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A NEW SPECIES OF *CLOACITREMA* (DIGENEA, PHILOPHTHALMIDAE) FROM GREATER FLAMINGO (*PHOENICOPTERUS ROSEUS*) WITH REMARKS ON THE GENERA *CLOACITREMA* AND *PYGORCHIS*

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A New Species of *Cloacitrema* (Digenea, Philophthalmidae) from Greater Flamingo (*Phoenicopterus roseus*) with Remarks on the Genera *Cloacitrema* and *Pygorchis*. Schuster R. K. — *Cloacitrema dubaiensis* Schuster, sp. n. is described from four adult specimens found in the cloaca of greater flamingos in Dubai, UAE. It is the first *Cloacitrema* species found in the Afrotropic ecozone. The new species is medium-sized and slim, with the ventral sucker in equatorial position and the uterus that extends laterally to intestinal caeca. It has oval, unlobed, touching each other testes in parallel to slightly oblique position. *C. dubaiensis* resembles *C. narrabeenensis* but differs in body shape, position of acetabulum, size of the seminal vesicle and number of vitelline follicles and their extension lateral to caeca.

Key words: *Cloacitrema*, new species, Digenea, Philophthalmidae, *Phoenicopterus roseus,* the UAE.

Новый вид рода *Cloacitrema* (Digenea, Philophthalmidae) из обыкновенного фламинго (*Phoenicopterus roseus*) с замечаниями о родах *Cloacitrema* и *Pygorchis*. Шустер Р. К. — *Cloacitrema dubaiensis* Schuster, sp. n. описывается по четырём взрослым экземплярам, обнаруженным в клоаке обыкновенных фламинго в Дубае (ОАЭ). Это первый вид *Cloacitrema*, найденный в Афротропическом регионе. Новый вид отличается средними размерами, удлинённой формой тела, экваториальным положением вентральной присоски и маткой, простирающейся латерально до ветвей кишечника. Семенники овальные, не разделенные на лопасти, касающиеся друг друга, лежащие параллельно, или слегка диагонально. Вид *C. dubaiensis* подобен *C. narrabeenensis*, но отличается от него формой тела, положением брюшной присоски, размером семенного пузырька, количеством желточников и их протяженностью латерально до уровня кишечных стволов.

Ключевые слова: *Cloacitrema,* новый вид, Digenea, Philophthalmidae, *Phoenicopterus roseus,* ОАЭ.

Introduction

The subfamily Cloacitrematinae Yamaguti, 1958 of the family Philophthalmidae Looss, 1899 consists of two morphologically similar genera *Cloacitrema* Yamaguti, 1935 and *Pygorchis*, Looss, 1899 representatives of which inhabit the cloaca of birds. The genus *Cloacitrema* with the type species *C. ovatum* Yamaguti, 1934 from *Bucephala clangula* (Linnaeus, 1758) in Japan was founded by Yamaguti (1935). So far, seven further species have been described. These are *C. michiganensis* McIntosh, 1938 from *Actitis macularia* (Linneus, 1758) and *Himantopus mexicanus* (Müller, 1776) in Michigan and Florida (USA), *C. oswaldoi* Travassos, 1940 from *Nyctianassa violacea* (Linneus, 1758) in Brazil, *C. deltoidea* Mamaev, 1959 from *Tringa incana* (Gmelin, 1789) in Yakutia (Russia), *C. marilae* Cimbaluk et Leonov 1963 from *Aythya marila* (Linneus, 1761) in Kamchatka (Russia), *C. pharyngeata* Belopol'skaja, 1963 from *Tringa glareola* (Linneus, 1758) in the Far East of Russia, *C. narrabeenensis* Howell et Bearup (1967) from *Croicocephalus novaehollandiae* (Stevens, 1826) in Australia and *C. philippinum* Velasquez, 1969 in *Gallus domesticus* (Linneus, 1758) and *Anas platyrhynchos* (Linneus, 1758). The closely related genus *Pygorchis* Looss, 1899 consists of *P. affixus* Looss, 1899 from *Corvus cornix* Linneus, 1758, *Falco tinnunculus* Linneus, 1758, *Circus aerogenosus* (Linneus, 1758) in Egypt, *P. alacolensis* Žatkanbaeva, 1967 from *Croicocephalus ridibundus* (Linneus, 1758), *Hydroprogne caspia* Kaup, 1829, *Sternea hirundo* Linneus, 1758 in Kazakhstan and *P. americanus* Dronen, 1985 from *Ajaia ajaja* Linneus, 1758 in Texas (USA).

