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FIRST RECORD OF SPECIES *MARKEWITCHELLA BONINI* (MEGNIN, 1899) SPASSKY ET SPASSKAJA 1972 (CESTODA, CYCLOPHYLLIDEA) IN CARRIER-PIGEON *COLUMBA LIVIA* F. *DOMESTICA* IN POLAND

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Abstract. This paper presents the results of a parasitological section performed on three pigeons (two young males and one adult female), *Columba livia* f. *domestica,* brought from northern Germany (Kiel) to a private farm in Szczecin in autumn 2010. After two weeks of their stay in Poland the birds died. During the parasitological section of the intestine of one young male, *Markewitchella bonini* (Megnin 1899) Spassky et Spasskaja 1972, determined as a tapeworm from the family Davaineidae Braun, 1900, was found for the first time in Polish and German fauna. The tapeworms were prepared as solid preparations stained with acetocarmine. Characteristic for this cestode species is an intermediate host – terrestrial molluscs. First named *Davainea bonini* (Megnin, 1899), as a parasite of birds of the genus *Columba*, *M. bonini* has so far been recorded in Bulgaria, Moldova, Ukraine, Kazakhstan, Russia, Iran and France, where its presence was observed in *Columba palumbus, Palumbus torquatus, Gallus gallus* f. *dom.* and in the genus *Anas.*

Keywords: *Columba livia* f. *domestica*, Cestoda, Davaineidae Braun, 1900, *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja 1972, Poland

INTRODUCTION

Cestodes of the family Davaineidae Braun, 1900 (Cyclophyllidea), parasites of mammals and birds, have four suckers on the scolex with edges that can be armed with small spines; a simple rostellum carries two circles of hammer hooks [Pojmańska and Cielecka 2001, Bezra et al. 2003, Kornyushin et al. 2009]. Each hermaphroditic segment contains one or two sets of reproductive organs, and the genital atrium opens up on one side or both sides, one at a time [Pojmańska and Cielecka 2001]. Numerous spherical testes are unevenly distributed. The ovary, often bilobed, is located in the center or closer to the poral part of the segment; directly

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behind it is a small lobed vitellarium. Embryonic development occurs in the utero and fully mature segments contain up to several hundred developed oncospheres. Intermediate hosts of tapeworms from this family are invertebrates, mostly insects and molluscs [Bezra et al. 2003, Kornyushin et al. 2009]. The fauna of Europe has been reported to be infested by a total number of 66 species of cestodes from the family Davaineidae [http://www.faunaeur.org].

Some of the final hosts of Davaineidae family tapeworms are Columbidae, order Columbiformes [Bezra et al. 2003, Kornyushin et al. 2009], with a large number of species living all over the world, except in polar regions [Chvapil 1985, Zasieczna et al. 1999, Tomiałojć and Stawarczyk 2003]. Their food consists of plants and small invertebrates, often intermediate hosts of many parasites. Therefore these birds may be a reservoir for parasitic diseases, some of which may also affect fowl [Sari et al. 2008].

One of the better-known Columbidae species is the rock pigeon *Columba livia* Gmelin, 1789, with a domesticated form *Columba livia* f. *domestica* grown both for sport and food. This paper presents the results of parasitological examination of racing pigeons of this species, imported from northern Germany (Kiel) to a private farm in Szczecin. A parasitological section of the small intestine showed the presence of the tapeworm *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja 1972, being found for the first time in Polish and German fauna [www.faunaeur.org].

MATERIAL AND METHODS

Three pigeons (one adult female and two young males) were subjected to parasitological tests. The birds were brought to Poland in autumn 2010 from Kiel (Germany) by a private breeder, and after several days in Poland died with symptoms of emaciation. The sex and age of the birds were determined on the basis of their gonads. In the gastrointestinal tract of one of the males, tapeworms were found. Isolated parasites were fixed and stored in 70% ethanol. Then, selected individuals were used to make solid preparations stained in iron acetocarmine, according to Goergiev et al. [Georgiev et al. 1986]. The cestodes were measured using a measuring eyepiece and then determined on the basis of the available keys and original papers [Bezra et al. 2003, Kornyushin et al. 2009].

RESULTS AND DISCUSSION

Over the past dozenyears, *Markewitchella bonini* has been described under several synonyms, for example *Davainea bonini* Megnin, 1899; *Brumptiella bonini* (Megnin, 1899) Lopez-Neyra, 1931 and *Skrjabinia bonini* (Megnin, 1899) [*quoted by* Kornyushin et al. 2009]. The species was first described under the name *Davainea bonini* (Megnin, 1899) as a parasite of birds of the genus *Columba* [quoted by Kornyushin et al. 2009]. Then it was transferred to the subgenus *Skrjabinia* (Fuhrmann, 1932), genus *Raillietina* (Fuhrmann, 1920). In 1966, subgenus *Skrjabinia* was separated as an independent genus [quoted by Kornyushin et al. 2009]. In mainstream literature [www.faunaeur.org] *Markewitchella bonini* is still listed

under the name *Skrjabinia bonini,* despite the fact that in 1972, due to significant differences in morphological structure and different intermediate hosts, it was transferred from the genus *Skrjabinia* to the monotypic genus *Markewitchella* [*quoted by* Kornyushin et al. 2009].

