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First Record and Prevalence of the Caecal Nematodes, *Heterakis gallinarum* and *Subulura suctoria* from the Guinea Fowl, *Numedia meliagris* in Saudi Arabia

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Abstract. Guinea fowls *(Numedia meleagris)* collected from a local market in Jeddah, Saudi Arabia, were infected with the caecal nematodes, *Heterakis gallinarum* and *Subulura suctoria*. This is the first record of either species from guinea fowls in Saudi Arabia. Twenty two (24.7%) out of 89 guinea fowls were found infected. *Heterakis gallinarum* (20.2%) was far more prevalent than *Subulura suctoria* (5.6%). Higher prevalence of either worm was recorded in female than in male birds, and a single female was doubly infected. The morphology of both worms was studied.

Introduction

Sizeable flocks of wild and semiferal guinea fowls *(Numedia meleagris)* occur both in the Sarawat mountains at Taif and in the Tihama valleys of Gazan Province in Saudi Arabia. some of these birds are captured and sold in local markets of the western and southwestern regions of the country. However, they are now protected by the National Commission for Wildlife Conservation and Management, which is maintaining a breeding flock of indigenous guinea fowls at the Commission's Wildlife Research Center in Taif.

Guinea fowls are known to be infeted with different nematode species, including both the caecal worms, *Heterakis gallinarum* (Shrank, 1788) Madsen, 1949 and *Subulura suctoria* (Molin 1860) Railliet and Henry, 1914 which have been reported from several parts of the world [1,2,3,4,5,6, p 323; 7, p 43-55; 8, 9, p. 161-166]. The two parasites were blamed for causing pathogenic effects leading to emaciation, diarrhoea and occasional death in guinea fowls [10]. However, the greatest importance of *H. gallinarum* is that it is the intermediate host of *Histomonas meleagridis*, which causes blackhead in turkeys and other birds [11, p 104-122; 12, p 632-634].

Heterakis gallinarum has been reported previously from chickens in Saudi Arabia [13, p 69-72], but the present study is the first record of that nematode from guinea fowls in Saudi Arabia and is the first ever report of *S. suctoria* in the country.

Materials and Methods

Sixty female and 29 male guinea fowls *(Numedia meleagris)*, purchased from a local market in Jeddah, were slaughtered and aviscerated. The caeca were removed and opened, and their contents washed in normal saline (0.9% NaCl) and searched for worms under a binocular dissecting microscope. Live worms were observed closely before being killed by immersion in hot 70% alcohol. Then the worms were relaxed overnight at 4°C and counted. They were then cleared in phenol-alcohol (80 parts melted phenol in 20 parts absolute alcohol), mounted in glycerin jelly and identified according to Yorke and Maplestone [14, p 536], Yamaguti [15, p. 197], Dunn [6, p. 323] and Soulsby [9, p. 161-166]. Morphology and measurements of the parasites were recorded. Representative specimens were drawn using a camera lucida.

Results

Twenty-two (24.7%) guinea fowls were infected with caecal nematodes. These were identified as *H. galllinarum* and *S. suctoria*. Seventeen fowls harbored *H. gallinarum*. Four harbored *S. suctoria* and 1 female bird was doubly infected (Table 1). *H. Galimarum* was more prevalent (20.2%) than *S. suctoria* (5.6%). Female birds were more heavily infected than males (Table 1).

Morphology

All measurements are in mm, mean followed in parenthesis by the range.

(a) *Heterakis gallinarum* (Schrank, 1788) Madsen, 1949.

Table 1. The Prevalence of *Heterakis oallinarum* and *Subulura suctoria* in guinea fowls in Saudi Arabia.

Species	No. of birds examined		No. of birds infected	% Infection	Worm counts*
H. gallinarum	Males	29	5	17.2	6 (1-9)
	Females	60	13	21.6	15 (5-31)
	Total	89	18	20.2	
S. suctoria	Males	29	1	3.4	2
	Females	60	4	6.7	4 (1.7)
	Total	89	5	5.6	

* Mean followed in parenthesis by the range.

(Synonyms: *Ascaris papillosa* Block, 1782; *H. gallinae* (Gmelin, 1790) Freeborn, 1923; *A. gallinae* (Gmelin, 1790 and *H. papillosa* Raitliet, 1885).

Small, whitish worms; mouth surrounded by trilobed lips; lateral alae extending along entire body. Oesophagus with strong posterior bulb, cephalic papillae and nerve ring present [Fig. 1A].

