Rec. zool. Surv. India : **108**(Part–4) : 105-112, 2008

ON FOUR NEW NEMATODE SPECIES OF THE GENUS *DIPLOTRIAENA* RAILLIET AND HENRY, 1909, FROM UTTARAKHAND, INDIA

S. R. DEYSARKAR* AND DEBABRATA SEN

Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053

INTRODUCTION

In the course of a faunistic survey in Almora, Champawat and Pithoragarh districts of Uttarakhand (then Uttar Pradesh) was undertaken during March-April, 1990, several helminth parasites were collected by thr first author from a number of birds and mammals of that region. The present paper deals with the descriptions of four new species of avian nematodes belonging to the genus *Diplotriaena* Railliet and Henry, 1909.

All measurements are in millimeter.

SYSTEMATIC ACCOUNT

Order SPIRURIDA

Superfamily DIPLOTRIAENOIDEA

Family DIPLOTRIAENIDAE (Skrjabin, 1916, subfam.) Anderson, 1958

Subfamily DIPLOTRIAENINAE SKRJABIN, 1916

Genus *DIPLOTRIAENA* Railliet and Henry, 1909

1. *Diplotriaena champawatensis* sp. n.

(Fig. 1. a, b and c)

Material : Holotype 1 male; Z.S.I. Reg. No. WN 972; host : Himalayan Whistling Thrush, *Myiophoneus caeruleus temmincki* (Aves: Passeriformes: Muscicapidae); location body cavity; locality-Champawat, district Champawat, Uttarakhand; Coll. S. R. Dey Sarkar; 12. 04 1990; paratypes 3 females; Z. S. I. Reg. No. WN 973; other details as in the holotype.

*Present Address : *2/24, Rashmoni Bazar Road, Kolkata-700 010*

Diagnosis : Body finely striated and rounded at both extremities; no lips; one pair of cephalic papillae on each side of the head; trident-like structures present on either side of anterior end of oesophagus and opening by pores on either side of the oral opening; the prongs of the tridents being equal, striated and with rounded tips; oesophagus divided into two parts; eight pairs of caudal papillae in male; spicules unequal, dissimilar and non-alate; vulva at glandular oesophageal portion of the body.

Description : Male. Body 23.84 mm long, 0.56 mm wide; tridents two in number, prongs equal, striated and with rounded tips, 0.272 mm long; nerve ring at 0.288 mm from the anterior end; oesophagus divided into two parts, an anterior, narrower and muscular, 0.288 mm long, 0.048 mm wide, and a posterior wider, glandular, 1.472 mm long, 0.16 mm wide; entire oesophagus 1.76 mm long; spicules unequal and dissimilar, left longer, tubular, ventrally curved, 1.312 mm long, non-alate with pointed tip; right spicule smaller, cork-screw shaped, about 1½ turns, 0.72 mm long in straight line and 0.88 long in curvature, non-alate; cloaca sub-terminal at 0.117 mm from the posterior end; caudal papillae 8 pairs, 2 pairs pre-anal and the rest post-anal in position.

Female : Body 46.56–56.64 mm long, 0.75–0.80 mm wide; trident as in the male, 0.176–0.240 mm long; nerve ring at 0.272–0.30 mm from anterior end; vulva at 0.528–0.560 mm from anterior end; anus terminal; eggs embryonated, 0.032 × 0.048 mm in diameter.

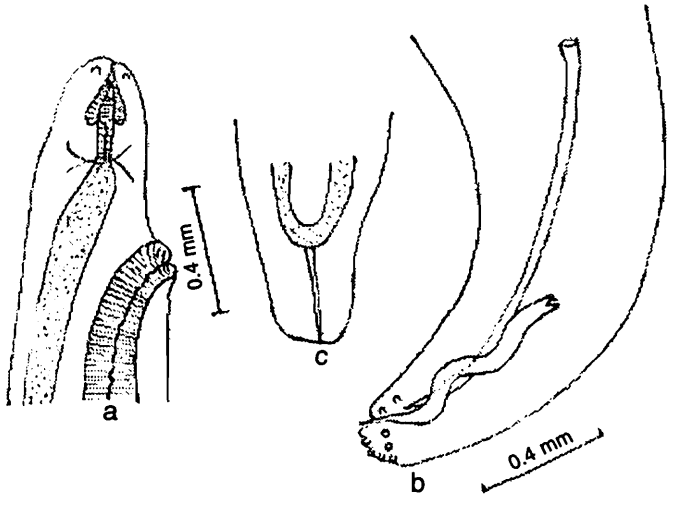

Fig. 1. : *Dipletriaena champawatensis* sp. n. a. Anterior end of female, showing vulva; b. Pesterior end male; c. Posterior end of female.

