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THE SPOTTED SANDGROUSE, *PTEROCLES SENEGALLUS* (LINNAEUS, 1771) AS A NEW HOST FOR THE SPIRURID NEMATODE *HARTERTIA GALLINARUM* (THEILER, 1919) IN IRAQ

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ABSTRACT

In this work, the spirurid nematode *Hartertia gallinarum* was reported in the intestine of the spotted sandgrouse, *Pterocles senegallus*, collected in three different locations: Ga'ara Depression, Iraqi Western Desert, Zurbatiyah and Al-Attariyah, Middle of Iraq. Description and measurements of the nematode were given. The role of termites in the infection of *P. senegallus* with *H. gallinarum* was discussed. Occurrence of *H. gallinarum* in *P. senegallus* represents a new host record.

Key words: *Hartertia*, Iraq, *Pterocles*, Spotted sandgrouse, Termite.

INTRODUCTION

The spotted Sandgrouse *Pterocles senegallus* is a common and widely distributed bird (Bolster, 1922) found in North Africa and Middle East, and it is a native bird in Iraq (BirdLife International, 2016). It inhabits mainly sand deserts and semi deserts with scattered plants and breeds nesting on ground in suitable areas of the middle and southern Iraq (Salim *et al*., 2006). This species is considered as one of the most popular game birds in its distribution range in Iraq.

The nematode *Hartertia gallinarum* (Theiler, 1919) is distributed in South and West Africa and Asia. It causes host diarrhea, weight loss, weakness and decreased egg production and losses of the bird host (Kaufmann, 1996).

In Iraq, Al-Hubaity (1976) found *H. gallinarum* in fowl *Gallus gallus domesticus* in Mousl, north of Iraq. Then it has been isolated from the caecum of Rock partridge, *Alectoris graeca* and from the gizzard, proventriculus, intestine and liver of Seesee partridge, *Ammoperdix griseogularis* in the Gara-area, Rutba, western desert district respectively (Mohammad, 1996; Mahmoud *et al*., 2000). Later, Khoshnaw and Abdullah (2013) recorded it in the caecum of chukar partridge *Alectoris chukar* in Shaqlawa district, Kurdistan region, North of Iraq.

The present paper deals with recording the nematode *H. gallinarum* from the intestine of *P. senegallus* for the first time in Iraq.

MATERIALS AND METHODS

A total of 16 spotted Sandgrouse, *Pterocles senegallus* (10 males and 6 females) were collected in three different locations; Ga'ara Depression, Iraqi Western Desert (7 males and 4 females), Zurbatiyah (1 male and 1 female) and Al-Attariyah (2 males and 1 female), Middle of Iraq (Map 1). Collection of birds was done during January-December 2016 in Zurbatiyah and Al-Attariyah while those of Ga'ara were previously collected during the years 2003-2004. Gastrointestinal tracts of the collected animals were excised, opened longitudinally and nematodes were removed, washed with physiological saline, fixed in 70% alcohol, cleared in lactopheno and identified morphologically based on the available keys and descriptions (Cram, 1927; Yamaguti, 1961). All measurements are in millimeters given as means followed by ranges in parentheses. Photomicrographs were taken with a digital camera Infinity lite-K100 attached to compound microscope Micros MCX100.

Map (1): Showing the collection sites of host birds from different regions of Iraq.

RESULTS AND DISCUSSION

Order Spirurata
Family Spiruridae
Genus *Hartertia* Seurat, 1915.
Hartertia gallinarum (Theiler, 1919) Cram, 1927.
Synonym: *Filaria gallinarum* Theiler, 1919. (Cram, 1927)**.**

Only specimens of the spotted sandgrouse, *P. senegallus* from Ga'ara Depression were infected with 29 specimens of *H. gallinarum*, 3 males and 26 females with an infection rate of 100% while the rest of the host samples yielded no parasites. The total infection rate was

68.75% with intensity of 2.64. According to Encyclopedia of Life (2017), GBIF (2017) and Fauna Europaea (2017), this nematode belongs to the order Spirurata and the family Hartertiidae. It has one synonym which is *Filaria gallinarum* Theiler, 1919. The worm is filiform attenuating at each extremity. Cuticle thick is finely striated transversely. Head small with a slight constriction. Two lips are trilobed and each lip toothed, with a lateral papilla and lined by a thick cuticle. Two cervical papillae just behind the lips. The pyriform vestibule is short. Esophagus is divided into two parts; the anterior one is short and muscular. The posterior is longer and glandular.

Male (Pl. 1, 2 and 3): Three males were isolated, each with symmetrical caudal alae. Six pedunculated papillae, four pairs are preanal. Measurements of three specimens were: Body is 16.003 (15.351-16.642) long x 0.79 (0.63-0.90) maximum wide. Cephalic papillae is situated at a distance of 0.052 (0.052-0.052) far from the anterior extremity of the body. Pyriform vestibule is 0.128 (0.120-0.135) long x 0.161 (0.145-0.182) wide. Oesophagus reaches 2.625 long in one specimen in which body length was 15.351. Oesophagus length as a proportion of body length is 0.171. Nerve ring 0.038 (0.031-0.047) long x 0.184 (0.166-0.197) wide, at a distance of 0.3032 (0.208-0.400) far from anterior extremity. Six pairs of pedunculated papillae, of which four precloacal and two postcloacal and group of very small sessile papillae present at tip of the tail. Spicules unequal, right spicule is 0.4108 (0.3224-0.468), the left spicule is (measurements for two specimens only) 1.522 (1.510-1.534) long. Tail length is 0.529 (0.5096-0.546). Tail length as a proportion of body length is 0.033 (0.0306-0.0356).

