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NEW RECORDS OF HELMINTHS OF THE CORNCRAKE, *CREX CREX* (AVES, RALLIDAE) FROM UKRAINE

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New Records of Helminths of the Corncrake, *Crex crex* (Aves, Rallidae) from Ukraine. Syrota, Ya. Yu., Korol, E. M., Kuzmin, Yu. I. — The article presents the records and brief descriptions of the trematodes *Brachylaima fuscata* (Rudolphi, 1819), *Prosthogonimus cuneatus* (Rudolphi, 1809), *Prosthogonimus ovatus* (Rudolphi, 1803), and the nematode *Cardiofilaria pavlovskyi* Ström, 1937 based on the specimens collected from four corncrakes, *Crex crex* Linnaeus examined on the territory of Ukraine. In the country, *P. cuneatus*, *P. ovatus*, and *C. pavlovskyi* are reported for the first time in this host-species.
Key words: *Brachylaima fuscata*, *Cardiofilaria pavlovskyi*, *Prosthogonimus cuneatus*, *Prosthogonimus ovatus*, bird, Ukraine.

Introduction

The corncrake, *Crex crex* Linnaeus, 1758 breeds in Europe and central Asia, as far east as western China, and winters in sub-Saharan Africa (BirdLife International, 2016). The bird mainly inhabits terrestrial ecosystems, but some freshwater ecosystems are also suitable for this species. Such a life history strategy makes possible the infection of this species with helminths of both waterfowl and of terrestrial birds. Due to this, the corncrake is quite interesting for the helminthological surveys. However, there are only few publications containing the data about helminths of the corncrake in Europe (Macko, 1971; Okulewicz, 1993; Hanzelova and Rysavy, 1999) and the species composition of its helminths was not comprehensively studied on the territory of Ukraine. In the country, the following helminths were previously reported from the corncrake: trematodes

Brachylaima fuscata (Rudolphi, 1819), *Leucochloridium holostomum* (Rudolphi, 1819), *Echinostoma revolotum* group; cestodes *Dilepis undula* (Schrank, 1788), *Rallitaenia pyriformis* (Wedl, 1855), *Rallitaenia rallida* (Macko, 1966) (Greben and Maleha, 2009; Smogorzhevskaya, 1976).

In this article, we present new records of helminths found in the corncrake on the territory of Ukraine with morphological descriptions of the parasites.*Prosthogonimus cuneatus* (Rudolphi, 1809), *P. ovatus* (Rudolphi, 1803), and *Cardiofilaria pavlovskyi* Ström, 1937 are reported from this host for the first time.

Material and methods

We investigated helminthological material stored in the collection of the I. I. Schmalhausen Institute of Zoology NAS of Ukraine, Kyiv (IZSHK). Helminths were collected from four specimens of the corncrake in July–September of 1973, 1989, and 1999 from the following localities (coordinates are given approximately): Kyiv Region, near Kyiv (50°36′40″ N, 30°21′40″ E); Chernihiv Region, Horodnia District (51°53′19″ N, 31°32′11″ E) and Nizhyn District (51°00′06″ N, 31°54′16″ E). Nematodes were fixed and stored in 4 % formalin solution. For temporary mounts, nematodes were cleared in lactophenol. Trematodes were fixed and stored in 70° ethanol. For permanent mounts, trematodes were stained in Mayer's haematoxylin. Stained helminths were dehydrated, cleared in clove oil, and mounted in Canadian balsam (Lutz et al., 2017). The specimens were studied under Zeiss Axio Imager M1 light microscope equipped with DIC optics and AmScope T690B microscope. Identification of helminths was based on morphological characters using the keys and the descriptions in Heneberg et al. (2015, 2016), Sonin (1968), and Strom (1937). Measurements in the text are given in micrometres.

Results

We examined and identified four species of helminths parasitic in the corncrake.

