

Trematodes of Audouin's gull, *Larus audouinii* (Aves, Laridae), from Chafarinas Islands (W Mediterranean)

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Trematodes of Audouin's gull, Larus audouinii (Aves, Laridae), from Chafarinas Islands (W Mediterranean). – A survey was carried out on the trematode fauna of *Larus audouinii* Payraudeau, 1826 (Aves, Laridae) in the Alboran Sea, south-western Mediterranean. A total of 10 trematode species was found: *Schistosomatinae* gen. sp., *Ornithobilharzia* sp., *Pachytrema calculus*, *Renicola lari*, *Brachylecithum microtesticulatum*, *Condylocotyla pilodora*, *Knipowitschiatrema nicolai*, *Cardiocephalus longicollis*, *Acanthotrema armata* and *Aporchis massiliensis*. The main morphoanatomic characteristics of helminths and the ecological host-parasite relationships are presented. *L. audouinii* becomes a new host for the 10 trematode species.

Key words: Trematoda, Laridae, *Larus audouinii*, Spain.

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Introduction

Although a large number of parasitological studies have been carried out on many gull species, no reference has yet been made to helminth fauna of Audouin's gull, *Larus audouinii* Payraudeau, 1826 (Aves, Laridae). During its breeding period Audouin's gull is an endemic species in the western Mediterranean, with the most numerous breeding colonies being in Spain. PEDROCCHI & RUIZ (1995) indicate that more than 90% of the world's breeding population of this gull, breeds in Spain.

This species is catalogued by the International Union for Conservation of Nature, as "conservation-dependent" (MACE & COLLAR, 1994), and among the 5% of European animal species that require strong efforts to be made for their conservation. For this reason, the Dirección General de Conservación del Medio Ambiente (Spain) promoted and financed research into the biology and ecology of this gull species in several breeding areas, mainly in Chafarinas Islands. As part of this project, the first complete research on the parasite fauna of this gull, has been carried out. The results on the Digenea are presented in this study. Another work (LAFUENTE et al., in press a) is referred on the Cestoda and Nematoda parasitizing Audouin's gull.

Material and methods

A total of 58 adult specimens of Audouin's gull from their breeding colony in Chafarinas Islands (35°11' N, 2° 26' W) (fig. 1) was examined. The breeding colony only fills the islands of Congreso and Rey. Sampling was made during days 6-16 V 1994 and 13-26 V 1995.

Sixteen specimens from Congreso Island (10 males and 6 females) and 42 from Rey Island (18 males and 24 females), were caught. Capture of animals, with the pertinent permits, was made by means of nest traps. Animals were killed with an overdose of chloroform. Twenty-four specimens were dissected *in situ*; and the remainder were frozen within five minutes of collection. In the laboratory, digestive tract, aerial sacks, heart, lungs, pancreas, kidneys and

liver were removed, opened and placed in Ringer solution for examination. Helminths were removed, washed in distilled water, and fixed and mounted according to routine techniques.

Results and discussion

Table 1 lists the 10 digenea found, with their main infection parameters. All the digenea are new records for the host, Audouin's gull.

Family Schistosomatidae Poche, 1907

Ornithobilharzia sp.

Fragmented specimens were found in the body cavity (but probably proceeding from blood system). Males had many testicles and females had the ovary at the anterior part of body, and the vitellaria at the posterior part and specimens were adscribed to the genus *Ornithobilharzia* (YAMAGUTI, 1971). Specific adscription was impossible however due to the poor condition of the worms.

Schistosomatinae gen. sp.

A male specimen of another blood digenea was also found in the body cavity, but its poor condition made generic adscription impossible.

Family Pachytrematidae Baer, 1943

Pachytrema calculus Looss, 1907 (fig. 2A)

Synonymous of *P. paniceum* Brinkmann, 1942, our specimens fit the descriptions of PURVIS (1937), BRINKMANN (1942), TIMON-DAVID (1955) and SITKO (1968, 1993). This is a parasite of the gall bladder. Its prevalence in Audouin's gull is higher than in other gulls.

Family Rencolidae Dollfus, 1939

Rencola lari Timon-David, 1933 (fig. 2B)

This digenea is very common in the kidneys of gulls. Our specimens fit the original descrip-

Tabla 1. Global Infection parameters of the trematode species parasitizing Audouin's gull in Chafarinas Islands: Bs. Blood system; Gb. Gall Bladder; K. Kidney. P. Pancreas; R. Rectum; Cl. Cloaca; I. Intestine; n. Number of parasitized hosts; Ex. Number of examined hosts; N. Total number of parasites.

