthla escamosa*. Except for *M. bonaerensis*, all other helminth species represent new host records, and all the digeneans reported constitute new locality records. Likely intermediate hosts for digeneans, such as *Neohelice granulata* (Crustacea: Decapoda), *Cyrtograpsus angulatus* (Crustacea: Decapoda), and *Heleobia australis* (Mollusca: Gastropoda), were also studied. The metacercariae of *M. bonaerensis* were found in the crabs *N. granulata* and *C. angulatus*, and cercariae closely resembling those of *M. bonaerensis*, *L. cruzi* and *H. escamosa* were found in the mollusc *H. australis*.

KEY WORDS: Argentina, Bahía Blanca estuary, digeneans, Echinostomatidae, *Himasthla escamosa*, *Larus atlanticus*, *Levinseniella cruzi*, *Maritrema bonaerensis*, *Maritrema orensensis*, Microphallidae, *Odhneria odhneri*, Olrog's gull.

Olrog's gull, *Larus atlanticus* Olrog, 1958 (Laridae), is endemic to tidal wetlands along the Atlantic coast of Argentina, Uruguay, and southern Brazil (Yorio et al., 2005). The limited geographical range of activity, small population size (4,000–5,000 breeding pairs), dietary specialization, and susceptibility to anthropogenic environmental changes have led to its listing as a vulnerable species (BirdLife International, 2008). Breeding is restricted to only 2 nesting areas that are some 700 km apart in southern Buenos Aires Province and northern Chubut Province, Argentina (Yorio et al., 1997). The largest and most important Olrog's gull colony encompasses about 80% of the breeding population for the species and is located at Isla del Puerto (38°48'S; 62°15'W), in the Bahía Blanca estuary, Argentina (Delhey,

Petracci, and Grassini, 2001). Olrog's gull adults are feeding specialists during their breeding season, preying mainly on the grapsid crabs *Neohelice granulata* Dana, 1851 (Sakai, Türkay, and Yang, 2006), and *Cyrtograpsus angulatus* Dana, 1851 (Crustacea: Decapoda) (Delhey, Carrete, and Martínez, 2001), which they also feed to their chicks. The first is a burrowing, semiterrestrial crab, which builds intricate complexes of burrows in the meso-littoral area, while the latter occupies the infralittoral (adults) and mesolittoral (juveniles) areas (Spivak, 1997). High morbidity and mortality occur among hatch-year Olrog's gulls every year during the species' breeding season in the Isla del Puerto breeding colony. Although recent research has contributed to the knowledge of the ecology, epidemiology, and pathology of helminth parasitism in Olrog's gulls, this work has been focused only on infections by the acanthocephalan, *Profilicollis chasmagnathi* (La Sala and Martorelli, 2007), leaving a notable gap in our knowledge of the digeneans and other parasitic helminths of Olrog's gull and their possible role in gull population dynamics.

The main objectives of this study were to determine the helminths present in Olrog's gull chicks from the Bahía Blanca estuary, and to investigate likely intermediate hosts for their cercariae and metacercariae.

Freshly dead preflledged chicks were harvested during the Olrog's gull breeding season (2003: 6 birds; 2005: 66 birds; 2006: 13 birds) at the Isla del Puerto breeding colony. Birds were necropsied within 4 hr of collection, and their gastrointestinal tract was removed and fixed in 10% formalin until they could be examined for the presence of parasites. Adult digeneans recovered from the intestine were stored in 70% ethanol, stained with hematoxylin and eosin, mounted in Canada balsam, and studied under a light microscope. Measurements are presented in mm. Voucher specimens were deposited in the Museo de La Plata Helminth Collection, Argentina, 5800–5804.

The mollusc *Heleobia australis* d'Orbigny, 1835

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(Mollusca: Gastropoda) and the crabs *N. granulata* and *C. angulatus* were sampled for parasitic larvae from foraging areas of adult Olrog's gulls. The crabs were killed by chilling and then fixed in 10% formalin. Subsamples of 30 crabs of each species were transported to the laboratory alive, killed by chilling, and dissected to harvest live metacercariae from the coelomic cavity, gills, leg muscle, ovary, and hepatopancreas. Individuals of *H. australis* were transported to the laboratory, kept alive in aquaria, and checked daily over a period of 72 hr for the emergence of cercariae. Individuals that did not produce cercariae during the first week were killed and further examined for the presence of sporocysts or rediae.

