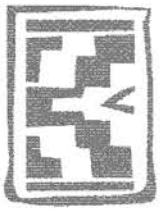

Studies on the genus *Setaria* Viborg, 1795 in South Africa. II. *Setaria scalprum* (Von Linstow, 1908) and *Setaria saegeri* (Le Van Hoa, 1961)

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ABSTRACT

WATERMEYER, R., BOOMKER, J. & PUTTERILL, J.F. 2003. Studies on the genus *Setaria* Viborg, 1795 in South Africa. II. *Setaria scalprum* (Von Linstow, 1908) and *Setaria saegeri* (Le Van Hoa, 1961). *Onderstepoort Journal of Veterinary Research*, 70:7–13

Setaria scalprum (Von Linstow, 1908) and *Setaria saegeri* (Le Van Hoa, 1961) are closely related filarid species that occur in the smaller antelope of Africa. Material previously collected from common duiker, *Sylvicapra grimmia,* steenbok, *Raphicerus campestris* and grysbok, *Raphicerus melanotis,* from several localities in the northern and eastern regions of South Africa was re-examined and measurements of adult worms were compared with those given in the original descriptions of the species. Scanning electron microscopy of the anterior and posterior regions of the female worms confirmed the validity of the two species. Differences in the postdeirid, ventral transverse bands and bosses on the cuticle of the male specimens were also observed. *Setaria saegeri* in common duiker and grysbok is a new parasite record for these hosts.

Keywords: Filarids, *Setaria saegeri*, *Setaria scalprum*, South African wildlife

INTRODUCTION

Various *Setaria* species have been recorded from wildlife in Africa, amongst which are *Setaria scalprum* (Von Linstow, 1908), described from steenbok, *Raphicerus campestris* and *Setaria saegeri* (Le Van Hoa, 1961) from common duiker, *Sylvicapra grimmia*. These two filarids are very similar and the possibility of misidentification of either species is possible, as stated by Le Van Hoa (1961) and Desset (1966). The description by Yeh (1959) of *S. scalprum* was, amongst others, from steenbok from Grahamstown, Eastern Cape Province, South Africa. *Setaria saegeri* has been recorded from common duiker in other parts of Africa, but no records of this species in South Africa could be found in the literature. Detailed scanning electron microscopic (SEM) studies on the morphological characteristics of *Setaria* species have been conducted by various workers, but mainly on species that occur in domesticated animals. There appears to be a paucity of information regarding SEM studies of *Setaria* spp. of wild animals of Africa.

During surveys of the helminth parasites of South African wildlife, specimens of the genus *Setaria* were collected from various artiodactylids, including common duiker (Boomker, Du Plessis & Boomker 1983; Boomker, Horak & De Vos 1986; Boomker, Keep & Horak 1987; Boomker, Horak & MacIvor 1989) and grysbok, *Raphicerus melanotis*, (Boomker *et al.* 1989). Ortlepp (1961) and Boomker *et al.* (1987, 1989) recorded *Setaria caelum* and *S. scalprum* from common duiker. Subsequent records of *Setaria* spp. from common duiker (Boomker *et al.*

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1983, 1986) and grysbok (Boomker *et al.* 1989) were identified only to the genus level. The SEM appearance, together with the measurements of *S. scalprum* and *S. saegeri,* are presented here and compared with the findings of Yeh (1959), Le Van Hoa (1961), and Desset (1966).

MATERIALS AND METHODS

The specimens originated from the helminthological collection of one of us (J.B.), currently housed in the Department of Veterinary Tropical Diseases, University of Pretoria, as well as the National Collection of Animal Helminths (NCAH). The following specimens were examined: 25 females from common duiker from the Weza Forest Nature Reserve, KwaZulu-Natal (WFNR); three males from the same host from Uitenhage, Eastern Cape Province; one female from grysbok, from the latter locality; five males and 19 females from common duiker from the farm Riekerts Laager, Limpopo Province; ten females from common duiker from Malelane, Kruger National Park (KNP); one female from steenbok from Nwashitsumbe, KNP; five males and 28 females from steenbok from Stellenbosch, Western Cape Province; two males and ten females from common duiker from Ondangua, Namibia, NCAH No. S2246 and three females from common duiker from Ndumu Nature Reserve, KwaZulu-Natal, NCAH No. S2336.