Parámetros globales de infección de las distintas especies de trematodos parásitos de la gaviota de Audouin en las islas Chafarinas: Bs. Sistema sanguíneo; Gb. Vesícula biliar; K. Riñón; P. Páncreas; R. Recto; Cl. Cloaca; I. Intestino; n. Número de hospedadores parasitados; Ex. Número de hospedadores examinados; N. Número total de parásitos.

Trematodes	Site	Prevalence		Intensity		Abundance	
		n/Ex.	%	\bar{x}	(Range)	N	\bar{x}
<i>Schistosomatinae</i> gen. sp.	Bs	1/58	1.72	-	-	1	-
<i>Ornithobilharzia</i> sp.	Bs	15/58	25.86	3.07	(1-9)	46	0.79
<i>Pachytrema calculus</i>	Gb	10/58	17.24	1.40	(1-2)	14	0.24
<i>Renicola lari</i>	K	23/30	76.67	30.17	(1-90)	694	23.13
<i>Brachylecithum microtesticulatum</i>	P	1/58	1.72	80	-	80	1.37
<i>Condylocotyla pilodora</i>	R, Cl	2/58	3.45	15.50	(1-30)	31	0.53
<i>Knipowitschiatrema nicolai</i>	I	35/58	60.34	12.66	(1-110)	443	7.63
<i>Cardiocephalus longicollis</i>	I	14/58	22.41	4.77	(1-19)	62	1.06
<i>Acanthotrema armata</i>	I	18/58	31.03	34.56	(1-137)	622	10.72
<i>Aporchis massiliensis</i>	I	1/58	1.72	-	-	-	-

scription (TIMON-DAVID, 1933). Infection prevalences of *R. lari* in different species of gulls, are generally very low, even void. Nevertheless, TIMON-DAVID (1955) found in herring gull, *L. argentatus* Pontoppidan, 1763 (probably *L. cachinnans* Pallas, 1811) of the SE of France, values of prevalences similar to those of the present study. Observed differences among prevalences of *R. lari* in other gulls with respect to Audouin's gull, may be due to factors such as distribution and/or availability of first (mainly crustaceans or molluscs) and second (fish) intermediate hosts. The specialized diet in Clupeiform fish shown by Audouin's gull in Chafarinas Islands (PEDROCCHI et al., 1996) does not seem to be the cause of the high prevalence of *R. lari*, as the yellow-legged gull *L. cachinnans* Pallas, 1811, with a more varied diet in the same area (WITT et al., 1981), shows a similar prevalence. It therefore seems that infection of both gull species occurs throughout prey that they usually eat.

Family Dicrocoeliidae Odhner, 1910

Brachylecithum microtesticulatum Timon-David, 1955 (fig. 2C)

From among more than 60 known species of *Brachylecithum*, only *B. microtesticulatum* parasitizes gulls and only this species is located in pancreas. The remaining species are located in liver, gall bladder and bile ducts. *B. microtesticulatum* shows high morphologic variability. Our specimens fit the descriptions of TIMON-DAVID (1955), BARTOLI & MAS-COMA (1989) and KOSTADINOVA (1996). The low prevalence of this trematode in Audouin's gull might be a consequence of its terrestrial life cycle, similar to that of *B. americanum* (DENTON, 1944), and also to the feeding habits (basically piscivorous) of Audouin's gull in the sampled area (PEDROCCHI et al., 1996). It should be kept in mind that

