



Parasites of South African wildlife. XVIII. *Cooperia pigachei* n. sp. (Nematoda: Cooperiidae) from the mountain reedbuck, *Redunca fulvorufula* (Afzelius, 1815)

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ABSTRACT

BOOMKER, J. & TAYLOR, W.A. 2004. Parasites of South Africa wildlife. XVIII. *Cooperia pigachei* n. sp. (Nematoda: Cooperiidae) from the mountain reedbuck, *Redunca fulvorufula* (Afzelius, 1815). *Onderstepoort Journal of Veterinary Research*, 71:171–174

A new species of *Cooperia*, for which the name *Cooperia pigachei* n. sp. is proposed, was recovered from a mountain reedbuck, *Redunca fulvorufula*, from the Sterkfontein Dam Nature Reserve, Free State Province, and is described and illustrated. It is close to *Cooperia neitzi* Mönning, 1932 and the South African race of *Cooperia rotundispiculum* in having more than 14 longitudinal cuticular ridges and in that the lateral cervical synlophe is of the closed type. The new species differs from all the other species of the genus in that the lateral branches of the dorsal ray are large and T-shaped. The spicules are robust, over 0.3 mm long and have large, curved shoes on their tips.

Keywords: *Cooperia pigachei*, mountain reedbuck, Nematoda, *Redunca fulvorufula*

INTRODUCTION

During a study on the ecology of antelope in the Sterkfontein Dam Nature Reserve, Free State Province, the helminth parasites of a number of mountain reedbuck, *Redunca fulvorufula*, and grey rhebuck, *Pelea capreolus*, were collected. The area falls within the Grassland Biome, specifically the Moist Cool Highveld Grassland type (Bredenkamp & Van Rooyen 1996). Rainfall varies from 600 to 900 mm per year and occurs in summer. Temperatures vary from –11 °C to 38 °C, with an average of 17 °C. This is mountain grassland, with the typical cool, wet Drakensberg montane climate and

severe frost. Occasional snow and frequent burning have major influences on the vegetation.

The mountain reedbuck from which the worms were recovered was a large adult female that was lactating but not pregnant, and, as determined from the kidney fat index, she was in reasonable condition. She was culled on the eastern side of the dam in the Park and was the only mountain reedbuck out of the 41 examined from which the new *Cooperia* species was recovered.

MATERIALS AND METHODS

Specimens were initially examined in water and when deemed necessary, cleared in lactophenol or phenol alcohol. Temporary cross-sections of the mid-body of a female specimen were made and mounted in lactophenol. All drawings (Fig. 1) were made with a compound microscope and a drawing tube, and measurements made from the drawings. Measurements are given as holotype/allotype fol-

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Accepted for publication 21 November 2003—Editor

lowed by the range of measurements of the paratypes (in parentheses). All are given in millimetres unless otherwise indicated.

The new species is placed in the family Cooperiidae, subfamily Cooperiinae according to the classification of Durette-Desset, Hugot, Darlu & Chabaud (1999).

RESULTS

Description

Males are 8.30 (8.23–8.93) long, and 0.202 (0.202–0.276) wide. The cephalic inflation is 0.143 (0.120–0.150) long and 0.051 (0.043–0.051) wide. The nerve ring was not seen in the holotype and was 0.253–0.332 from the anterior end in the paratype males. The excretory pore is 0.345 (0.366–0.406) and the minute deirids 0.363 (0.380–0.413) from the anterior end. The oesophagus is 0.552 (0.453–0.589) long.

The bursa has the typical appearance of the genus in that the short ray 2 is widely separated from the considerably longer ray 3. Rays 4 and 5 run parallel next to each other and have diverging tips, and the dorsal ray has a lyre-shaped appearance (Fig. 1A). The lateral branches of the dorsal ray arise at or just after the bifurcation of the main stem. These branches are unique within the genus in that they are quite robust and T-shaped (Fig. 1B). The spicules are virtually equal, the left one being 0.373 (0.340–0.396) long and the right one 0.368 (0.331–0.396). The tips of the spicules are large and enclosed in semi-transparent “shoes” (Fig. 1C). A gubernaculum is absent.

Females are 10.249 (8.353–11.249) long and 0.147 (0.120–0.207) wide. The cephalic inflation is 0.154 (0.076–0.161) long and 0.048 (0.041–0.083) wide. The nerve ring was not seen in the allotype but is situated 0.145–0.276 from the anterior end in the paratype females. The excretory pore and minute deirids are close together, 0.343 and 0.352 (0.251–0.465 and 0.265–0.478) from the anterior end, respectively. The oesophagus is 0.456 (0.336–0.465) long.