The nematodes were cleared in lactophenol and examined under a compound microscope using differential interference illumination. Measurements were obtained from *camera lucida* drawings of the material, and are given in millimetres in Tables 1 and 2. Specimens for scanning electron microscopy, which had been preserved in 70% ethanol, had a segment of the head and tail removed prior to further processing. Samples were re-hydrated to distilled water after which they were post-fixed in 4% glutaraldehyde and 1% osmium tetroxide. Specimens were dehydrated through graded ethanol and critical point dried from 100% ethanol to carbon dioxide. Each dried head and tail segment was individually mounted onto a conical brass SEM viewing stub and sputter coated with gold. Samples were viewed and micrographed using a Hitachi S-2500 scanning electron microscope operated at 8 kV.

RESULTS AND DISCUSSION

Of the 112 helminths examined, 65 out of 77 from common duiker from the different localities as well as the one nematode from grysbok from Uitenhage proved to be *S. saegeri.* The 12 specimens from common duiker from Ondangua, Namibia were not suitable for identification. The 34 helminths from steenbok from the KNP and Stellenbosch were identified as *S. scalprum.*

In Tables 1 and 2 the measurements of *S. scalprum* and *S. saegeri* are compared with those of Yeh (1959) and Le Van Hoa (1961), respectively.

Setaria scalprum from steenbok examined in this study generally corresponded closely to the description of Yeh (1959), except for being slightly smaller. The majority of measurements of the South African *S. saegeri* were similar to those recorded by Le Van Hoa (1961). However, the following differences were apparent: female specimens had a shorter oesophagus, the deirids were closer to the anterior end, and the tail was longer than that recorded by Le Van Hoa (1961). The scanning electron microscopical appearance of *S. scalprum* and *S. saegeri* are presented in Fig. 1 and 2.

It was evident that the two species are morphologically distinct, as recorded by Le Van Hoa (1961) and Desset (1966). In lateral view, the cephalic elevations of *S. scalprum* are short, stub-like projections whereas those of *S. saegeri* are prominent, long, tooth-like structures (Fig. 1A and 2A). In ventral view the elevations of *S. scalprum* have a wide base with the sides tapering down gradually towards the peribuccal crown whereas those of *S. saegeri* have a rounded base with the sides almost parallel (Fig. 1B and 2B). In apical view, the mouth opening of *S. scalprum* is round and is surrounded by a slightly raised peribuccal crown. The elevations are elongated in a dorsoventral plane. The mouth of *S. saegeri* is oval in shape and the elevations are smaller and rounded with diverging tips (Fig. 1C and 2C). Furthermore, the deirids of *S. scalprum* are single whereas those of *S. saegeri* are double (Fig. 1D, E and 2D, E) and the caudal appendages of *S. scalprum* are larger than those of *S. saegeri* (Fig. 1F and 2F). Yeh (1959) described the terminal button on the posterior extremity of *S. scalprum* females as a small knob, often ill-defined and Le Van Hoa (1961) only mentions the tail length of *S. saegeri.* Desset (1966) describes the terminal buttons of the two species as more or less tuberculated in *S. saegeri* and smooth in *S. scalprum* and her illustrations are the same as those of Le Van Hoa (1961). This is contradictory to our findings in that the terminal button of *S. scalprum* is bluntly rounded and bifid whereas that of *S. saegeri*

TABLE 1 The comparative measurements (in mm) of *Setaria scalprum* from steenbok, *Raphicerus campestris*