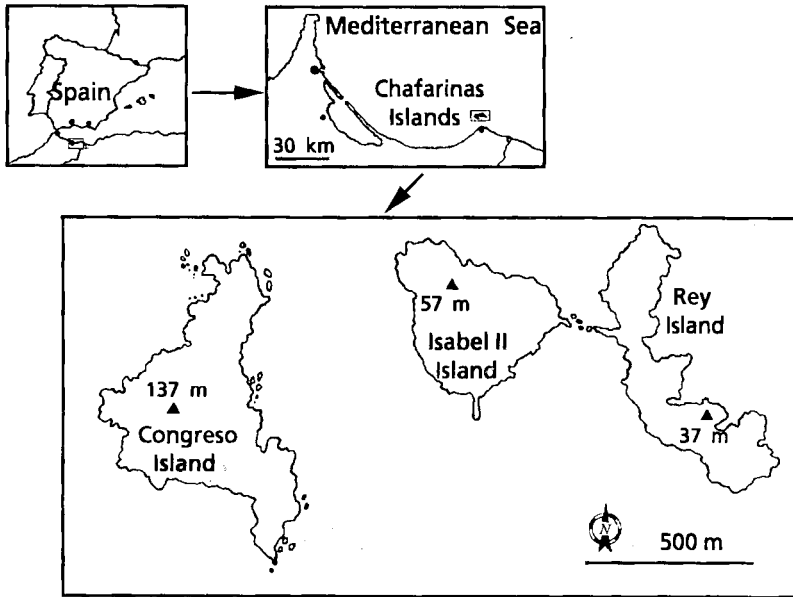


Fig. 1. Location of the study area in the Mediterranean Sea.
 Localización geográfica del área de estudio en el mar Mediterráneo.

the different species of *Brachylecithum* are terrestrial birds such as falconids, corvids and passeriforms (SINGH, 1962; YAMAGUTI, 1971).

Family Heterophyidae Odhner, 1914

Condylocotyla pilodora Pearson et Prévot, 1985 (fig. 2D)

This trematode has only been recorded, with a low prevalence, in gulls by PEARSON & PREVOT (1985) (in herring gull) and in the present work. Many parasitological studies have been made on gulls and *C. pilodora* was not found: SUGOSTOWSKA (1960, 1963) on 58 and 102 black-headed gulls, *L. ridibundus* L., 1766, respectively; PEMBERTON (1963) on 146 black-headed gulls; SITKO (1968, 1993) on 302 and 542 black-headed gulls respectively; BAKKE, (1972) on 269 common gulls, *L. canus* L.; POJMANSKA et al. (1984) on 151 black-headed gulls; VOJTEK (1981) on 364 black-

headed gulls; BUSTA & GROSCHAFT (1986) on 778 black-headed gulls; BRGLEZ et al. (1987) on 215 black-headed gulls. This suggests that the more habitual definitive host for this trematode is still unknown.

Knipowitschiatrema nicolai (Issaitschikow, 1927) (fig. 3A)

This trematode, located in the posterior part of the intestine, shows a characteristic acetabulogenital complex and a seminal vesicle S-shape.

Its prevalence in Audouin's gull (60%) is higher than in the herring gull (24%) (TIMON-DAVID, 1955) and lesser black-backed gull, *L. fuscus* L. (25%) (PEMBERTON, 1963). As first and second intermediate hosts of this trematode, a Prosobranch mollusc, *Cerithium vulgatum* and the garfish, *Belone belone* have been recorded. The former is a common species in the Mediterranean Sea (PEARSON & PREVOT, 1985; D'ANGELO & GARGIULLO,