Females: 10.1 (9.00-11.20) long × 0.34 (0.28-0.39) wide. Oesophagus 0.92 (0.84-1.0) long. Vulva located anterior or sometimes posterior to middle of body. Vagina directed towards cephalic end for short distance, turning first posteriorly and then anteriorly before bifurcating and joining the corresponding uterus. Eggs in single cell stage, with smooth, thick shells (Fig. 1 B). Anal opening located some distance from tail tip [Fig. 1 C].

Males: 7.8 (6.0–9.5) long, 0.29 (0.0.22-0.33) wide. Oesophagus 0.89 (0.80-0.98) long. Tail straight, ending in spatulate point and provided with 12 pairs of papillae. Precloacal sucker near precloacal papillae, well-developed and strongly chitinized. Caudal alae well-developed. Spicules dissimilar, strongly chitinized, right spicule 1.9 (1.30-2.40), left spicule 0.66 (0.45-0.87) Fig. 1 D).

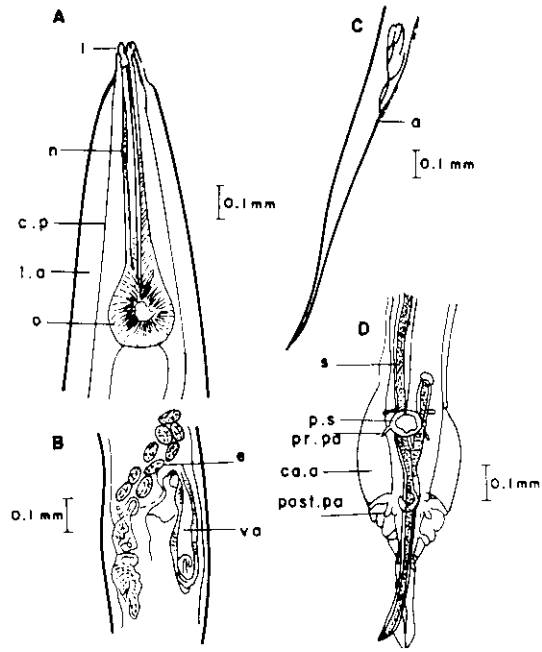

Fig. 1. Camera lucida drawings of *Heterakis gallinarum* obtained from the caecum of the Guinea fowl *Numedia meleagris* in Saudi Arabia. A, anterior end of worm; B, vulvar region of female; C, tail of female; D. tail of male, a, anus; ca.a, caudal alae; c.p. cephalic papillae; e, egg; l., lips; l.a, lateral alae; n.r, nerve ring; o, oesophagus; post, pa, posterior papillae; pr.pa, precloacal papillae; p.s., precloacal sucker; s. spicule; va, vagina.

(b) *Subulura suctoria* (Molin, 1860) Raitliet and Henry, 1914:
(Synonyms: *H. suctoria* Molin, 1860; *Allodsapa suctoria* (Molin, 1860) Seurat, 1914; *A. brumpti* Lopez-Neyra, 1922; *S. brumpti* (Lopez-Neyra, 1922) Cram, 1926.

Small worms with anterior end curved dorsally. Mouth surrounded by 6 poorly developed lips, followed by a small buccal cavity. Oesophagus well-developed, dilated posteriorly, followed by deep constriction, then a spherical bulb (Fig. 2A).

Females: 13.5 (9.0–18) long × 0.39 (0.32–0.45) wide. Oesophagus 1.3 (1.2–1.4) long. Vulva 4.2 from anterior end. Eggs thin-shelled, subglobular or spherical, with fully developed embryos (Fig. 2B).

Males: [Plate 2 B]: 9.7 (7.46-12.00) long × 0.3 (0.26-0.35) wide. Oesophagus 0.95 (0.87-1.00) long. Tail curved ventrad, with 2 very narrow caudal alae; with slit-like precloacal sucker having radiating muscular support. Caudal papillae 3 pairs precloacal; 8 pairs cloacal. Gubernaculum well-developed. Spicules equal, well-chitinized, rod-shaped and alated, measuring 7.2 (0.98-1.35) Fig. 2C).