Criterion	Males			Females		
	This paper (n = 5)	Mean	Yeh (1959)	This paper (n = 6)	Mean	Yeh (1959)
Length	27.00–38.00	34.40	37.00	60.00–86.00	75.25	95.00
Width	0.299–0.345	0.328	0.270	0.377–0.519	0.471	0.670
Muscular oesophagus, length	0.230–0.446	0.369	0.380	0.391–0.480	0.421	0.420
Glandular oesophagus, length	2.880–4.400	3.415	3.540	3.980–4.809	4.386	4.700
Total oesophagus length	3.280–4.630	3.784	3.920	4.460–5.200	4.811	5.120
Nerve ring from anterior end	0.154–0.230	0.196	0.210	0.179–0.270	0.211	0.170
Deirids from anterior end	0.213–0.472	0.370	*	0.267–0.368	0.326	*
Vulva, distance from anterior end	–	–	–	0.184–0.370	0.283	0.290
Tail, length	0.110–0.143	0.130	0.120	0.276–0.368	0.328	0.420
Caudal appendages from tail tip	–	–	–	0.017–0.025	0.022	0.020
Caudal appendages, length	–	–	–	0.004–0.005	0.004	*
Right spicule, length	0.101–0.126	0.109	0.130	–	–	–
Left spicule shaft, length	0.133–0.179	0.159	0.140	–	–	–
Left spicule blade, length	0.055–0.103	0.077	0.100	–	–	–
Left spicule, total length	0.234–0.236	0.235	0.240	–	–	–
Distance between cephalic elevations, lateral view	0.033–0.040	0.037	*	0.031–0.050	0.041	*
Distance between cephalic elevations, ventral view	0.010–0.020	0.013	*	0.020	0.020	*

– Not applicable

* Measurements not given by author

TABLE 2 The comparative measurements (in mm) of *Setaria saegeri* from common duiker, *Sylvicapra grimmia*

Criterion	Males			Females			
	This paper		Le Van Hoa (1961)	This paper			Le Van Hoa (1961)
	Grey duiker (n = 5)		Grey duiker	Grysbok (n = 1)	Grey duiker (n = 19)		Grey duiker
	Range	Mean			Range	Mean	
Length	26.00–33.00	29.00	30.00	37.00	44.00–76.00	66.28	70.00
Width	0.300–0.370	0.330	0.230	0.390	0.360–0.560	0.470	0.470
Muscular oesophagus, length	0.280–0.500	0.410	0.370	0.510	0.280–0.590	0.470	0.480
Glandular oesophagus, length	2.600–5.180	4.210	4.700	5.150	4.570–5.660	5.230	6.120
Total oesophagus length	3.050–5.680	4.670	5.070	5.660	5.160–6.140	5.710	6.600
Nerve ring from anterior end	0.180–0.250	0.200	0.180	0.170	0.180–0.200	0.180	0.200
Deirids from anterior end	0.450–0.530	0.500	0.475	0.340	0.310–0.450	0.340	0.800
Vulva, distance from anterior end	–	–	–	0.250	0.230–0.350	0.280	0,300
Tail, length	0.120–0.140	0.120	0.140	0.320	0.300–0.480	0.380	0.230
Caudal appendages from tail tip	–	–	–	0.020	0.020–0.030	0.020	*
Caudal appendages, length	–	–	–	0.002	0.002–0.003	0.002	*
Right spicule, length	0.100–0.130	0.110	0.120	–	–	–	–
Left spicule shaft, length	0.188–0.207	0.197	*	–	–	–	–
Left spicule blade, length	0.062–0.064	0.063	*	–	–	–	–
Left spicule, total length	0.252–0.269	0.260	0.230	–	–	–	–
Distance between cephalic elevations, lateral view	0.030–0.040	0.030	*	0.040	0.040–0.050	0.040	*
Distance between cephalic elevations, ventral view	0.020	0.020	*	0.020	0.020	0.020	*