M. bonini has so far been recorded in Bulgaria, Moldova, Ukraine, Kazakhstan, Russia, Iran and France [Bezra et al. 2003, www.faunaeur.org], where its presence was observed in *Columba palumbus, Palumbus torquatus, Gallus gallus* f. *dom.* and in the representatives of the genus *Anas* [Bezra et al. 2003).

Of the three examined birds (two young males and one adult female), only one (young male) was infected with parasites. Ten tapeworms were isolated from its intestine, and were identified as *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaya 1972. Table 1 presents measurement results for selected structures of the parasite.

Table 1. Morphological features of *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja 1972, µm

Tabela 1. Charakterystyka morfometryczna *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja 1972, µm

Feature Struktura	Bezra et al. 2003	Kornyushin et al. 2009	Own material Materiał własny
Testis – diameter Jądro – średnica	48.0x60.0	55.0–80.0	50.0x55.0
Cirrus sac – length Torebka cirrusa – długość	200.0–220.0	100.0–220.0	180.0
Cirrus sac – width Torebka cirrusa – szerokość	100.0	60.0–80.0	65.0
Cirrus – diameter Cirrus – średnica	20.0	5.0–7.0	10.0
Ovary – width Jajnik – szerokość	164.0–240.0	230.0	120.0
Vitellarium length x width Żółtnik długość x szerokość	–	75.0–125.0x50.0–110.0	60.0x45.0
Hermaphroditic proglottid lenght x width Człon hermafrodytyczny długość x szerokość	480.0–500.0x380.0–660.0	–	700.0x660.0
Uterine progtottid lenght x width Człon maciczny długość x szerokość	2500.0x760.0	–	2790.0x1134.0
Egg diameter Jajo średnica	32.0–40.0x36.0–40.0	45.0–65.0x40.0–55.0	30.0–40.0x35.0–40.0

Strobila. No tapeworms with scolex were isolated. The strobila consisted of numerous segments with rounded posterior ends. The maximum length without scolex reached 60.0 mm, but according to some sources [Bezra et al. 2003, Kornyushin et al. 2009], this part of the body may be even 110.0 mm long. The segments are very diverse in shape, i.e. short and wide (hermaphroditic segments) (Fig. 1) or long (uterine segments) (Fig. 2).

The width varied from 660.0 to 1134.0 µm, and length from 700.0 to 2790.0 µm. Genital atria lie on one side in the 1/3 length of the segment.

Male reproductive system. The average dimensions of the hermaphroditic segments are 700.0 x 660.0 µm. Each segment contains from 25 to 31 oval or slightly round testes. They fill the space between the excretory ducts and ovary, and the average size of one testicle is 50.0 x 55.0 µm. The cirrus sac is highly muscular, in the shape of a pear fruit, stretching to almost half the width of the segment, reaching dimensions of 180.0 x 65.0 µm (Fig. 3). Vas deferens is located behind the cirrus sac and creates several loops. The cirrus, with a length of 96.6 µm and 10 µm in diameter, is densely covered with short piles.

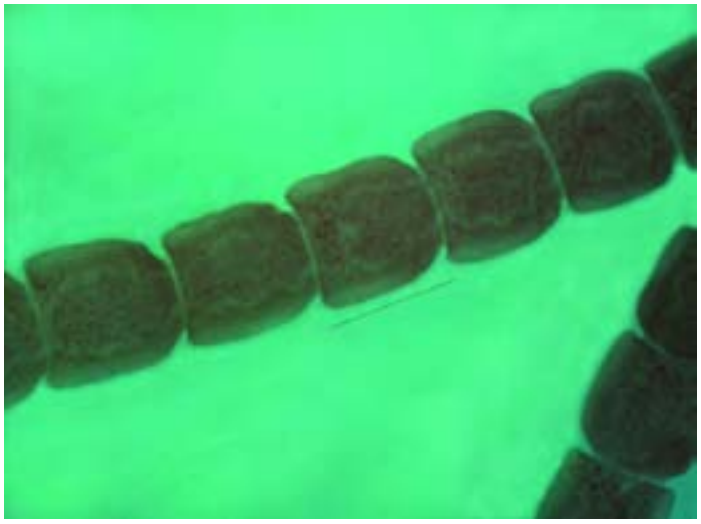

Fig. 1. Hermaphroditic proglottids of *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja, 1972 (scale bar: 700 µm)

Rys. 1. Człony hermafrodytyczne *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja, 1972 (skala: 700 µm)

Female reproductive system. The lobed ovary reaches a length of 60–90 µm and a width of 110–120 µm. It stretches across the segment, occupying the space between the excretory ducts. At the base of the ovary is a small lobed vitellarium. The maximum length of uterine segments is 2790.0 µm with twice smaller width (average of 1134.0 µm). Each of the mature segments is filled with numerous round or slightly oval eggs, with an average size of 30–40 x 35–40 µm. These sizes are consistent with data obtained by other authors [Bezra et al. 2003, Kornyushin et al. 2009].