Discussion : The present species differs from all other recorded species of the genus in various body measurements and in the number and arrangement of caudal papillae in the male. Hitherto, two species *Diplotriaena mukteswarensis* Singh, 1962 and *Diplotriaena nepalensis* Soota and Chaturvedi, 1967 are described from the same specific host i. e., *Myiophoneus caeruleus temmincki*

from India (Mukteswar- Kumaun, Uttarakhand) and Nepal respectively. The present species differs from them in the following respect: in *D. mukteswarensis* the left spicule is smaller (0.979 mm vs. 1.312 mm), caudal papillae 6 pairs, 2 pairs preanal, 2 pairs adanal large and 2 pairs postanal in position where as the present species having 8 pairs of caudal papillae of equal size, 2 pairs preanal and the rest postanal; in *D. nepalensis* body is longer (38.2 mm vs. 23.84 mm), both the spicules are smaller (left 1.0 mm and right 0.64 mm long vs. left 1.312 mm and right 0.72 mm long), caudal papillae 5 pairs (4 + 1 + 0 vs. 8 pairs (2 + 0 + 6).

It is therefore, regarded as new and a specific name *Diplotriaena champawatensis* sp. n. is being proposed to accommodate it.

2. ***Diplotriaena zootherae*** sp. n.

(Fig. 2. a and b)

Material : Holotype 1 male; Z.S.I. Reg No. WN 974; host: Orange headed Ground Thrush, *Zoothra citrina citrina* (Aves : Passeriformes : Muscicapidae); location coelomic cavity, near heart; locality Champawat (ca.1370 m), district Champawat, Uttarakhand; Coll. S. R. Dey Sarkar; 12.04.1990.

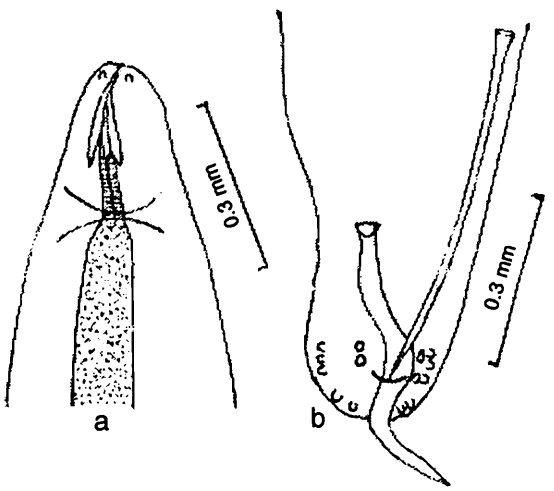

Fig. 2. : *Dipletriaena zootherae* sp. n. a. Anterior end and b. Posterior end of female.

Diagnosis : Body long, delicate, unstriated and rounded at both extremities; mouth simple without lips; the prongs of the tridents equal, unstriated and distally pointed; oesophagus divided in to two parts; 7 pairs of caudal papillae in male, 5 pairs pre-anal and 2 pairs post-anal; spicules unequal and dissimilar.

Description : Male. Body 25.44 mm long, 0.352mm wide; tridents two in number, prongs equal, smooth and with pointed tips, 0.272 mm long; nerve ring at 0.24 mm from the anterior end;

oesopgagus divided into two parts, an anterior muscular and narrower, 0.32 mm long, 0.032 mm wide and a posterior wider and glandular, 1.92 mm long; entire oesophagus 2.24 mm long; spicules unequal and dissimilar, the left being longer, more or less straight, 0.656 mm long, the right shorter, spiral about one turn, 0.448 mm long in straight line and 0.528 mm in curvature; cloaca subterminal, 0.112 mm from the posterior end; caudal papillae 7 pairs of equal size, 5 pairs pre-anal and two pairs post-anal, terminal; of the pre-anals 2 pairs ventral and 3 pairs lateral in position.

Female : Unknown.