The aim of this paper is to describe a new *Cloacitrema* species found in *Phoenicopterus roseus* Pallas, 1811.

Material and methods

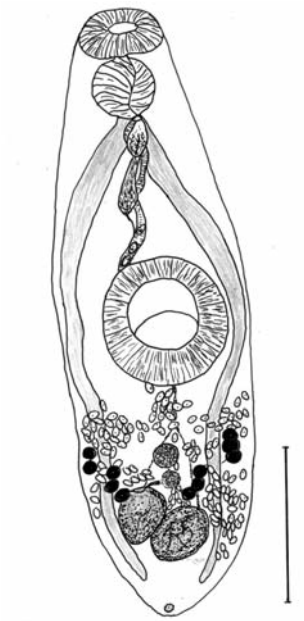
Trematodes attached to the cloaca were found in four out of five greater flamingos originating from Ras al Khor wildlife sanctuary situated at the terminal point of the creek of Dubai, UAE (25°11'23.40" N; 55°19'05.75" E). The parasites in numbers of 1, 2, 5 and 8 were removed from the host and adult specimens[1] were placed in normal saline on a slide to study the postovarian complex and the eggs in the terminal part of the uterus. Later, they were fixed in 70 % hot (70 °C) ethanol, stained in an aquatic solution of carmine, dehydrated increasing ethanol series, cleared in clove oil and mounted in DPX mounting medium on slides. The description is based on 4 adult specimens with the uterus containing eggs with occulate miracidia as well as free miracidia.

Measurements in micrometers (unless otherwise stated) were given as means followed by range in brackets.

Cloacitrema dubaiensis Schuster, **sp. n.** (fig. 1–4)

Type material: Type. Holotype and 2 paratypes deposited at Meguro Parasitological Museum as: M. P. M. Collection Number 20867

Description. Body elongate ellipsoid in shape, 3.28 (3.03–3.80) mm long by 1.15 (1.10–1. 20) mm at greatest width. Cuticule smooth, aspinose. Oral sucker subterminal, 323 (300–370) × 468 (400–500). Short prepharynx. Pharynx spherical 318 (320-370) × 370 (300–350). Esophagus short: 38 (30–50) long and 125 (100–150) wide. Caeca ending posterior to testes. Acetabulum equatorial, round: 713 (650–800) × 723 (650–800). Testes juxtaposed or slightly oblique, close together or touching, unlobed, oval in shape, 248 (200–300) × 185 (150–250), at posterior part of the body, intercaecally. Vasa efferentia unite on halfway between testes and acetabulum. Vas deferens proceeds dorsally to acetabulum alongside the metraterm with terminal part sac like enlarged and function-



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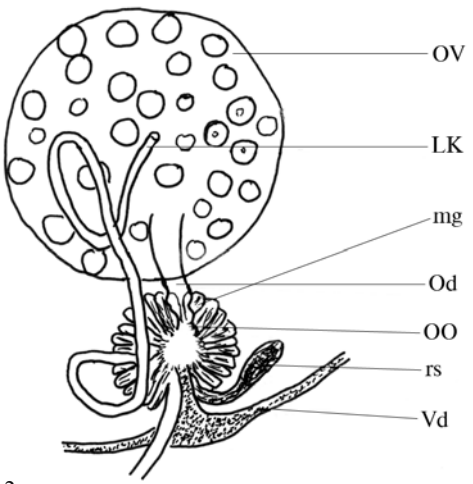

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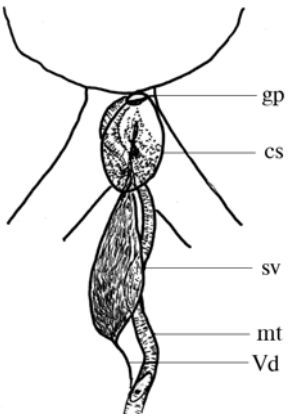
Fig. 1. *Cloacitrema dubaiensis* (holotype) total. Scale bar 1 mm.

Рис. 1. *Cloacitrema dubaiensis* (голотип), общий вид. Масштабная линейка 1 мм.