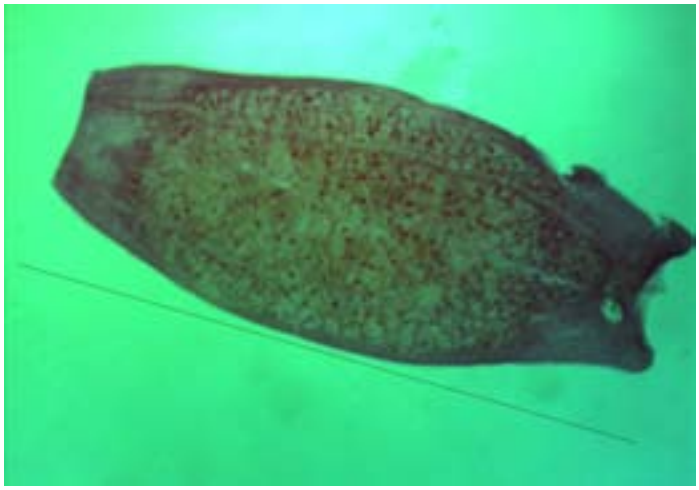

Fig. 2. Uterine proglottid of *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja, 1972 (scale bar: 2700 µm)

Rys. 2. Człon maciczny *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja, 1972 (skala: 2700 µm)

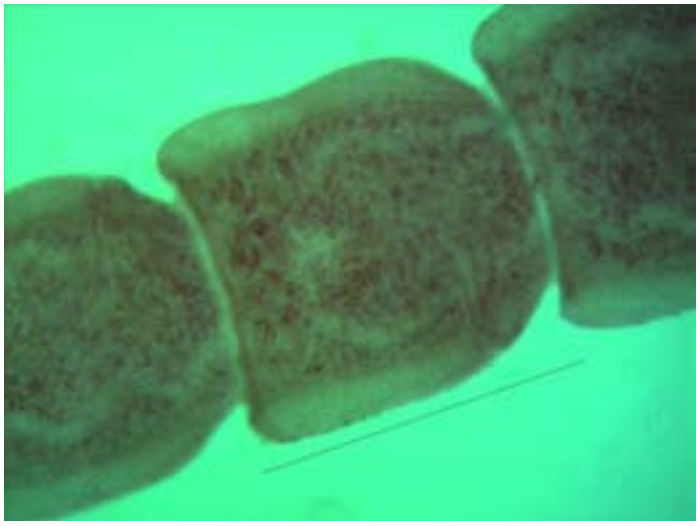

Fig. 3. Hermaphroditic proglottids of *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja, 1972 (scale bar: 700 µm)

Rys. 3. Człony hermafrodytyczne *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja, 1972 (skala: 700 µm)

CONCLUSIONS

Morphometric measurements of the male and female reproductive systems of the examined tapeworms and its host species show they belong to the species *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja, 1972. As there is no information on the occurrence of this parasite in pigeons in reports on tapeworms in vertebrates from Poland and Germany [http://www.faunaeur.org], this study is the first report of this parasite in the fauna of both countries.

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PIERWSZE STWIERDZENIE GATUNKU *MARKEWITCHELLA BONINI* (MEGNIN, 1899) SPASSKY ET SPASSKAJA, 1972 (CESTODA, CYCLOPHYLLIDEA) U GOŁĘBIA POCZTOWEGO *COLUMBA LIVIA* F. *DOMESTICA* W POLSCE

Streszczenie. Niniejsza praca przedstawia wyniki sekcji parazytologicznej trzech gołębi pocztowych (dwóch młodych samców i jednej dorosłej samicy) *Columba livia* f. *domestica* sprowadzonych jesienią 2010 roku z północnych Niemiec (Kiel) do prywatnej hodowli w Szczecinie. Po dwóch tygodniach pobytu w Polsce ptaki padły. Podczas sekcji parazytologicznej w jelicie jednego młodego samca wykazano obecność *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja, 1972, tasiemca z rodziny Davaineidae Braun, 1900, stwierdzonego po raz pierwszy zarówno w faunie Polski, jak i Niemiec. Z wybranych osobników tasiemców sporządzono preparaty stałe barwione acetokarminem żelazistym. Charakterystyczną cechą tasiemców należących do tego gatunku jest żywiciel pośredni, którym są lądowe mięczaki. Gatunek po raz pier-

wszy został opisany pod nazwą *Davainea bonini* (Megnin, 1899) jako pasożyt ptaków z rodzaju *Columba. M. bonini* notowany był dotychczas w Bułgarii, Mołdawii, Ukrainie, Kazachstanie, Rosji, Iranie i Francji, gdzie jego obecność stwierdzono u *Columba palumbus*, *Palumbus torquatus*, *Gallus gallus* f. *dom.* oraz u przedstawicieli rodzaju *Anas.*

Słowa kluczowe: Davaineidae Braun, 1900, gołąb pocztowy, *Markewitchella bonini* (Megnin, 1899) Spassky et Spasskaja 1972, Polska, tasiemce

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