In total, 6 species of digeneans (4 Microphallidae and 1 Echinostomatidae) were found in the gastrointestinal tracts of Olrog's gull chicks. These were *Maritrema bonaerensis* Etchegoin and Martorelli, 1997 (Microphallidae), *Maritrema orensensis* Cremona and Martorelli, 1998 (Microphallidae), *Odhneria odhneri* Travassos, 1921 (Microphallidae), *Levinseniella cruzi* Travassos, 1920 (Microphallidae), and *Himasthla escamosa* Díaz and Cremona, 2004 (Echinostomatidae).

Prevalence of infection by *M. bonaerensis* in Olrog's gull chicks was 82.6% (95% confidence interval [CI] 0.7308–0.8925, $n = 86$). *Himasthla escamosa* was present in only 1 bird (prevalence: 1.2%, 95% CI: 0.0001–0.0692, $n = 86$). Prevalence of all other digenean species was not determined. Metacercariae of *M. bonaerensis* were also found in populations of *N. granulata* (prevalence: 84.42%, 95% CI: 0.7915–0.8856, $n = 231$) and *C. angulatus* (prevalence: 94%, 95% CI: 0.8971–0.9663, $n = 200$) from foraging areas of Olrog's gulls. Microphallidae cercariae that closely resembled those of *M. bonaerensis* and *L. cruzi* as described by Etchegoin and Martorelli (1997) and Martorelli (1988), respectively, were found in *H. australis*. Cercarial stages that closely resembled *Himasthla* spp. (Yamaguti, 1975) were found in *H. australis*, although final identification is pending.

According to the most recent review (Lunaschi et al., 2007), all helminth species found in the present study have been reported previously from a number of birds and intermediate hosts (see following references). *M. bonaerensis* is the only species so far reported from Olrog's gull (Etchegoin and Martorelli, 1997; Cremona et al., 1999), but this work represents the southernmost report for this species.

Among birds, *M. bonaerensis* has also been found

in the brown-hooded gull, *Larus maculipennis* Lichtenstein, 1823 (Laridae), and in the kelp gull, *Larus dominicanus* Lichtenstein, 1823 (Laridae) (Etchegoin and Martorelli, 1997; Cremona et al., 1999). In general, the key diagnostic features and measurements of *M. bonaerensis* from our study corresponded with those reported by Etchegoin and Martorelli (1997); however, *M. bonaerensis* from this study had a prepharynx that was half as long (0.01–0.02 vs. 0.02–0.04), a considerably wider cirrus sac (0.04–0.07 vs. 0.01–0.02), and smaller testes (right testis, 0.04–0.08 \times 0.02–0.06 vs. 0.08–0.12 \times 0.06–0.11; left testis, 0.06–0.08 \times 0.03–0.07 vs. 0.08–0.12 \times 0.06–0.12).

Maritrema orensensis was first described in *L. dominicanus* from the coast of the Buenos Aires Province (Cremona and Martorelli, 1998), but there have been no further reports from birds from Argentina since then. With the exception of a smaller left testis (0.03–0.05 \times 0.02–0.03 vs. 0.03–0.08 \times 0.03–0.07) observed in *M. orensensis* from our study, all other measurements agree with those reported by Cremona and Martorelli (1998).

Levinseniella cruzi was first described by Travassos (1920) in the white-cheeked pintail, *Anas bahamensis* Linnaeus, 1758 (Anatidae), from Brazil; however, it was subsequently reported from the white-tufted grebe, *Rollandia rolland chilensis* Lesson, 1828 (Podicipedidae), in the South American stilt, *Himantopus melanurus* Vieillot, 1817 (Recurvirostridae), and in the southern lapwing, *Vanellus chilensis* Wagler, 1827 (Charadriidae) from Argentina (Martorelli, 1988; Martorelli and Ivanov, 1996). To date, there have been no reports of this species in Olrog's gulls. In our study, we found some measurements of structures to be different from those reported by Martorelli (1988) for this species (i.e., a shorter body, 0.39–0.69 \times 0.19–0.31 vs. 0.51–1.13; a shorter esophagus, 0.04–0.11 vs. 0.08–0.26; and shorter intestinal ceca, 0.11–0.27 vs. 0.18–0.33; a smaller ovary, 0.05–0.09 \times 0.02–0.05 vs. 0.07–0.10 \times 0.04–0.08; and smaller testes—right testis, 0.05–0.08 \times 0.05 vs. 0.10–0.15 \times 0.05–0.08; left testis, 0.05–0.09 \times 0.03–0.07 vs. 0.10–0.13 \times 0.05–0.08).