The vulva lies in the posterior third of the body, 7.698 (6.526–8.066) from the anterior end. Vulvar flaps are limited to the immediate vicinity of the vulva and are only slight expansions of the surrounding cuticular ridges of all individuals (Fig. 1D), except one, who has definitive flaps and several expanded cuticular ridges. The combined length of

the opposed ovejectors, including the infundibula, sphincters and vestibule, is 1.370 (0.966–1.906). The tail is 0.159 (0.138–0.202) long. Eggs *in utero* measure 0.069–0.078 (0.074–0.097) long and 0.035–0.039 (0.037–0.055) wide.

On cross-section at the midbody, both the male and the female have seven dorsal and seven ventral ridges in addition to three lateral ridges on each side (Fig. 1D). The three lateral ridges are quite small. Ridges D1, D7, V1 and V7 are of similar size and slightly bigger than the lateral ones. The remaining dorsal and ventral ridges are large and more or less of equal size. All the ridges are perpendicular to the body surface.

In lateral view, the male cervical synlophe has 11 cuticular ridges (Fig. 1E) that are widely separated. The dorso- and ventro-lateral ridges (those bordering the minute lateral ridge) emerge close to each other a short distance behind the deirid. These then diverge slightly and run parallel over the length of the body. The lateral ridge starts a short distance behind the emergence of the dorso- and ventro-lateral ridges. Initially this field is hardly visible but soon becomes a distinct, solid band that runs for almost the entire length of the body. The lateral fields differ from the other fields in having a hyaline appearance and no ornamentation, whereas all the others have a tuberculated appearance brought about by underlying struts. As in many other species of the genus, the ridges extend from the base of the cervical inflation to the anterior part of the bursa in males and beyond the anus in females.

Type host

Mountain reedbuck, *Redunca fulvorufula* (Afzelius, 1815), from the Sterkfontein Dam Nature Reserve, (28°24'30 S; 28°58'25 E), eastern Free State Province, South Africa.

Material examined

Holotype male, allotype female, and four male and 13 female paratypes. The specimens have been deposited in the National Collection of Animal Helminths (formerly the Onderstepoort Helminthological Collection), Onderstepoort, access number T2185.

Etymology

The specific name is derived from the French for the long-toed, turned-up shoes, “pigaches”, worn during the Middle Ages.

