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Research Note

The first report of *Morishitium vagum* (Trematoda: Cyclocoelidae) in *Turdus merula* in Iran

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Summary

This paper describes a trematode isolated from the air sacs of a common blackbird (*Turdus merula*) by the authors in Qaemshahr city, Mazandaran province, north of Iran. The specimens were in the best form to make whole-mounts for species identification. The identified species was *Morishitium vagum* (Morishita 1924) Witenberg 1928, belonging to the family Cyclocoelidae Stossich 1902, according to morphologic and morphometric characters, as explained in references. This is the first report of a species belonging to the family Cyclocoelidae in Iran, and the first report of this type-species isolated from *Turdus merula* in the world.

Keywords: *Morishitium vagum*; *Turdus merula*; Iran

Introduction

Turdus merula, so-called common blackbird, and “Tika”/تیکو/ in the vernacular language, is ubiquitous throughout the world, and one of the birds living in Mazandaran province with a lush forest and a warm-humid climate. This bird is almost existence around Europe. It is also spread in Australia, the northwestern parts of Africa as well as Asia. In general, this bird prefers mostly humid places. The blackbirds (*Turdus merula*) feed on invertebrates such as snails easily found in wet regions. They also eat berries, cherries, grapes and some of the other types of fruits (Lundberg, 1985). Mazandaran province with a humid climate is an ideal place for the breeding of the bird. Additionally, one such location is an appropriate habitat for various kinds of terrestrial and freshwater snails that some are intermediate hosts for larval stages of parasites (Sharif *et al.*, 2010).

This paper describes a trematode isolated from the air sacs of a common blackbird (*Turdus merula*) by the authors in Qaemshahr city, Mazandaran province, north of Iran. The specimens were in the best form to make whole-mounts for species identification. The found parasites were identified as follows:

Material and Methods

The found parasites were pumpkinseed-like macroscopically. This parasite was found between July to September 2011. For their identification, the specimens were fixed in AFA solution, containing ethanol (95 %) 85 ml, formaldehyde (37 %) 10 ml, and glacial acetic acid 5 ml, and then were stained with carmine alum, encompassing 2 % carmine dye (w/v) and 5 % aluminum potassium sulfate (w/v). Afterwards, they were dehydrated in an increasing graded series of ethanol for 30 min each (50 %, 70 %, 80 %, 95 %, and 100 %), passed through 50 % xylol-ethanol, cleared in 100 % xylol and kept as whole-mounts on glass slides. Then, the morphologic and morphometric characters of the specimens were determined, and using taxonomic keys, the specimen was identified. In addition, to determine the prevalence of the found parasite, 30 males and 30 females of the common blackbird were examined.

Results

The findings showed that four common blackbirds (6.6 %), including three males and one female were infected with the found pa-

Table 1. The number of *Morishitium vagum* in the air sacs of the infected birds

Air sacs	Common blackbird			
	male-1	male-2	male-3	female
Cervical air sacs	0	0	0	0
Interclavicular air sac	18	21	34	15
Anterior thoracic air sacs	76	47	58	44
Posterior thoracic air sacs	12	3	4	0
Abdominal air sacs	0	9	0	0
Total	106	80	96	59

rasite. It was also observed that the anterior thoracic air sacs had the highest number of the found parasite in comparison with other air sacs (Table 1). The following description is based on 10 specimens for the found species:

Morphology

Body elongate and flat typically. It tapers towards the anterior end and rounded at both extremities. Tegument smooth and thick. The broadest region located in the middle of the body. Oral and ven-

tral suckers absent. Mouth opening slightly oval and subterminal. Pharynx oval and well developed. Esophagus very short. Caecal bifurcation posterior to genital pore. Caeca form cyclocoel near to posterior extremity of the body. Genital pore post-pharyngeal and circular in shape, situated between the pharynx and the caecal bifurcation. Cirrus visible, emerging from the genital pore. Cirrus sac well developed, oval in shape. Internal and external seminal vesicles not observed. Vas deferens and vas efferens not observed. Two large, globular testes situated obliquely to each other

Fig. 1. *Morishitium vagum* (Morishita 1924) Witenberg 1928. The picture on the right is a view of the ventral surface of the parasite. The picture on the left is a view of the dorsal surface of the parasite and shows the cirrus sac. a: mouth opening, b: pharynx, c: esophagus, d: genital opening, e: cirrus sac, f: uterine, g: excretory duct, h: caecum, i: vitellaria, j: upper testis, k: ovary, l: Mehlis' gland, m: transverse vitelline duct, n: lower testis, o: cyclocoel, p: excretory bladder.

Drawings were made using camera lucida.

and located in the posterior quarter of the body. Uterine coils confined to the intercaecal region and not extending laterally beyond the caeca. Uterus with numerous large eggs. Mehlis' gland well developed. Ootype and oviduct not observed. Laurer's canal not observed. Ovary circular and situated in the intertesticular space, forming a diagonal line with testes. Seminal receptacle overlies the Mehlis' gland and not evident. Vitelline reservoir clear. Transverse vitelline duct observable and clearly overpasses the surface of the posterior testis. Vitelline fields extending from posterior region of the caecal bifurcation to near posterior intestinal arc, but not united posteriorly. Excretory duct visible, extending from pharyngeal region to near end of the body, forming excretory bladder at the end of the body.