Fig. 2. *C. dubaiensis*: ovary and postovarian complex. OV: ovary, LK: Laurer's canal, mg: Mehlis' gland, Od: oviduct, OO: ootype, rs: receptaculum seminis, Vd: vitelline duct.

Рис. 2. *C. dubaiensis*: яичник и постовариальный комплекс.

[1] The most of the flukes recovered from the four birds were juvenile with undeveloped genitalia measuring only 1 mm.



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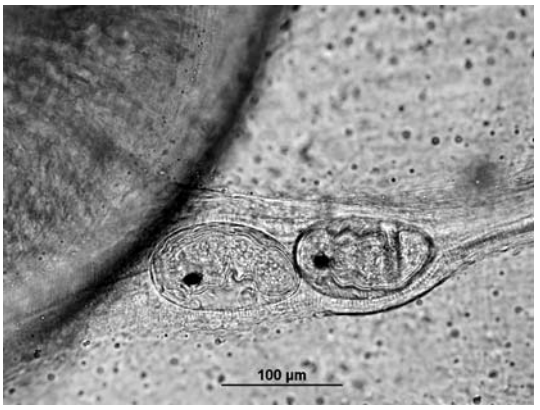

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Fig. 3. *C. dubaiensis*: region of terminal genital ducts. gp: genital porus, cs: cirrus sac, sv: seminal vesicle, mt: metraterm, Vd: vas deference.

Рис. 3. *C. dubaiensis*: участок дистальных половых протоков.

Fig. 4. *C. dubaiensis* eggs in the metraterm.

Рис. 4. Яйца *C. dubaiensis* в метатерме.

ing as external seminal vesicle. Cirrus sac containing prostate cells and cirrus, terminating at a common genital pore ventral to posterior part of pharynx. Ovary spherical, median, pretesticular 160 (140–200) in diameter. Oviduct staring at dorsal surface of ovary. Ootyp, Mehlis'gland complex, vitelline reservoir immediately posterior and dorsally to ovary. Receptaculum seminis present. Coiled Laurer's canal opens at dorsal surface at the level of ovary. Vitelline follicles compact, dorsal to caeca, 4 to 7 on each side, starting extra-caecally at the level of ovary, continuing intercaecally to anterior part of testes. Uterus posterior to acetabulum with coils reaching extracaecal space. Metraterm alongside vas deferens, dorsally of seminal vesicle and cirrus pouch and opening at common genital pore. Eggs in terminal part of uterus, in unfixed specimens yellowish, 121 (118–125) × 70 (68–72) containing oculate, ciliated miracidia. Free miracidia in distal uterus elongated, 160–162 × 70–72, containing a sausage shaped sporocyste. Excretory vesicle with two arms reaching level of oral sucker, excretory pore dorsally at anterior end.

Type host: greater flamingo (*Phoenicopterus roseus* Pallas, 1811) (Aves, Phoenicopteridae).

Site of infection: cloaca.

Type locality: Ras al Khor, Dubai, the UAE.

Etymology: The specific epithet is derived from the locality of the host, Dubai.

Differential diagnosis

The length of *Cloacitrema* species varies between 1.05–1.49 mm in *C. philippinum* and 4.2–5.2 mm in *C. oswaldoi*. With an average length of 3.28 *C. dubaiensis* belongs to the medium sized species and is comparable only to *C. ovatum*. But with a length to width index of 2.8 : 1 *C. dubaiensis* is the slimmest while *C. ovatum* is the broadest representative in this genus in absolute measurements as well as in relation to its length (1.8 : 1). *C. dubaiensis* has most similarities with *C. narrabeenensis* (sucker ratio of 1 : 2, uterus coils extend extracaecally, testes oval, touching, parallel to slightly oblique, presence of a cirrus, eggs more than 120 µm in length and more than 60 µm in width). Both species differ in body shape, the position of the acetabulum, the length of the seminal vesicle and the number of vitelline follicles and their extension lateral to caeca.

Remarks

The main diagnostic features of the genus *Cloacitrema* are the position of acetabulum and testes, character of the male terminal genital ducts and the extension of uterine loops (Yamaguti, 1935). This diagnosis was extended by including the shape of the body and by the extension of vitellary fields laterally to caeca of by Kanev et al. (2005) (table 1). As seen from the table 2, only the existence of an external seminal vesicle is a common feature for all described so far *Cloacitrema* species. *C. ovatum* meets all the generic criteria while *C. deltoidea* showed the least compliance with the generic diagnosis. The description of the latter species is based on only two specimens and is most probably a result of poor fixation. *C. deltoidea* has never been mentioned again in the literature and should be treated as species inquirenda.