Odhneria odhneri was first described from the yellow-crowned night-heron, *Nyctanassa violacea* Linnaeus, 1758 (Ardeidae) in Brazil by Travassos (1921). It was later reported in birds of the families Anatidae, Ardeidae, Charadriidae, and Scolopacidae from Canada, the United States, and Puerto Rico (Sinclair, 1971). Other species of this genus, such as *Odhneria raminellae* Deri, 1958, *Odhneria charadrii*

Cable, Connor, and Balling, 1960, and *Odhneria limnodromi* Schell, 1967, were reported by Heard (1970) in the clapper rail, *Rallus longirostris* Boddaert, 1783 (Rallidae), and by Schell (1967) in North America. Sinclair (1971) noted that there were variations and overlapping features, which led to the suggestion that these species should be regarded as synonyms of *O. odhneri*. In Argentina, *O. odhneri* has been reported only in the Neotropic cormorant, *Phalacrocorax brasilianus* Gmelin, 1789 (Phalacrocoracidae), and in *L. dominicanus* from Chubut Province (Cremonte and Etchegoin, 2002). In comparison with measurements reported by Travassos (1921), *O. odhneri* from our study was considerably shorter (0.33–0.62 vs. 0.78–0.95), it had a smaller oral sucker (0.05 × 0.05–0.06 vs. 0.07–0.08), a shorter esophagus (0.02–0.09 vs. 0.14–0.16), and a relatively smaller acetabulum (0.04–0.09 vs. 0.09–0.10).

Himasthla escamosa was first reported in *L. dominicanus* from the coast of Buenos Aires and Chubut Province by Díaz and Cremonte (2004), and to date, it has not been reported in other hosts. Some measurements of *H. escamosa* from this study were different from those described by the aforementioned authors (i.e., a larger oral sucker, 0.08–0.12 × 0.09–0.12 vs. 0.06–0.11 × 0.05–0.09; a wider and longer pharynx, 0.12–0.14 × 0.65–0.85 vs. 0.84–0.12 × 0.30–0.65; a larger acetabulum, 0.30–0.41 × 0.32–0.42 vs. 0.19–0.32 × 0.15–0.30; a bigger cirrus sac, 1.02–1.64 × 0.20–0.29 vs. 0.68–1.11 × 0.07–0.25; a larger ovary, 0.12–0.19 × 0.10–0.44 vs. 0.05–0.16 × 0.07–0.17; and larger testes— anterior testis, 0.50–0.59 × 0.24–0.30 vs. 0.20–0.47 × 0.12–0.31; posterior testis, 0.43–0.59 × 0.26–0.32 vs. 0.22–0.60 × 0.10–0.33).

Despite the morphometric differences we observed between our specimens of digeneans and those described by previous authors, we consider these differences to represent intraspecific variability.

Regarding likely intermediate hosts of these digeneans, the present work is supported by previous findings by Etchegoin and Martorelli (1997), who reported the presence of sporocyst and metacercaria stages of *M. bonaerensis* in *H. australis* and the crabs *N. granulata* and *C. angulatus*, respectively. Also, Martorelli (1988) confirmed that the life cycle of *L. cruzi* involved 2 other species of molluscs, *Heleobia conexa* Gaillard, 1974 and *Heleobia parachappei* d'Orbigny, 1835, as first intermediate hosts, and the freshwater shrimp *Palaemonetes argentinus* Nobili, 1991 (Crustacea, Palaemonidae) as a second intermediate host. Our findings suggest a life cycle involving *H. australis* as first intermediate host and

N. granulata and *C. angulatus* as second intermediate hosts in the ecology and transmission of digenean infections in Olrog's gulls in the Bahía Blanca estuary.

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