Phylum Platyhelminthes
Class Trematoda
Family Brachylaimidae

Brachylaima fuscata (Rudolphi, 1819)

Six specimens were collected from the intestine of one bird.

Locality: Nizhyn District (Chernihiv Region).

Description (based on 4 mature specimens). Body elongated (fig. 1, A), with maximum width 476–542 anterior to ventral sucker; body length 2,487–2,849. Oral sucker larger than ventral sucker. Oral sucker 241–288×211–282. Ventral sucker 150–182×145–180. Distance from anterior end of body to centre of ventral sucker 890–960. Pharynx well-developed, round, 102–174×123–168. Gonads in posterior quarter of body. Ovary between testes. Anterior testis 160–272×167–261, posterior testis 164–269×122–245. Ovary 131–162×136–171. Vitellarium distributed in two lateral fields, extending from posterior extremity of ventral sucker to level of anterior edge of anterior testis. Eggs oval, numerous, 28–35×16–18 in size.

Family Prosthogonimidae

Prosthogonimus cuneatus (Rudolphi, 1809)

Two specimens, one adult and one immature, were collected from the bursa of Fabricius of one bird.

Locality: Horodnia District (Chernihiv Region).

Description of an adult specimen. Body oval (fig. 1, C), 2,072 long, with maximum width 752 atlevel of ovary. Oral sucker subspherical, 191×212. Ventral sucker 351×360. Distance from anterior end of body to centre of ventral sucker 930. Pharynx well developed, oval 105×96. Oesophagus short, 120–190 long. Testes elongate-oval. Size of right testis 200×96, size of left testis 198×90. Cirrus sac 220×44. Ovary 220×300. Ventral sucker slightly overlapping ovary anteriorly. Loops of uteri extending from posterior edge of ventral sucker to posterior end of body. Vitellarium at lateral margins of body. Anterior border of vitellarium at level of posterior edge of ventral sucker, posterior border