– Not applicable

* Measurements not given by author

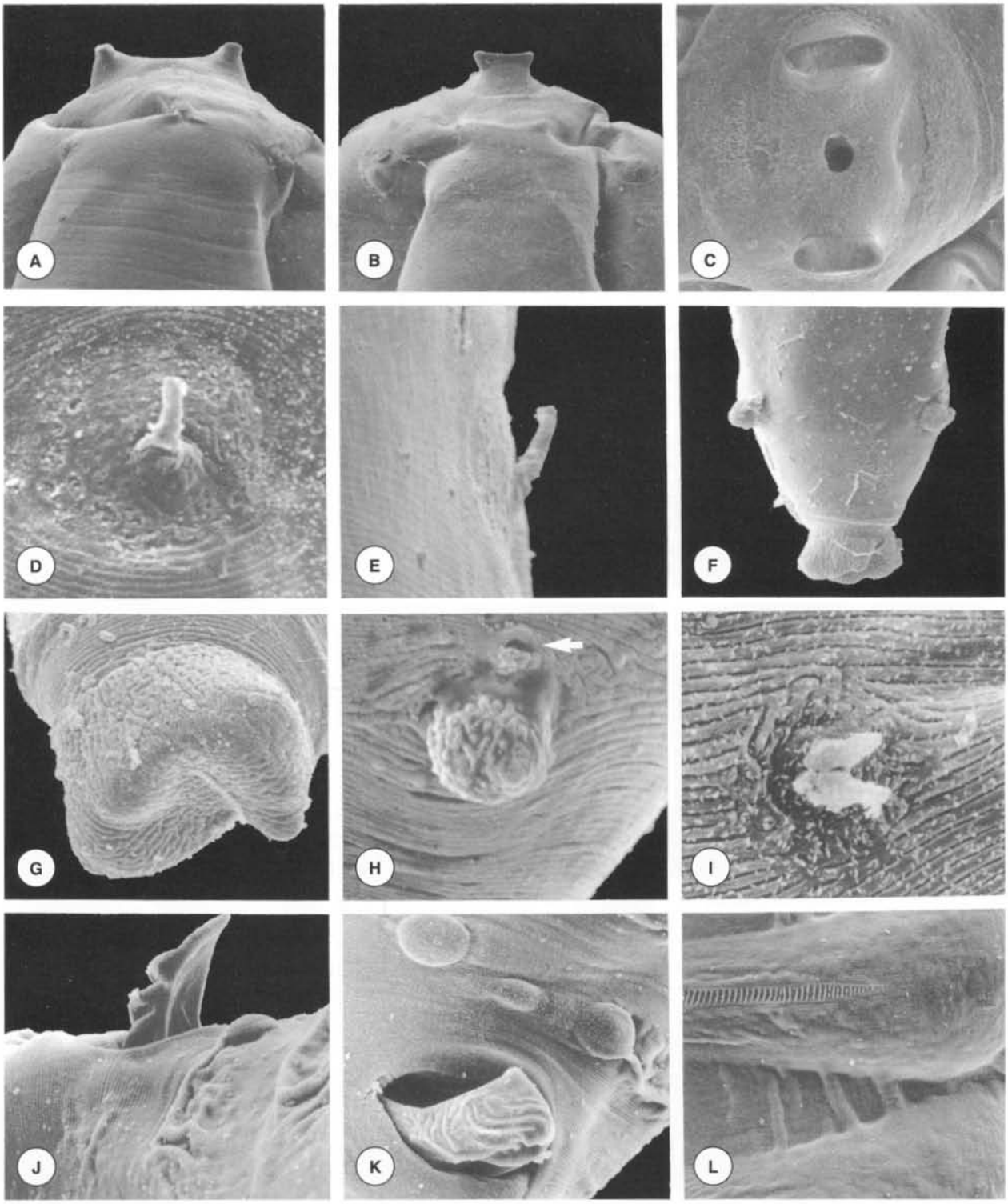

FIG. 1 *Setaria scalprum*

A. Lateral view of cephalic elevations, x 600. B. Ventral view of elevations, x 600. C. Apical view of elevations, x 600. D. Apical view of deirid, x 3 000. E. Lateral view of deirid, x 3 000 F. Ventral view of female tail, x 1 000. G. Terminal knob of female, x 4 000. H. Phasmidial pore of female (arrow), x 5 000 I. Postdeirid of male, x 5 000. J. Bosses on the cuticle, x 2 000. K. Male posterior end, x 2 000. L. Ventral transverse bands of male, x 1 500