Female (Pl. 4, 5): Twenty-six females were isolated. They are larger than males. Body is 18.385 (9.807-28.455) long x 0.758 (0.260-1.523) maximum wide. Head is 0.089 (0.057-0.119) long x 0.187 (0.130-0.244) wide. Tooth at a distance of 0.094 (0.050-0.124) from anterior extremity of the body. Cervical papillae are situated at a distance of 0.0349 (0.026-0.0468) from anterior extremity. The vestibule is 0.143 (0.022-0.218) long x 0.161 (0.114-0.234) wide. Excretory pore is situated at 0.451 (0.338-0.546) from anterior extremity. Oesophagus is 3.077 (2.654-3.675). Oesophagus as a proportion of body length is 0.179 (0.147-0.209). Nerve ring is 0.055 (0.026-0.13) long x 0.204 (0.145-0.296) wide, at distance of 0.316 (0.208-0.520) from anterior extremity. Vulva distance from anterior extremity is 11.485 (5.612-16.720). The embryonated eggs have thick double shell. Tail is conical, rounded at its end and 0.408 (0.025-1.575) long.

The morphology of *H. gallinarum* in the present study did not show differences from *H. gallinarum* found in Cram (1927) but there are some differences in measurements between the present specimens and those of Cram (1927) as well as with those of the other local studies by (Al-Hubaity, 1976; Mohammad, 1996; Mahmoud *et al*., 2000; Khoshnaw and Abdullah, 2013) which had been isolated from different bird species belonging to another order. Presence of the same species of parasites in different host species may induce some morphological variations (Hildebrand *et al*., 2015) and / or physiological variations (Mehlhorn, 2016).

It is worth to mention that Mohammad (1996) had reported this nematode from *Alectoris graeca*. This host was proved later to be *A. chukar* according to Salim *et al*. (2006). So, the hosts examined by Mohammad (1996) and Khoshnaw and Abdullah (2013) were actually the same bird species (*A. chukar*). Occurrence of *H. gallinarum* in *P. senegallus* of the present investigation represents a new host record in Iraq and to the best of our knowledge it is the first time that this parasite has ever been recorded from members of the family Pteroclididae (Order, Pterocliformes). Regarding transmitting of *H. gallinarum* to its present host which depends only on small seeds (Bolster, 1922), we have now only indirect evidence that the

spotted sandgrouse *P. senegallus* eats ants and termites during its breeding season (Campbell and Lack, 1985) probably because protein is required for egg laying, incubation activities and chick growing. It is necessary to reveal this subject through crop analyses of a good number of male and female individuals of this bird collected from different parts of its distribution range in Iraq. It seems necessary also to investigate about another species of parasites infecting this game bird from the human health viewpoint since large numbers of the bird are eaten every year by humans.

The nematode *H. gallinarum* infects chicken and other birds (Baker, 1973). To complete its life cycle, it requires termites (Kaufmann, 1996). Babaeian and Zangiband (2014) found that this nematode needs the termite *Anacanthotermes ubachi* for its development. *A. ubachi* (found in Ga'ara Depression) and two other *Anacanthotermes* species: *A. vagans* and *A. sawensis* were previously recorded in Iraq by Al-Alawy (1987).

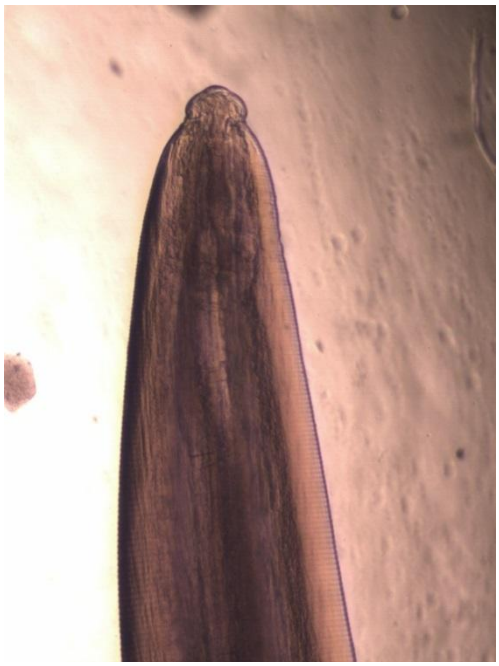

Plate (1): Anterior end of male of *Hartertia gallinarum*.

Plate (2): Head of male of *H. gallinarum* (lateral view)

Plate (3): Tail of male of *H. gallinarum*

Plate (4): Anterior end of female of *H. gallinarum*

Plate (5): Posterior end of female of *H. gallinarum*

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القطا المرقط *Pterocles senegallus* (Linnaeus, 1771) كمضّيف جديد للدودة الخيطية *Hartertia gallinarum* (Theiler, 1919) في وسط العراق

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الخلاصة

هذا البحث معني بظهور الدودة الخيطية *Hartertia gallinarum* من أمعاء القطا المرقط *Pterocles senegallus* الذي جمع من منخفض القعرة في غرب العراق ومن زرباطية والعطارية في وسط العراق. أعطي وصف وقياسات تلك الدودة الخيطية، كما ألقي الضوء على دور النمل الأبيض *Anacanthotermes ubachi* في إصابة القطا المرقط بتلك الدودة الخيطية. بموجب الدراسة الحالية يعتبر القطا المرقط مضيّفا جديدا لهذه الدودة الخيطية في العراق.