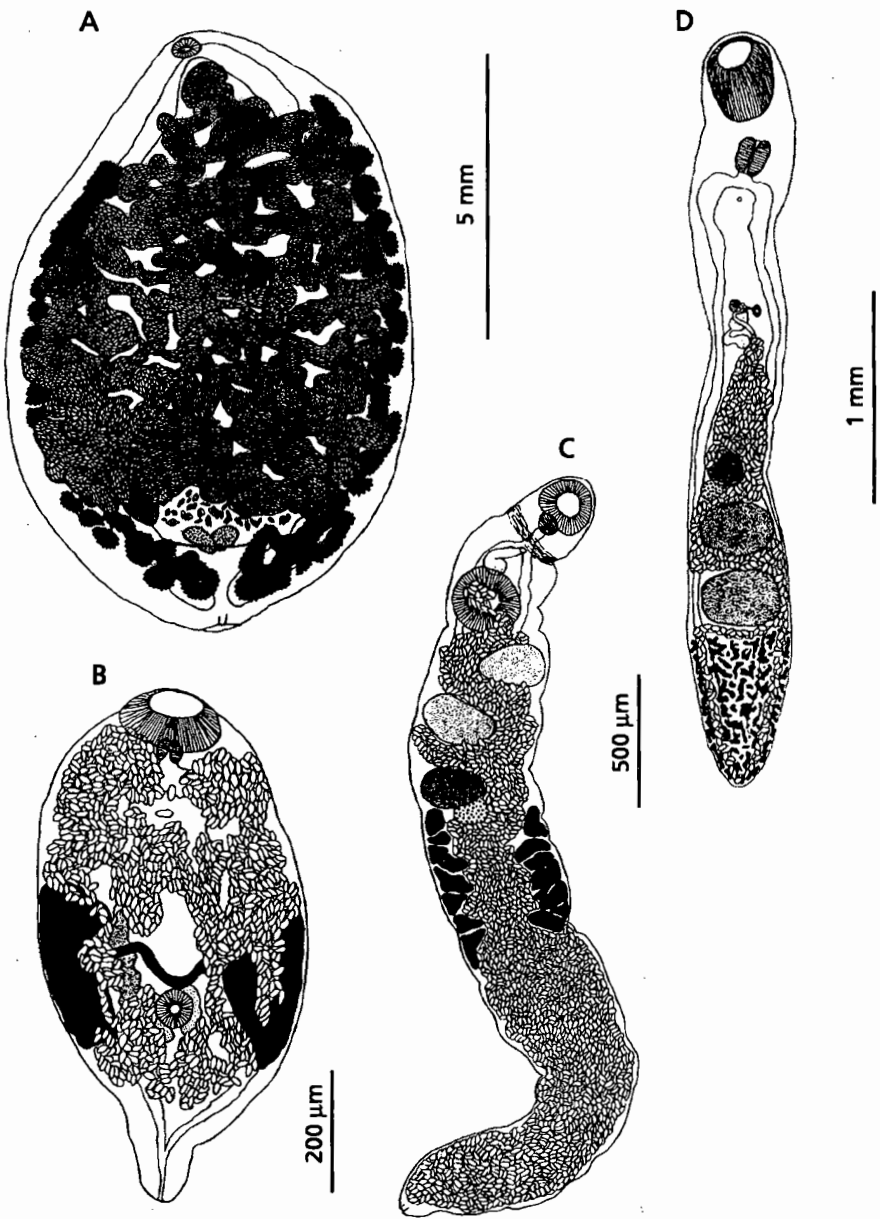


Fig. 2. A. *Pachytrema calculus*; B. *Renicola lari*; C. *Brachylecithum microtesticulatum*; D. *Condylocotyla pilodora*.