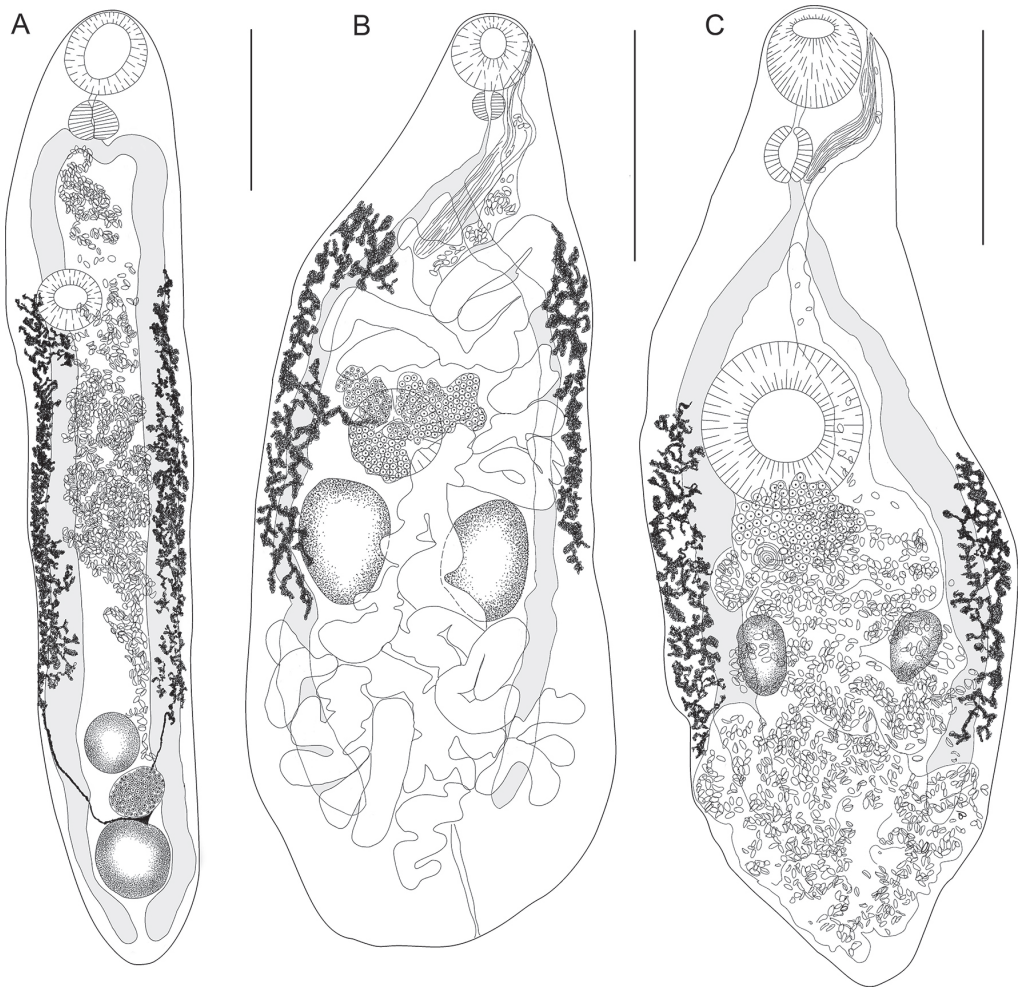

Fig. 1. General view of the trematodes found in the corncrake in Ukraine: *Brachylaima fuscata* (A), *Prosthogonimus ovatus* (B), *Prosthogonimus cuneatus* (C). Scale bars 500 μm.

of vitellarium posterior to posterior edge of testes. Eggs oval, numerous, 23–25×14–15 in size.

Description of an immature specimen. Body pear-shaped, 1,425 long, with maximum width 580 at level of testes. Size of oral sucker 168×160, size of ventral sucker 265×260. Pharynx 55×35. Distance from anterior end of body to centre of ventral sucker 660. Testes round. Right testis 148×150, left testis 150×153. Ventral sucker partly covering anterior part of ovary. Ovary 147×178. Vitellarium undeveloped.

Prosthogonimus ovatus (Rudolphi, 1803)

One adult specimen was collected from the bursa of Fabricius of one bird.

L o c a l i t y: Horodnia District (Chernihiv Region).

Description. Body pear-shaped (fig. 1, B), 1,899 long; its maximum width 735 in posterior quarter. Oral and ventral suckers subspherical. Oral sucker 130×136. Ventral sucker 250×263. Distance from anterior end of body to centre of ventral sucker 870. Pharynx well developed, round, 106×88. Testes elongate-oval. Right testis 283×220. Left testis 260×180. Cirrus-sac 350×80. Ovary 165×313. Ventral sucker totally covering ovary. Anterior border of uteri loops distal to intestine bifurcation, posterior border of uteri loops almost at end of body. Anterior edge of vitellarium at level of anterior border of uteri loops.