Morphometry

Adults 5.5 – 9 mm in length and 1.48 – 2.6 mm in width in the broadest region of the body. Mouth opening 112.5 – 162 µm in long diameter and 102 – 146.5 µm in short diameter. The long diameter of the pharynx 157 – 240 µm and the short diameter of which 102.5 – 141 µm. Esophagus length 31 – 68.5 µm. Genital pore diameter 106 – 157 µm. The length of the cirrus 165 – 231.5 µm. Testes 227 – 293 µm in diameter. The diameter of the ovary 107.5 – 163 µm. Mehlis' gland 172 – 235 µm in diameter. Eggs in the metraterm 48 – 70 µm in length and 25 – 37.5 µm in width.

Recognition

Parasite: *Morishitium vagum* (Fig. 1)

Host: *Turdus merula* (new).

Location in host: Air-sacs, especially anterior thoracic air-sacs.

Locality: Host obtained from Qaemshahr city forests, north of Iran (new).

Type specimen: Lectotype, Coll. No. 11725, as well as three paralectotype specimens in the first author's collection.

Remarks

The distinguishing characteristics of the type-species *Morishitium (M.) vagum* are as follows: Oral and ventral suckers absent. Genital pore in a post-pharyngeal position. Testes forming a diagonal line with ovary. Uterine coils confined by caeca and not extending beyond the outer wall of the caeca. Vitelline fields not united posteriorly and located along the outside wall of the caeca, but do not overlie it. The above-mentioned features confirms the type-species *M. vagum* (Morishita 1924) Witenberg 1928, belonging to the family Cyclocoelidae Stossich 1902.

Discussion

Several species of trematodes belonging to the family Cyclocoelidae Stossich (1902) have been so far separated from the common blackbird. The reported valid species from this bird include *Morishitium elongatum* (Harrah 1921), *Morishitium petrowi* (Oganesov 1959) and *Cyclocoelum polonicum* (Machalska 1980) (Machalska, 1980; Rzaq *et al.*, 2014; Norman & Vasyl, 2014). Therefore, this paper is the first report of *M. vagum* in *Turdus merula* in the world. The family Cyclocoelidae Stossich (1902), with over 50 species, genera and subfamilies, is the largest and most

controversial family in the superfamily Cyclocoeloidea. The typical feature of this family is cyclocoel; however, a few genera in several other families also show this feature. In the family Cyclocoelidae, the position of the testes and ovary to each other is a crucial and very useful attribute to distinguish the genera belonging to this family. However, authors elsewhere claimed that the position of the testes and ovary to each other is not a reliable key for distinction of the genera in the last-mentioned family, because during the mounting process the position of the testes or ovary may change (Dronen *et al.*, 2008). Despite what was mentioned above, in the present study all of the mounted specimens in terms of the testes and ovary position were like each other.

There are at least 14 valid genera in this family (Kanev *et al.*, 2008). Misdiagnosis of a genus/species as a new genus/species in this family led to the creation of many synonym parasites (Winston, 1999). For example, *Pseudhyptiasmus* Dollfus (1948) and *Neocyclocoelum* Feizullaev (1980) are considered as two synonyms of the type-species *M. vagum*. Two above-mentioned genera, in fact, are invalid (Kanev *et al.*, 2008). Morishitia (1924) described a new species, isolated from golden pheasant (*Chrysolophus pictus*), and named it *Cyclocoelum vagum*. After some revisions in the family Cyclocoelidae, this species was renamed *M. vagum* by Witenberg (1928). It is interesting that the species described by Morishitia (1924), namely *Cyclocoelum vagum*, had both oral and ventral suckers, but the species named *M. vagum* by Witenberg in 1928 had no suckers while it was the same specimen described by Morishitia (1924). Nevertheless, the species identified in the present study was matched precisely to that named *M. vagum* as a valid genus.

Hyptiasmus arcuatus Kossack (1911), was originally described by Brandes (1892) as *Monostoma arcuatum*. This type-species is very similar to *M. vagum* morphologically. There are three differences by which can distinguish these two species from each other: 1) the uterine coils extend beyond the caeca in *Hyptiasmus arcuatus*, but in *M. vagum* are confined by the caeca and do not overpass it; 2) the vitelline fields unite posteriorly in *Hyptiasmus arcuatus*, but not in *M. vagum*; 3) the genital opening in *Hyptiasmus arcuatus* is pre-pharyngeal whereas in *M. vagum* that is post-pharyngeal.

Prohyptiasmus robustus Witenberg (1923) is another genus highly similar to *M. vagum*, but differs in that: 1) its genital opening is pre-pharyngeal, and 2) the uterine coils extend beyond the caeca. Apart from two above-mentioned genera, namely *Hyptiasmus arcuatus* and *Prohyptiasmus robustus*, all of the other genera in the family Cyclocoelidae are more easily distinguishable from *M. vagum* in terms of the shape of the testes and their position to the ovary; i.e. lobed, oval, circular or irregular in shape, and line or triangular in position.

As a final point, this is the first report of the type-species *M. vagum* in Iran. Additionally, this is the first report of infection with *M. vagum* in common blackbird (*Turdus merula*) in the world. Moreover, with a search in the literature it seems that this is the first report of a parasite belonging to the family Cyclocoelidae in Iran. Hence, the authors hope that this paper encourages researchers to find the parasite fauna in various types of birds in different parts of Iran.

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