Discussion : Though a single specimen was available for study, the present species differs from the closely related species thus: from *Diplotriaena mukteswarensis* Singh, 1962, in the size of spicules, size and shape of the prongs of the tridents, and in the number and position of the caudal papillae (in *D. mukteswarensis*, male body 24.042 mm long, prongs of the tridents equal, 0.196 mm long, spicule left 0.979 mm and right 0.745 mm long; caudal papillae 6 pairs (2 + 2 + 2); from *Diplotriaena chandragiriensis* Soota and Chaturvedi, 1971, in the size of spicules, number and arrangement of caudal papillae (in *D. chandragiriensis* male body 22.0 mm long, spicules left 0.77 mm and right 0.55 mm long; caudal papillae 5–6 pairs [4 + 0 + (1 – 2)].

Hence, it is regarded as new to science and a specific name *Diplotriaena zootherae* sp. n. is being proposed to accommodate it.

3. ***Diplotriaena niltavae*** sp. n.

(Fig. 3. a, b and c)

Material : Holotype 1 male; Z.S.I. Reg. No. WN 975; host- Large Niltava, *Niltava grandis grandis* (Aves : Passseriformes : Muscicapidae); location abdominal cavity; locality–Champawat (ca. 1370 m), district Champawat, Uttarakhand; coll. S. R. Dey Sarkar; 11.04.1990; paratypes 2 males, 2 females, Z.S.I. Reg. No. WN 976; other details as in the holotype.

Diagnosis : Body delicate and smooth; two pairs of cephalic papillae on either side of the head; tridents with equal unstriated prongs and rounded tips; anterior end rounded and posterior end truncate in both sexs; caudal papillae 12 pairs; spicules unequal and dissimilar, the left being longer, almost straight and the right smaller, stouter and spiral about one turn; vulva of female in the glandular oesophageal portion of the body.

Description : Male. Body 24.0–24.4 mm long, 0.496–0.512 mm wide; tridents two in number, 0.128 mm–0.144 mm long; prongs equal, unstriated and with rounded tips; nerve ring at 0.224 mm–0.240 mm from the anterior end; oesophagus divided into an anterior narrower and muscular and a posterior glandular and wider portion; the anterior muscular portion 0.352 mm long, 0.032 mm wide and the posterior portion 2.288 mm long, 0.064 mm wide; entire oesophagus 2.64 mm long; spicules unequal, dissimilar, non-alate, with pointed tips; the left longer, 0.656–0.720 mm

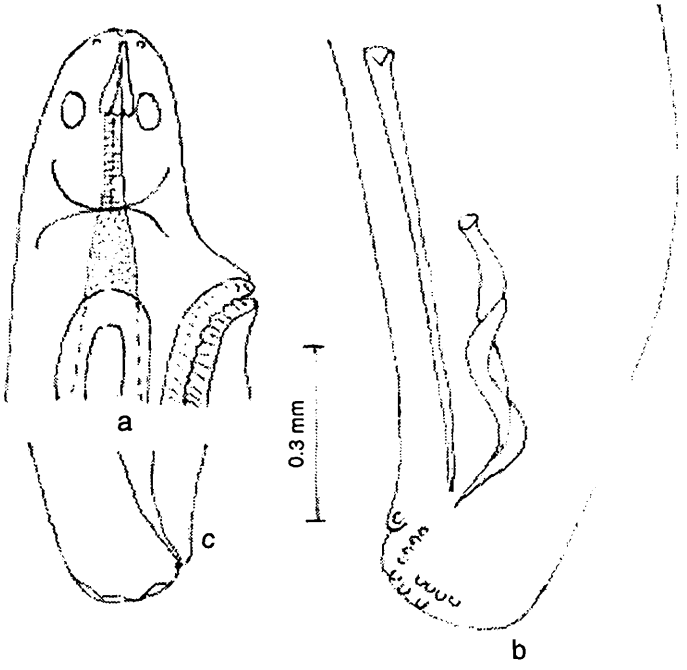

Fig. 3. : *Dipletriaena niltavae* sp. n. a. Anterior end of female, showing vulva; b. Pesterior end of male; c. Posterior end of female.

long, almost straight and the right being stouter and spiral about one turn, measuring 0.464–0.496 mm in straight line; cloaca subterminal at 0.08–0.112mm from the posterior end; caudal papillae 12 pairs, one pair pre-anal on the cloacal lip and the rest post-anal, of the post-anals 4 pairs ventral, 4 pairs lateral and 3 pairs terminal in position.