A. *Pachytrema calculus*; B. *Renicola lari*; C. *Brachylecithum microtesticulatum*; D. *Condylocotyla pilodora*.

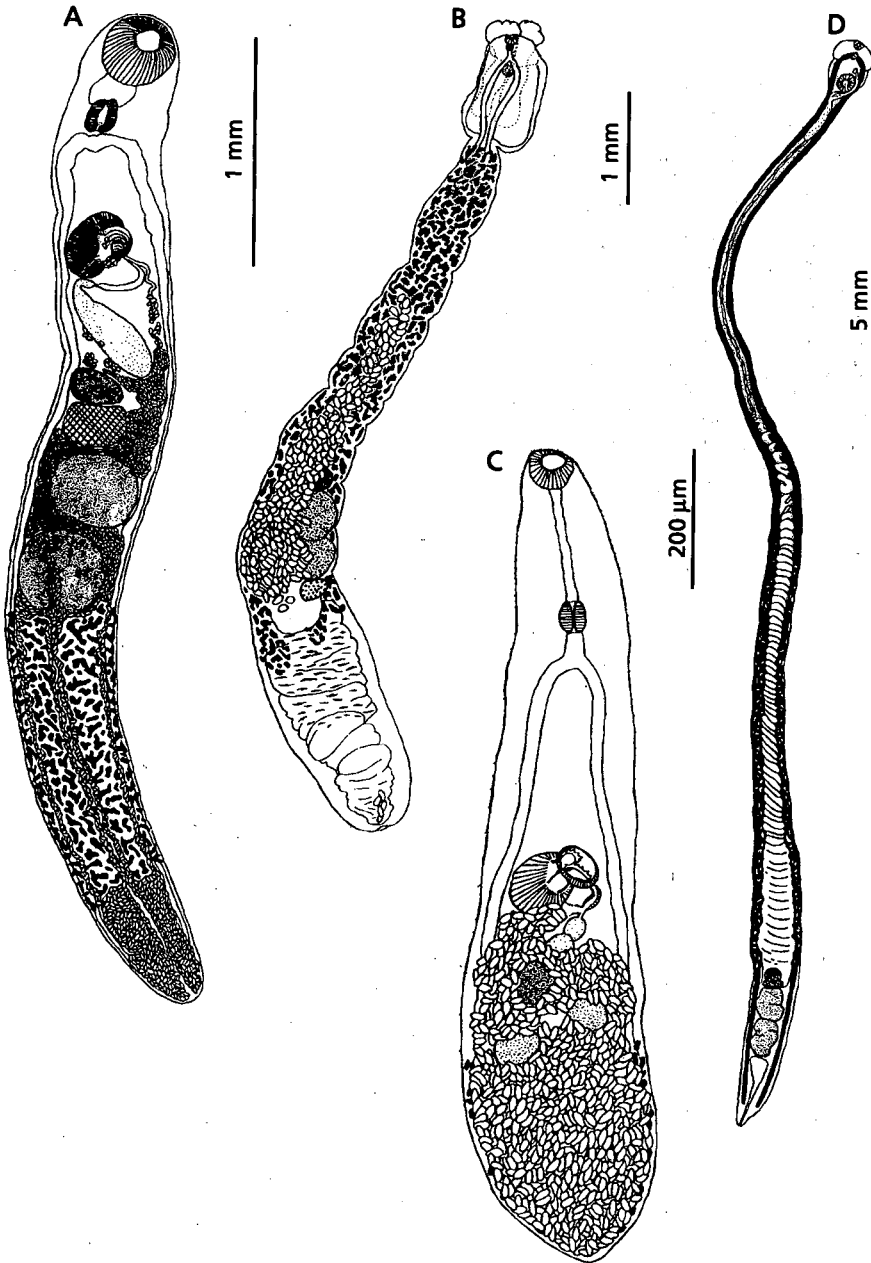


Fig. 3. A. *Knipowitschiatrema nicolai*; B. *Cardiocephalus longicollis*; C. *Acanthotrema armata*; D. *Aporchis massiliensis*.

A. *Knipowitschiatrema nicolai*; B. *Cardiocephalus longicollis*; C. *Acanthotrema armata*; D. *Aporchis massiliensis*.

1978). The latter is not a usual prey in the diet of Audouin's gull (PEDROCCHI et al., 1996). The high prevalence suggests that other fish species may also be second intermediate hosts in the life cycle of *K. nicolai*.

Acanthotrema armata Lafuente, Roca et Carbonell, 1999 (fig. 3C)

This is a new species found on Audouin's gull, the description of which is presently in press (LAFUENTE et al., in press b).

Most individuals (98%) were located in the posterior part of the intestine. Its prevalence, mean intensity and abundance are relatively high and suggest that it is a common species in the helminth community of *L. audouinii*.

Family Strigeidae Railliet, 1919

Cardiocephalus longicollis (Rudolphi, 1819) (fig. 3B)

This trematode shows a higher prevalence than those in other gulls from north Europe (WILLIAMS, 1962; PEMBERTON, 1963; HARRIS, 1964; BAKKE, 1972) in which this species is absent or very scarce. Studies on gulls living near the Mediterranean Sea show prevalences between 1.3 and 10.8% (TIMON-DAVID, 1955; SITKO, 1968; 1993; BUSTA & GROSCHAFT, 1986; BRGLEZ et al., 1987).

Family Echinostomatidae Poche, 1926

Aporchis massiliensis Timon-David, 1955 (fig. 3D)

Only one Echinostomatid trematode was found, this being in the intestine of a gull. This specimen shows eggs with a long polar filament, and lobed testicles fitting the original description of *A. massiliensis* (TIMON-DAVID, 1955), who found this species parasitizing the herring gull in southeast France. The species was also recorded on the lesser black-backed gull in Great Britain with a prevalence of 12.5% (PEMBERTON, 1963). Our finding is the third for European gulls. *A. massiliensis* appears to be a rare parasite on palaeartic gulls.

Resumen

Trematodos de la gaviota de Audouin, Larus audouinii (Aves, Laridae) de las islas Chafarinas (Mediterráneo occidental)

Se ha llevado a cabo un estudio sistemático, faunístico y ecológico de los trematodos parásitos de *Larus audouinii* Payraudeau, 1826 (Aves, Laridae) en el mar de Alborán (Mediterráneo sudoccidental), concretamente en las islas Chafarinas (fig. 1). Se detectó un total de 10 especies de digénidos: *Schistosomatinae* gen. sp., *Ornithobilharzia* sp., *Pachytrema calculus*, *Renicola lari*, *Brachylecithum microtesticulatum*, *Condylocotyia pilodora*, *Knipowitschiatrema nicolai*, *Cardiocephalus longicollis*, *Acanthotrema armata* y *Aporchis massiliensis*. De estas especies, se presentan y discuten sus principales rasgos morfoanatómicos (figs. 2 y 3) y las relaciones parásito-hospedador. La tabla 1 recoge los parámetros globales de infección de las distintas especies de digénidos encontradas y su localización en el hospedador. Todas y cada una de estas especies resultaron ser nuevas citas para el hospedador *Larus audouinii*.

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