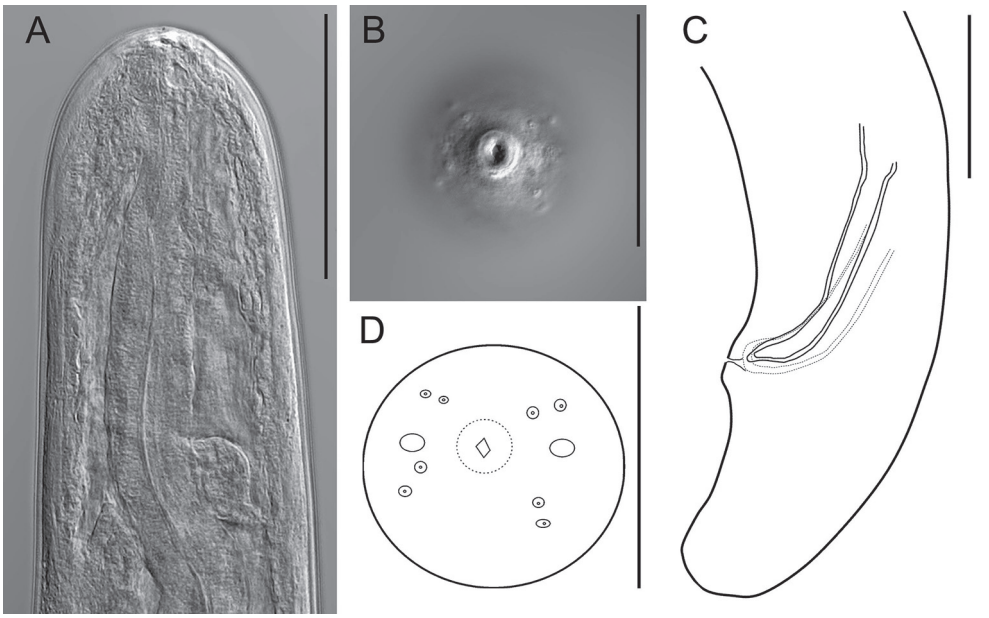

Fig. 2. *Cardiofilaria pavlovskyi*. A — anterior part of body, lateral view; B — apical view of anterior extremity, optical section at level of cuticular ring; C — posterior part of body, lateral view; D — position of apical structures (papillae and amphids), en face view. Scale bars 50 μm.

Branches of vitellarium different in size. One branch extending to middle of testes. Another branch extending to end of testes. Eggs oval, numerous, 25–28×13–14 in size.

Phylum Nematoda
Class Chromadorea
Family Onchocercidae

Cardiofilaria pavlovskyi Ström, 1937

Two specimens (males) were collected from the air sacs of two birds.

Locality: Kyiv Region, near Kyiv.

Description of 2 males. Nematodes of small size. Body cylindrical, slightly narrowing to anterior and posterior extremities (fig. 2, A), 6,431–7,485 long. Body width 110–115 at level of posterior edge of oesophagus. Maximum body width 143–165 near middle of body. Cuticle smooth. Mouth small, dorso-ventrally elongated in studied specimens. On anterior extremity, 4 pairs of papillae in two circles and lateral amphids (fig. 2, B, D). Distinct cuticular ring surrounding buccal cavity. Oesophagus divided into muscular and glandular parts, border between parts indistinct. Muscular part of oesophagus 48–51 long, glandular part 355–377 long. Nerve ring in first quarter of glandular part of oesophagus, 127–136 from anterior extremity. Spicules subequal and slightly dissimilar (fig. 2, C). Left spicule 75–81 long, right spicule 60–65 long. Tail short and blunt, 69–76 long.

Discussion

Our record of *B. fuscata* is the second registration of this species in the corncrake from Ukraine. The first record (Greben and Maleha, 2009) is somewhat insufficiently documented; it was presented just as an item in a species list without any illustrations or description of morphology. In Ukraine, this helminth is also known from *Pluvialis apricaria* (Linnaeus), *Sturnus vulgaris* Linnaeus, and *Garrulus glandarius* Linnaeus (Iskova et al., 1995). The species was found in game fowl, doves, pigeons and passeriform birds, rarely also in birds