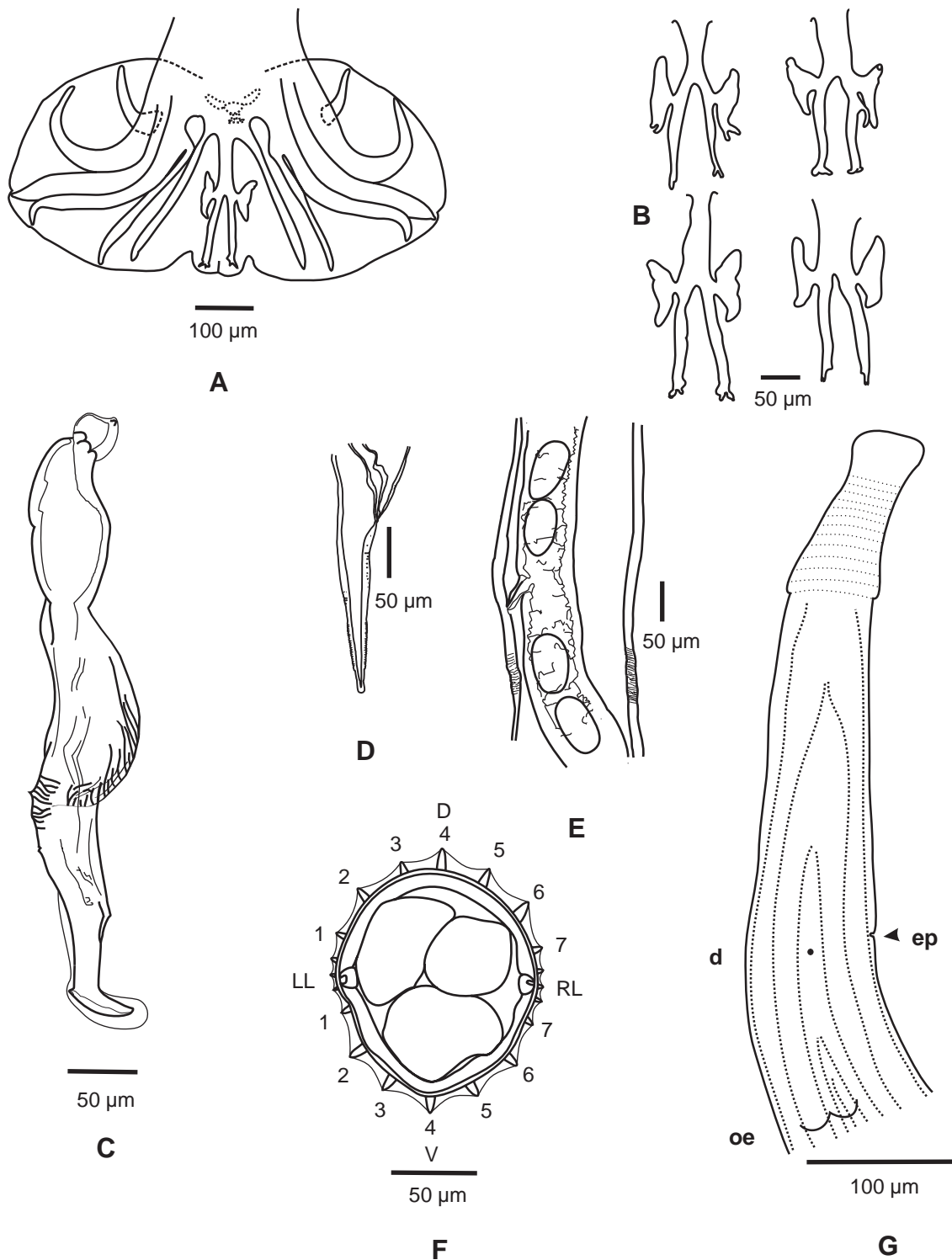


FIG. 1 *Cooperia pigachei*. A, dorsal view of the bursa; B, variations in the configuration of the dorsal ray; C, externo-lateral view of the right spicule; D, female tail, right lateral view; E, left lateral view of the vulval region of a female without flaps; F, schematic representation of a cross-section at mid-body of a female (D = dorsal, V = ventral, LL = left lateral and RL = right lateral); G, schematic representation of the lateral synlophe of a male (d = deirid, ep = excretory pore and oe = end of the oesophagus)

DISCUSSION

A large number of species of the genus *Cooperia* Ransom, 1907 occur in ruminants in Africa and these have been revised by Gibbons (1981). The majority of these species have 14 longitudinal cuticular ridges, five dorsal, five ventral, and two in each lateral field. Those with fewer ridges are *Cooperia chabaudi* Diaouré, 1964 that has 10 ridges and *Cooperia connochaeti* Boomker, Horak & Alves, 1979, that has 12 ridges of which the dorsal three are considerably smaller than the others. According to Gibbons (1981), *Cooperia neitzi* Mönnig, 1932 and *Cooperia verrucosa* Mönnig, 1932 have 19–20 ridges, 13 or 14 in the dorsal and ventral fields, and three in each lateral field. Hoberg, Lichtenfels & Pilitt (1993) state that at the midbody there are 20 ridges in male *C. neitzi* and 20–25 in females, and Boomker (1991) found *Cooperia rotundispiculum* to have 18–20 ridges. The male and female specimens examined in this study have 20 ridges, the arrangement of which is similar to that described for *C. neitzi*.

The cuticular inflations around the vulval area of the one specimen in which they were present are similar to that described by Hoberg *et al.* (1993) for *C. neitzi*. It is a prominent bilateral inflation, formed by hypertrophied ridges and reverts back to the pattern at midbody immediately following the posterior ovjector.

The cervical synlophe of *C. pigachei* is similar to that described for *C. neitzi*, *Cooperia punctata* and *Cooperia pectinata* (Lichtenfels 1977; Hoberg *et al.* 1993) in that it is of the converging or closed type. As is the case with *C. neitzi*, the minute lateral-most ridge of *C. pigachei* does not appear to be supported by struts, hence its hyaline appearance, while the remaining ridges are supported by struts giving them a striated or beaded appearance (Hoberg *et al.* 1993). From the illustrations provided by Hoberg *et al.* (1993) the lateral-most ridge of *C. neitzi* arises immediately posterior to the deirids, close to or at the junction of the oesophagus with the intestine,

while the adjoining two (dorso- and ventro-lateral ridges) arise some distance in front of the deirid. In *C. pigachei* these three ridges arise quite a distance behind the deirids.

The configuration of the spicules of *C. pigachei* is near that of *Cooperia curticei* (Giles, 1892) Ransom, 1907, *Cooperia fuelleborni* Hung, 1926, *Cooperia hungi* (Mönnig, 1931) Mönnig, 1932, *Cooperia neitzi* Mönnig, 1932, *Cooperia pectinata* Ransom, 1907, *Cooperia rotundispiculum* Gibbons & Khalil, 1980 and the *Cooperia rotundispiculum* race described by Boomker (1991) in having large pectinate expansions more or less in the middle of each spicule. However, the new species differs from all of these by the presence of large curving "shoes" on the distal parts of the spicules. In addition, the dorsal ray is also unique among the *Cooperia* spp. in that it is the only species where the lateral branches of the dorsal ray are T-shaped.

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