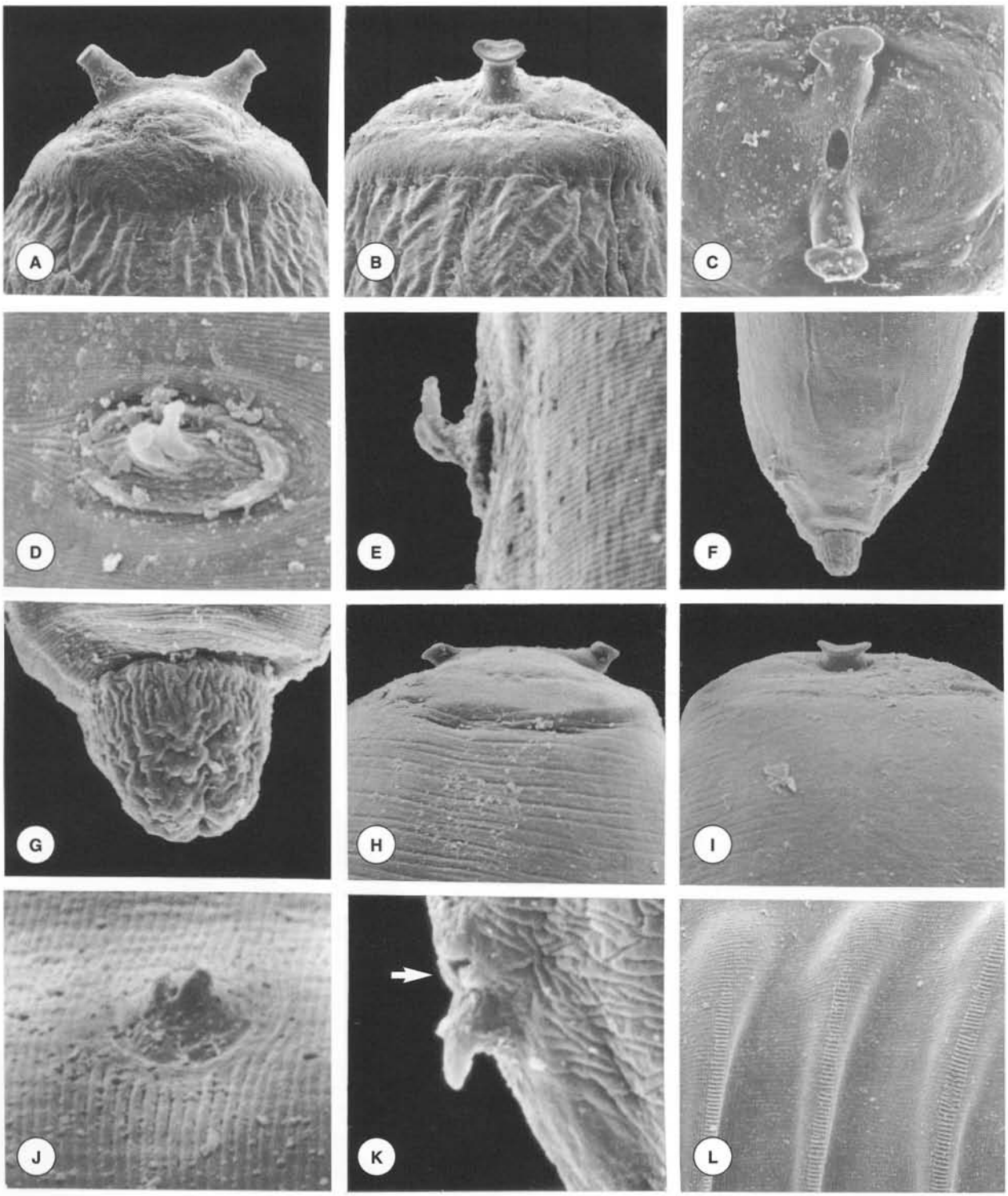

FIG. 2 *Setaria saegeri*

A. Lateral view of cephalic elevations, x 600. B. Ventral view of elevations, x 600. C. Apical view of elevations, x 600. D. Apical view of deirid, x 3 000. E. Lateral view of deirid, x 3 000. F. Ventral view of female tail, x 1 000. G. Terminal knob of female tail, x 4 000. H. Lateral view of cephalic elevations, x 600. Elevations are shortened due to shrinkage during SEM preparation. I. Ventral view of elevations, J. Postdeird of male, x 5 000. K. Caudal appendage of male with phasmidial pore (arrow), x 2 000. L. Ventral transverse bands of male, x 1 500

is thimble-shaped and rugose (Fig. 1G and 2G). The phasmidial pore, first visualized with the aid of scanning electron microscope by Shoho & Uni (1977), is situated on the upper side of the caudal appendages in both sexes and clearly visible in the female of *S. scalprum* and that of the male of *S. saegeri* (Fig. 1H and 2K). The postdeirid of the male *S. scalprum* is double and spine-like, the spines being of equal length, whereas that of *S. saegeri* is also double but shorter than that of *S. scalprum,* with spines of unequal length. (Fig. 1I and 2J). Small uniform bosses are present on the cuticle of *S. scalprum* males (Fig. 1J). The posterior end of a *S. scalprum* male with its protruding right spicule and a small sessile papilla just anterior to the cloaca and a pair of pre-cloacal papilla are illustrated in Fig. 1K. The ventral transverse bands on the cuticle of *S. scalprum* males appear larger with interconnecting ridges whereas in *S. saegeri* the bands are smaller and the ridges absent (Fig. 1L and 2L).