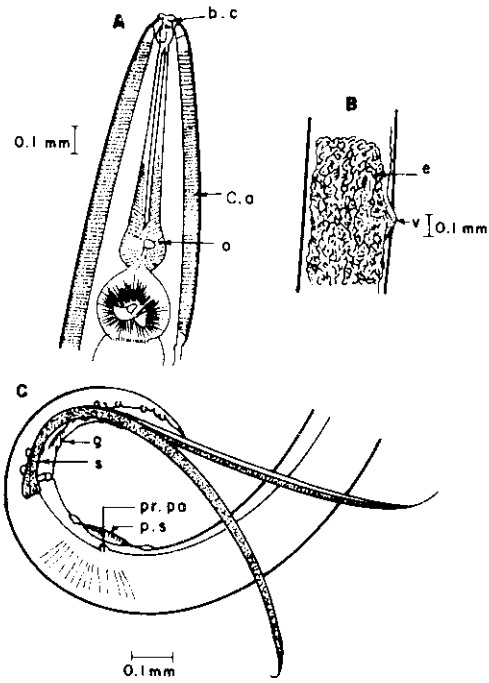

Fig. 2. Camera lucida drawings of *Subulura suctoria* obtaind from the caecum of the guinea fowl *Numedia meleagris* in Saudi Arabia. A, anterior end of worm; B, tail of male; C, vulvar region of female; b.c, buccal cavity; c.a, cephalic alae; e, egg; g, gubernaculum; o, oesophagus; pr.pa, precloacal papillae; p.s. precloacal sucker; s, spicule; v, vulva.

Discussion

The morphology of both worms is in line with that elsewhere [4, 14, p. 536, 15, p. 197, 16]. However, they are somewhat larger than those collected from chickens by El Assaly [17], and Mahdy [18]. *H. gallinarum* was previously reported at a higher prevalence from the chicken in Saudi Arabia [13, p. 69-72] but the present one is its first report from the guinea fowl in the country. *S. suctoria* is reported for the first time, not only from the Kingdom, but also from the whole of Asia. Previously, this worm has been reported only from Africa and South America [6, p. 323; 9, p. 161-166, 19]. The higher prevalence of *H. gallinarum* in the chickens in comparison to the guinea fowl, could, as suggested by Ramadan [7, p. 43-55], indicates a difference in the susceptibility of either host to the worm. On the other hand, the higher prevalence of *H. gallinarum* as compared to *S. suctoria* in the guinea fowls could well be a reflection of their respective biology. The former has a direct life cycle, while the latter requires intermediate hosts such as beetles or cockroaches [6, p. 323, 9, p. 161-166, 17, 20, 21]. The higher prevalence and worm counts in female compared to male guinea fowls is difficult to explain, but similar observations have been made with regards to other helminths of domestic [22, 23] and wild birds [24].

Though both worms have been blamed on previous occasions for causing pathogenic effects [10], yet both are considered to be fairly non-pathogenic [6, p. 323, 9, p. 161-166, 12, p. 632-634]. However, *H. gallinarum* is of unique biological importance in being the only nematode that is truely an intermediate host for another parasite, the mastigamoebid *Histomonas meleagritis* [11, p. 104-122, 12, p. 632-634]. This latter protozoan has actually been observed to multiply in the tissues of the nematode and to penetrate into its developing ova [11, p. 104-122]. It even thrives in the paratenic host of the nematode, the earthworm, that happens to ingest infected eggs and later transmits both parasites to birds [11, p. 104-122, 12, p. 632-634].

References

[1] Cram, K.B. "New Records of Distribution of Various Nematodes." *J. Parasitol.* 14 (1927), 70.
[2] Dickmans, G. "Report of the Parasitologist." *Puerto Rico Agr. Expt. Sta. Rept.* (1927), 27-28.
[3] Fahmy, M.A.M. *Investigations on Some of the Parasites of Poultry*. MVSc. Thesis, Cairo University, Egypt, 1983.
[4] Gupta, N.K. and Acharya, A.K. "Some Ascarids of Poultry from North India." *Res. Bull.* (N.S.) *Punjab University* 21, 3/4 (1970), 379-391.
[5] Khadziev, G.Z. "Some Aspects of the Biology of *Heterakis gallinae* and its Effect on Guinea Fowl." *USSR Akademiya Nauk*, Bashkir Filial Instituta Biologii 18 (1974), 150-155.
[6] Dunn, A. *Veterinary Helminthology*. 3rd. ed. London: William Hiennemann Medical Books Ltd., 1978.