The postequatorial position of the ventral sucker is only the case in *C. ovatum, C. pharyngeatum* and *C. marilae* while the center of the acetabulum in the remaining *Cloacitrema* species is situated, similar to *Pygorchis* species, in equatorial or even pre-equatorial position.

With the exception of *C. marilae* that possesses lobed testes, in all remaining species of this genus the margin of testes is smooth. The position of testes to each other even within one species may vary from parallel to slightly oblique (*C. philippinum*, *C. narrabeenensis, C. dubaiensis)*. The same testes configuration is described for *P. alacolensis* and *P. americanus* while in *P. affixus* the testes are in a parallel position.

A symmetrical constriction at the level of acetabulum is only mentioned explicitly in the verbal description of *C. ovatum* and *C. narrabeenensis.* It is faintly recognizable in the figures provided in the description of *C. oswaldoi* and *C. michiganensis* and absent in *C. marilae*, *C. philippinum* and *C. dubaiensis.* However, such a constriction is distinct in *P. americanus.*

Table 1. Differentiation between *Cloacitrema* and *Pygorchis* (Kanev et al., 2005)
Таблица 1. Отличия между *Cloacitrema* и *Pygorchis* (Kanev et al., 2005)

Diagnostic features	*Cloacitrema*	*Pygorchis*
body shape	elongate, rounded ends	elliptical ovate
constriction at level of acetabulum	present	–
center of acetabulum	postequatorial	preequatorial
testes	juxtaposed	diagonal
external seminal vesicle	present	absent
internal seminal vesicle	absent	present
vitteline follicles	inter and extracaecal	intercaecal
uterine loops	intercaecal	overlapping caeca

Table 2. *Cloacitrema* species that meet the diagnosic criteria of the genus
Таблица 2. Виды *Cloacitrema*, соответствующие диагностическим критериям рода

Criteria	Species								
	1	2	3	4	5	6	7	8	9
body elongated with rounded ends	+	+	+	–	+	+	+	+	+
symmetrical constriction at level of acetabulum	+	+	+	–	–	–	+	–	–
acetabulum in postequatorial position	+	–	–	–	+	+	–	–	–
testes juxtaposed, oval and smooth	+	+	+	–	–	+	±	±	±
external seminal vesicle	+	+	+	+	+	+	+	+	+
vitelline follicles extending obliquely across caeca	+	–	+	+	+	–	–	–	+
uterine loops pretesticular, not extending laterally to caeca	+	–	–	–	+	–	–	+	–

Notes. 1 – *C. ovatum,* 2 – *C. michiganensis,* 3 — *C. oswaldoi,* 4 — C. deltoidea, 5 — *C. marilae,* 6 — *pharyngeata,* 7 – *C. narrabeenensis,* 8 — *C. philippinum,* 9 — *C. dubaiensis*

In five *Cloacitrema* species, vitelline follicle fields cross the caeca. In the four remaining species they are intercaecal, just reaching the dorsal surface of the caeca. Vitelline fields extending extracaecally can be seen in *P. alacolensis* and *P. americanus* but not in the type species, *P. affixus*.

The last diagnostic criterion is the intercaecal, pretesticular position of uterus coils. Only *C. ovatum, C. marilae* and *C. philippinum* fulfill this character while other *Cloacitrema* species do not. The uterus in all three *Pygorchis* species fills the postacetabular space and well extends extracaecally and posttesticular.

All but one (*C. pharyngeata*) *Cloacitrema* species have eggs containing fully developed oculate miracidia. According to the egg size they can be grouped into 3 categories: 1. Small eggs with a length of less than 60 μm (*C. ovatum, C. pharyngeata, C. philippinum*), 2. Medium sized eggs with a lengths between 60 and 90 μm (*C. michiganensis, C. oswaldoi, C. deltoidea, C. marilae*), and 3. Large eggs with a length of more than 90 μm (*C. narrabeenensis, C. dubaiensis*). All 3 *Pygorchis* species have medium sized eggs.

As seen from this analysis the structure of the terminal male genital ducts is the only true character to distinguish between *Cloacitrema* and *Pygorchis*.

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