Table 1. Metrical characters of *Prosthogonimus cuneatus* and *P. ovatus*

Characters	*Prosthogonimus cuneatus*			*Prosthogonimus ovatus*		
	from *Crex crex*, present study	from various hosts, in Heneberg et al. (2015)	from *Corvus cornix*, in Sharpilo & Iskova (1989)	from *Crex crex*, present study	from various hosts, in Heneberg et al. (2015)	from *Pica pica*, in Sharpilo & Iskova (1989)
	n = 1	n = 15	n/a	n = 1	n = 30	n/a
Body length	2,072	4,147–5,148	5,840–7,040	1,899	3,289–5,634	3,820–5,520
Body width	752	1,714–3,661	3,200–3,580	735	1,543–2,229	1,820–2,250
Oral sucker length	191	238–534	520–540	130	122-340	190–210
Oral sucker width	212	267–598	520–540	136	139–340	170–190
Ventral sucker length	351	493–920	800–880	250	319–460	410–440
Ventral sucker width	360	522–920	800–880	263	348–460	410–440
Pharynx length	105	128–276	320–330	106	99–202	130–150
Pharynx width	96	133–244	300–320	88	93–193	130–150
Left testis length	198	478–810	1,180–1,360	260	348–1118	810–900
Left testis width	90	267–754	1,040–1,120	180	174–745	600–640
Right testis length	200	478–775	1,180–1,360	283	290–1088	810–900
Right testis width	96	232–662	1,040–1,120	220	174–745	600–640
Ovary length	220	319–1311	n/a	165	368–736	n/a
Ovary width	300	248–1118	n/a	313	184–920	n/a
Egg length	23–25	26–34	24–28	25–28	29–34	21–24
Egg width	14–15	14–17	12–16	13–14	14–17	14–16

of prey and owls in the Nearctic and Western Palaearctic regions (Heneberg et al., 2016; Gibson et al., 2005).

Prosthogonimus cuneatus and *P. ovatus* are cosmopolitan parasites of young birds of various orders (Sharpilo and Iskova, 1989). These helminths are often found in waterfowl (Heneberg et al., 2015). Prior to our studies, these two species have never been recorded in the corncrake on the territory of Ukraine or elsewhere. The studied specimens differed from those described in the literature in most metrical characters (table 1). We suggest that smaller size of the studied specimens is related to the relatively small size of the host. However, the qualitative characters (position of the ovary relatively to the ventral sucker, position of the vitellarium relatively to the testes and the ventral sucker, position of the uterine

Table 2. Metrical characters of *Cardiofilaria pavlovskyi* males

Characters	From *Crex crex*, present study	From *Corvus brachyrhynchos*, in Bartlett & Anderson (1980)	From *Oriolusoriolus*, in Strom (1937) (after Sonin, 1968)	From *Hirundapus caudacutus*, in Sonin (1963) (after Sonin, 1968)
	n = 2	n = 25	n/a	n/a
Body length	6,431–7,485	6,500–8,800	7,500	7,800
Body width at mid-body	143–165	105–184	150	180
Muscular oesophagus length	48–51	n/a	n/a	n/a
Glandular oesophagus length	355–377	n/a	n/a	n/a
Total length of oesophagus	403–428	176–250*	400	500
Nerve ring	127–136	140-194	175	150
Right spicule	60–65	54-76	69	60
Left spicule	75–81	64–84	80	70
Tail	69–76	56–94	81	60

* Presumably, incorrect measurements.

loops relatively to the ventral sucker and branches of the caecum) allowed to identify the studied specimens unambiguously.

Cardiofilaria pavlovskyi was found in Europe, Asia and North America in a fairly wide range of bird-hosts belonging to Passeriformes, Falconiformes, Apodiformes, and Charadriiformes (Sitko and Okulewicz, 2010). On the territory of Ukraine, this species was previously registered in the European honey buzzard, *Pernis apivorus* (Linnaeus) (Smogorzhevskaya and Sharpilo, 1984). The morphological characters in the studied male specimens appeared to correspond to the characteristics inherent to this species (table 2).

Thus, we report on three helminths which had not previously been recorded in the corncrake in the world and on the territory of Ukraine. We also confirmed the parasitism of *B. fuscata* in the corncrake in Ukraine.

Microscopic studies were done using the equipment of the Centre of collective use of scientific equipment "Animalia" (Institute of Zoology, NAS of Ukraine).

References

Bartlett, C. M., Anderson, R. C. 1980. Filarioid nematodes (Filarioidea: Onchocercidae) of *Corvus brachyrhynchos brachyrhynchos* Brehm in southern Ontario, Canada and a consideration of the epizootiology of avian filariasis. *Systematic Parasitology,* **2** (1), 77–102.