[7] Ramadan, E.I.M. *Some Morphological Studies on Heterakis Worms Infecting Chickens n Egypt.* MVSc. Thesis, Cairo University, Egypt (1979), 43-55.
[8] Naido, T.S.V. "Studies on Some Species of Nematode Parasites of Birds from Nagpur, India." *Rivista diparasitologia,* XLII (1981), 2.
[9] Soulsby, E.J.L. *Helminths Arthropods and Protozoa of Domesticated Animals.* 7th ed. London: ELBS, 1982.
[10] Macclioni, G., Marconcini, A. and Fuso, F. "Pathogenic Effect of *Ascaridia numida* in Guinea Fowls." *Annali della Facolta di Medicine Veterinaria di Pisa* 31 (1978), 114-126.
[11] Lee, D.L. Helminths as Vectors of Micro-organisms. In: *Ecology and Physiology of Parasites.* Toronto: University of Toronto Press, 1971.
[12] Ruff, M.D. *Nematodes and Acanthocephalans.* In: Diseases of Poultry, 8th ed. (Hofstad *et al.* editors). Iowa: Iowa State University Press, 1984.
[13] Abou Znada, Najwa, Y. *Studies on Intestinal Nematodes of Saudi Fowls,* Ph.D. Thesis, Girls' College, Jeddah, Saudi Arabia, 1987.
[14] Yorke, W. and Maplestone, P.A. *Nematode Parasites of Vertebrates.* London: J. and A. Churchill, 1926.
[15] Yamaguti, S. Systema helminthum. Vol. III. The Nematodes of Vertebrates. Part I. N.Y.: Interscence Publ.,1961.
[16] Abdou, A.H. and Selim, M.K. "The Life-cycle of *Subulura suctoria* in Domestic Fowl." *Z. Parasitenk* 23 (1963), 45-49.
[17] El-Assaly, T.M *Morphological Studies on the Nematodes of Genus Subulura in Poultry.* MVSc. Thesis, Cairo University, 1983.
[18] Mahdy, O.A. *Studies on Parasitic Worms Infesting Chickens and Ducks in Giza Governorate, Egypt.,* MVSc. Thesis, Cairo University, Egypt, 1988.
[19] Lopez-Neyra, C.R. "Estodios y revision de la familia Subulucidae, con descripcion de especies nuevas... *Rev. Iber. Parasitol* 6 (1945), 271-329.
[20] Cuckler, a.g. and Alicata, J.E. "The Life History of *Subulura brumpti,* a Caecal Nematode of Poultry in Hawaii." *Trans. Am. Micro. Soc.* 63 (1944), 349-357.
[21] Abdou, A.H. and Selim, M.K. "On the Life-cycle of *Subulura suctoria,* a Caecal Nematode of Poultry in Egypt." *Z. Parasitenk.* 18 (1957), 20-23.
[22] Ackert, J.E. and Case, A.A. "Susceptibility of Mature Chickens to Tape Worms Infection." Trans. Kans. Acad. Sci., 41 1938, 299-302.
[23] Omar, H.M. *Studies on the Biology of Some Tapeworms of Poultry in Giza, Egypt.* MVSc. Thesis, Cairo University, Egypt, 1980.
[24] Omar, H.M. and Abouznada, Najwa, Y. *Ammoperdix heyi* (Phasionidas) A New Avian Host of the Tape Worm *Cotungia digonopora. Proc. 2nd Sci. Congr. Egyptian vet. Poultry Ass.* (Cairo, UAR12-14 March, 1989).

أول تسجيل للإصابة بديدان الأعورين من نوعي
Subulura suctoria , Heterakis gallinarum
ومدى انتشارها في دجاج غينيا بالمملكة العربية السعودية

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ملخص البحث. سجلت إصابات بديدان الأعورين *Subulura suctoria, Heterakis gallinarum* في دجاج غينيا Numedia meleagris المباع بالسوق المحلي بمدينة جدة وتعتبر هذه الدراسة أول دراسة يتم فيها تسجيل الإصابات بتلك الديدان الاسطوانية في دجاج غينيا بالمملكة. وقد أجريت الدراسة على ٩٨ طائرًا وجدت الديدان في ٢٢ منها (٢٤,٧٪) وقد لوحظ أن نسبة الإصابة بديدان النوع *Heterakis gallinarum* تفوق بكثير نسبة الإصابة بديدان النوع *Subulura suctoria* . وكانت إصابة الإناث بصفة عامة أعلى من مثيلتها في الـذكـور. ووجـدت إصـابـة مزدوجـة بإحـدى الإناث. وقد تضمن البحث بالإضافة إلى ذلك دراسة مورفولوجية للديدان المذكورة.