Shrinkage is one of the disadvantages of using SEM techniques and could lead to incorrect identification if not taken into consideration (Fig. 2H and 2I). Thus, light microscopy and scanning electron microscopy, used in conjunction are a useful combination for descriptions of nematodes.

Setaria saegeri was described from common duiker from the Congo but has also been recorded from the same host from Zimbabwe (Roth & Dalchow 1967), the Central African Republic and Cameroon (Troncy, Graber & Thal 1976). *Setaria scalprum* was described from steenbok but has also been found in impala, *Aepyceros melampus,* (Yeh 1959; Ortlepp 1961), common duiker (Desset 1966); Grants gazelle, *Gazella granti* (Yeh 1959), oribi, *Ourebia ourebi,* (Chabaud & Rousselot 1956; Yeh 1959; Ortlepp 1961; Desset 1966), red duiker, *Cephalophus natalensis,* (Boomker, Keep, Flamand & Horak 1984; Boomker, Horak & Flamand 1991). Boomker *et al.* (1989) recorded *S. scalprum* from common duiker that was, after re-examination, found to be *S. saegeri.* In 1961, Ortlepp recorded the presence of *S. caelum* in common duiker. The material was re-examined but due to severe shrinkage, the critical characteristics, such as cephalic elevations, deirids and posterior ends could not be clearly distinguished. Material collected from common duiker during 1963, by the same author and identified as *S. caelum* could be established as *S. saegeri* and the record of Boomker *et al.* (1987) of *S. caelum* from the same host was confirmed as *S. saegeri.*

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