BirdLife International. 2016. *Crex crex*. The IUCN Red List of Threatened Species 2016: e.T22692543A86147127. http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22692543A86147127.en. Downloaded on 06 July 2018.

Gibson, D. I., Bray, R. A., Harris, E. A. 2005. Host Parasite Database of the Natural History Museum, London. Available from: http://www.nhm.ac.uk/research-curation/scientific-resources/taxonomy-systematics/host-parasites/database/index.jsp? (July 2018)

Greben, O. B., Maleha, A. M. 2009. Fauna of flatworms in Corncrake (*Crex crex* L.) from Ukraine. *In: XIV conference of Ukrainian scientific society of parasitologists (Uzhgorod, 21–24 September 2009)*. Kyiv, 29 [In Russian].

Hanzelova, V., Rysavy, B. 1999. Synopsis of cestodes in Slovakia. V. Dilepididae, Dipylidiidae and Paruterinidae. *Helminthologia,* **36** (2), 111–117.

Heneberg, P., Sitko, J., Bizos, J. 2015. Integrative taxonomy of central European parasitic flatworms of the family Prosthogonimidae Lühe, 1909 (Trematoda: Plagiorchiida). *Parasitology International*, **64** (5), 264–273.

Heneberg, P., Sitko, J., Bizos, J. 2016. Molecular and comparative morphological analysis of central European parasitic flatworms of the superfamily Brachylaimoidea Allison, 1943 (Trematoda: Plagiorchiida). *Parasitology*, **143** (4), 455–474.

Iskova, N. I., Sharpilo, V. P., Sharpilo, L. D., Tkach, V. V. 1995. *Catalogue of the helminths of Ukrainian vertebrates. Trematodes of terrestrial vertebrates*. Kiev, 1–93.

Lutz, H. L., Tkach, V. V., Weckstein, J. D., Webster, M. S. 2017. Methods for Specimen-based Studies of avian Symbionts. *In:* Michael, S. W., ed. *The Extended Specimen: Emerging Frontiers in Collections-based Ornithological Research.* CRC Press, Boca Raton, 157–183.

Macko, J. K. 1971. The helminth fauna of *Crex crex* from East Slovakia. *Helminthologia*, 10, 297–305.

Okulewicz, A. 1993. *Capillariinae (Nematoda) palearktycznych ptaków*. Wydawn. Uniwersytetu Wrocławskiego, 1–147 [In Polish].

Sharpilo, V., Iskova, N. 1989. *Fauna of Ukraine, Vol. 34, issue 3. Trematodes of the suborder Plagiorchiata*. Naukova Dumka, Kiev, 1–277 [In Russian].

Sitko, J., Okulewicz, A. 2010. *Checklist of the Nematodes in Birds in the Czech Republic and the Slovak Republic*. Comenius Museum, Přerov, 1–100.

Smogorzhevskaya, L. A. 1976. *Helminths of aquatic and marsh birds of the fauna of Ukraine*. Naukova dumka, Kiev, 1–416 [In Russian].

Smogorzhevskaya, L. A., Sharpilo, V. P. 1984. On study of nematodes birds of prey and owls of Ukraine. *Vestnik Zoologii*. (2), 81–82 [In Russian].

Sonin, M. D. 1963. Filaria of birds in Far-Eastern USSR. *In*: *Trudy Gel'mintologicheskoi Laboratorii Akademiya Nauk SSSR, 13*, 227–249 [In Russian].

Sonin, M. D. 1968. *Essentials of nematology. Vol. XXI. Filariata of animals and man and the diseases caused by them. Diplotriaenoidea*. Nauka, Moscow, 1–391 [In Russian].

Strom, Z. K. 1937. A new nematode of birds *Cardiofilaria pavlovskyi* n. gen., n. sp. *In*: *Trudy Sov. Izuch. Proizvod. Sil. Ser. Turkm*, *9*. 217–221 [In Russian].

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