Female : Body 36.0–36.4 mm long, 0.72–0.80 mm wide; tridents as in the male, 0.128–0.144 mm long; nerve ring at 0.256 mm from the anterior end; oesophagus as in the male, the junction of oesophagus and intestine not traceable due to heavy deposition of eggs; vulva at 0.40–0.448 mm from the anterior end; anus almost terminal; eggs 0.024–0.032 mm × 0.032–0.048 mm in diameter.

Discussion : The species under study approaches nearer to *Diplotriaena mukteswarensis* Singh, 1962, *Diplotriaena chandragiriensis* Soota and Chaturvedi, 1971 and *D. doonensis* Soota and Tripathi, 1975 in the relative body size and of the size of the prongs of the tridents, but it differs from them in the number and arrangements of caudal papillae in the male and the relative size of the spicules. It is nearer to *D. molpastisi* Majumdar and Chakravarty, 1963 in the size of spicules (in *D. molpastisi* left spicule 0.65mm and the right spiocule 0.45 mm long), but differs from it in various body measurements, size and shape of the prongs of the tridents, number and arrangement of caudal papillae (in *D. molpastisi* tridents 0.15 mm long and the prongs being corrugated, caudal papillae 10 pairs, 4 pairs pre-anal and 6 pairs post-anal. Further, it is closer to *D. tricuspis* (Fedchenko, 1874) Seurat, 1915, in the number of caudal papillae in male but differ from it thus:

in various body measurements, in the arrangement of caudal papillae, *D. tricuspis* having a variable number of caudal papillae, 9–14 pairs, of them 3–4 pairs being pre-anal; in having longer spicules, left 1.0–2.5 mm and right 0.55–0.96 mm long, but the present species having 12 pairs of caudal papillae, one pair pre-anal and the rest post-anal and left spicule up to 0.72 mm and the right up to 0.496 mm long. Therefore, the present species regarded as new and a new specific name *Diplotriaena niltavae* sp. n. is proposed to accommodate it.

4. ***Diplotriaena almoraensis*** sp. n.

(Fig. 4. a, b)

Material : Holotype 1 male; Z.S.I. Reg No. WN 977; host–Tit, *Parus major*, (Aves : Passeriformes : Paridae); location–body cavity; locality–Dinapani (1859 m), 10 km North-East of Almora, district Almora, Uttarakhand; coll. S. R. Dey Sarkar; 03.04.1990; paratype: posterior fragment of a male; Z.S.I. Reg. No. WN 978; other particulars as in the holotype.

Diagnosis : Body long, delicate and smooth; mouth simple without lips; tridents with unstriated equal prongs and rounded tips; anterior end round and posterior end truncate; oesophagus divided; caudal papillae 5 pairs, 1 pair pre-anal and 4 pair post-anal; spicules unequal and dissimilar.

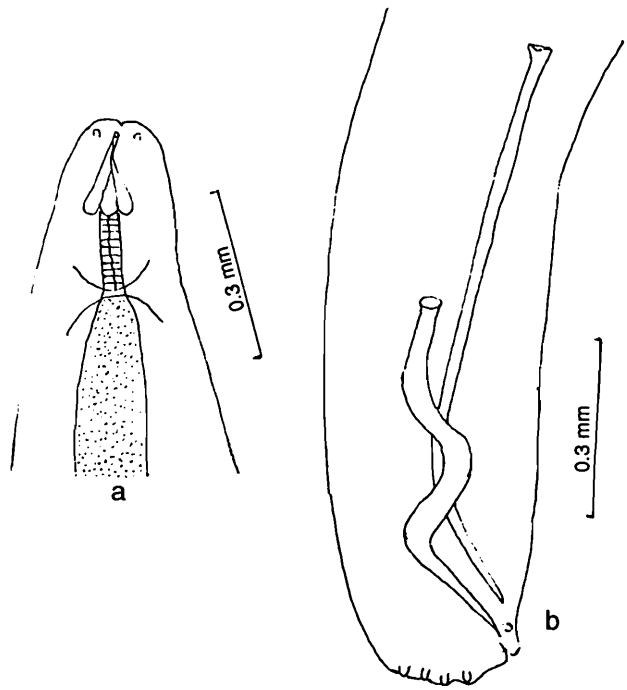

Fig. 4. : *Dipletriaena almoraensis* sp. n. a. Anterior end of and b. Pesterior end of male.

Description : Male. Body 39.2 mm long, 0.32 mm wide; tridents with unstriated equal prongs, and rounded tips, 0.16 mm long; nerve ring at 0.32 mm from the anterior end; oesophagus divided, anterior portion narrower and muscular, 0.32 mm long, and the posterior portion wider and glandular, 1.28 mm long; entire oesophagus 1.60 mm long; spicules unequal and dissimilar, the left longer, ventrally curved, 0.848–1.072 mm long and the right being shorter and spiral about one turn, 0.448–0.560 mm long; spicules ratio about 1 : 1.9; caudal papillae 5 pairs, 1 pair pre-anal and 4 pairs post-anal, terminal in position; cloaca at 0.08 mm from the posterior end.

Female : Unknown.

Discussion : The present species comes closer to *Diplotriaena doonensis* Soota and Tripathi, 1975, in number and arrangement of caudal papillae but differs from it in body length, size and shape of the prongs of tridents, size and ratio of spicules (in *D. doonensis* body being 21.6–24.0 mm long in males; prongs equal with transverse markings, 0.19–0.20 mm long; spicules, left 0.88 mm and right 0.6–0.66 mm long and their ratio being 1 : 1.5). It also approaches nearer to *D. kumaunensis* Singh, 1962, *D. nepalensis* Soota and Chaturvedi, 1967 and *D. chandragiriensis* Soota and chaturvedi, 1971, in number of caudal papillae, but differs from them in the arrangement of caudal papillae and their relative body measurements and the length of spicules (in *D. kumaunensis* male body being 22.1mm long, length of prongs of tridents 0.15mm, left spicule 0.623 mm and right spicule 0.418 mm long, caudal papillae 5 pairs (= 3 + 1 + 1); in *D. nepalensis* male body being 38.2 mm long, prongs 0.18 mm long, left spicule 1.0mm and the right spicule 0.64 mm long, caudal papillae 5 pairs (= 4 + 0 + 1); in *D. chandragiriensis* male body 22.0 mm, prongs 0.13 mm, left spicule 0.77mm and the right spicule 0.55mm long, caudal papillae 5–6 pairs [= 4 + 0 + (1 – 2)]. It also differs markedly from all other species known under the genus and from different hosts in the number of caudal papillae and size and shape of spicules.

Therefore, the present species is regarded as different from all known forms under the genus *Diplotriaena* Railliet and Henry, 1909, and is named *Diplotriaena almoraensis* sp. n.

SUMMARY

The paper deals with four new species of the genus *Diplotriaena* Railliet and Henry, 1909, of avian nematodes from Almora and Champawat districts, Uttarakhand, India.

ACKNOWLEDGEMENT

The authors are thankful to the Director, Zoological Survey of India, Kolkata, for giving laboratory facilities during this work. Due gratitude is also expressed to Dr. Amalendu Chatterjee,

Scientist–E, Officer-in Charge and other members of Nemathelminthes Section, Z.S.I., for their co-operation and help.

REFERENCES

Baylis, H. A. 1939. Fauna of British India including Cylon and Burma. Nematoda. Vol. II (Filarioidea, Dictophymoidea and Trichinelloidea). Published by Taylor and Francis, London. Also published by Today Tomorrow's Printers and Publishers, New Delhi. 274 pp.

Majumdar, G and Chakravarty, G. K. 1963. New nematodes from birds. Pt. I. *z. f. Parasitenkunde*, **23** : 1-10.

Singh, K. S. 1962. Parasitological Survey of Kumaun Region. Part-I. On three new species of the genus *Diplotriaena* Railliet and Henry, 1909 (Diplotriaeninae: Filariidae : Nematoda) from birds of Mukteswar. *Indian Journal of Helminthology*, **14,** No. I : 16-23.

Soota, T. D. and Chaturvedi, Y, 1967. On two new nematode species of the genus *Diplotriaena* Railliet and Henry, 1909, from Nepal and India. *J. Zool. Soc. India,* **19** (1 & 2) : 133-136.

Soota, T. D. and Chaturvedi, Y, 1971. Description of a new nematode of the genus *Diplotriaena* Railliet and Henry, 1909, and notes on the taxonomic status of another nematode *Porrocaecum haliasturi* Gupta, 1960. *J. Zool. Soc. India,* **23**(1) : 21-23.

Soota T. D. and Triparhi, 1975. On some nematode from Doon valley, Uttar Pradesh, India. *Proc. Zool. Soc.,* Calcutta, **28** : 103-109.

Yamaguti, S. 1961. Systema Helminthum. III. The Nematodes of Vertebrates. Pt. I & II. 1261 pp. Interscience Publishers, Inc. New York.