

PARASITES OF SOUTH AFRICAN WILDLIFE. V. A DESCRIPTION OF THE MALES OF *OESOPHAGOSTOMUM MOCAMBIQUEI* ORTLEPP, 1964 FROM WARTHOGS, *PHACOCHOERUS AETHIOPICUS* (PALLAS, 1766)

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ABSTRACT

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Oesophagostomum mocambiquei Ortlepp, 1964 was described from 9 females recovered from a warthog, *Phacochoerus aethiopicus* (Pallas, 1766), from northern Mozambique. Large numbers of *O. mocambiquei* were recovered during subsequent surveys of the parasites of warthogs from the Kruger National Park and the Hoedspruit Nature Reserve. The males, which have not yet been described, resemble those of *Oesophagostomum santosdiasi* Ortlepp, 1964 in the principal measurements. They can, however, be differentiated by the shape of the mouth capsule, which is round in *O. mocambiquei* and oval in *O. santosdiasi*.

A simplified key for the identification of the *Oesophagostomum* species that occur in warthogs in South Africa and Namibia is provided and the differences between them tabulated.

The names *Oesophagostomum mocambiquei* and *Oesophagostomum santosdiasi* are corrected to *O. mocambiquei* and *O. santosdiasi* respectively, since diacritic marks are not allowed under the Code of International Zoological Nomenclature.

INTRODUCTION

The species *Oesophagostomum mocambiquei* Ortlepp, 1964 was created for female worms recovered from the large intestines of warthogs, *Phacochoerus aethiopicus* (Pallas, 1766), from the northern parts of Mozambique and near Pilgrim's Rest in the eastern Transvaal (Ortlepp, 1964). The males of this species, however, have not yet been described.

Surveys of the parasites of warthogs have since been conducted in the Kruger National Park (KNP) (Horak, Boomker, De Vos & Potgieter, 1988) and the Hoedspruit Nature Reserve (HNR) (Boomker, Horak, Booysse & Meyer, unpublished data, 1989). Large numbers of male and female *O. mocambiquei* were recovered from the KNP and the HNR, and many of the worms were fixed *in copula*. As only *O. mocambiquei* and *Oesophagostomum mwanzae* Daubney, 1924 were present in the warthogs from the HNR, and in view of the distinct differences between the 2 species, the males found in association with female *O. mocambiquei* were considered to be the males of that species. They are described here and a simplified key for the identification of the *Oesophagostomum* spp. of warthogs in South Africa and Namibia is provided, and the differences between them tabulated.

MATERIALS AND METHODS

Large numbers of *O. mocambiquei* were recovered from the caecum and colon of warthogs shot in the HNR in the eastern Transvaal Lowveld. They were killed in hot saline and fixed in cold 10% formalin. To clear them, worms were individually mounted in lactophenol and Berlese's medium, and they were measured with the aid of a calibrated ocular micrometer. Drawings were made with a camera lucida.

The specimens were prepared for scanning electron microscopy by rinsing in buffer and dehydrating in graded concentrations of ethyl alcohol. They were then critical point dried with carbon dioxide and

mounted on stubs, followed by coating with a thin layer of carbon and sputter coating with gold. The examinations and photography were done with a Jeol 35C scanning electron microscope.

DESCRIPTION

Material examined

Six female worms from *Phacochoerus aethiopicus*, from the type locality (Onderstepoort Helminthological Collection, No. T 2141).

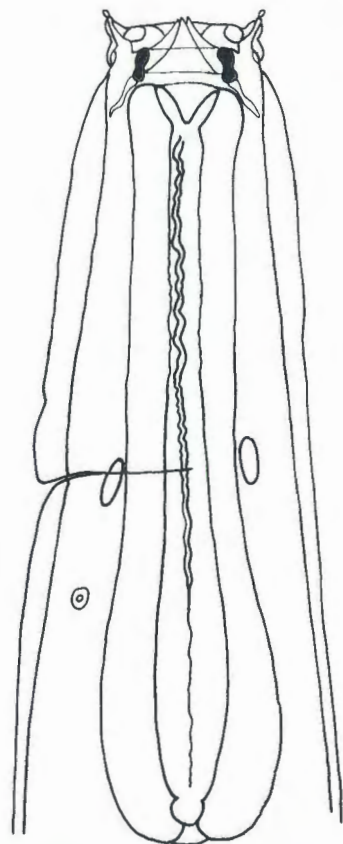


FIG. 1 Lateral view of the anterior end of a male *Oesophagostomum mocambiquei* (Bar length = 0.1 mm)

TABLE 1 The principal measurements (in mm) of *Oesophagostomum mocambiquae*

	Type specimens		This study	
	Ortlepp (1964)	This study	Males	Females
Length	17–20	13,18–17,92	12,30–15,82	16,26–19,88
Maximum width	0,350–0,420	0,580–0,800	0,408–0,552	0,560–0,760
Width of mouth collar	0,090–0,100	Damaged	0,080–0,092	0,088–0,104
Depth of buccal capsule	0,014–0,016	0,016–0,032	0,028–0,034	0,024–0,048
Width of buccal capsule	0,044–0,048	0,040–0,056	0,036–0,048	0,032–0,052
Thickness of buccal capsule wall	0,008	0,006–0,008	0,006–0,008	0,006–0,008
Distance of cervical groove from anterior end	0,220–0,227	0,220–0,280	0,180–0,252	0,160–0,296
Distance of cervical papillae from anterior end	0,300–0,330	0,384–0,402	0,260–0,424	0,280–0,412
Distance of nerve ring from anterior end	Just behind cervical groove	0,220–0,268	0,208–0,280	0,208–0,288
Length of oesophagus	0,420–0,500	0,464–0,536	0,424–0,556	0,484–0,564
Length of spicules	Not applicable		2,180–2,950	–
Length of gubernaculum	Not applicable		0,084–0,160	–
Length of vagina	0,650–0,750	0,664–0,720	–	0,728–0,952
Distance from tip of tail to anus	0,100–0,130	0,088–0,116	–	0,088–0,132
Distance from tip of tail to vulva	Not given	0,208–0,268	–	0,236–0,340
Distance between anus and vulva	0,130–0,150	0,120–0,160	–	0,140–0,212
Eggs (<i>in utero</i>), length	0,080–0,090	0,080–0,092	–	0,080–0,100
Eggs (<i>in utero</i>), width	0,047–0,048	0,048–0,068	–	0,040–0,056

TABLE 2 A summary of the differences between the species of *Oesophagostomum* that occur in warthogs in South Africa and Namibia

Species	Length (mm)	Shape of mouth capsule	Shape of oesophagus	Tail	Vagina (mm)	Spicules (mm)	Source
<i>O. mocambiquae</i>	12–20	Cylindrical	Club	Bent	0,73–0,95	2,18–2,95	This study
<i>O. mpwapwae</i>	13–15	Cylindrical	Club	Straight	2,1	3,10–3,80	Duthy, 1947; Ortlepp, 1964
<i>O. mwanzae</i>	13–20	Oval	Club, with 3 valves	Bent	0,35–0,50	1,87–2,20	Daubney, 1924; Ortlepp, 1964
<i>O. roubaudi</i>	17–23	Oval	Club	Bent	0,17–0,26	1,27–1,32	Daubney, 1926
<i>O. santosdiasi</i>	12–15	Oval	Club	Bent	0,70–1,0	2,40–2,70	Ortlepp, 1964
<i>O. simpsoni</i>	15–21	Oval	Short, thick sides almost parallel	Straight	0,10–0,15	1,20–1,30	Goodey, 1924 Ortlepp, 1964

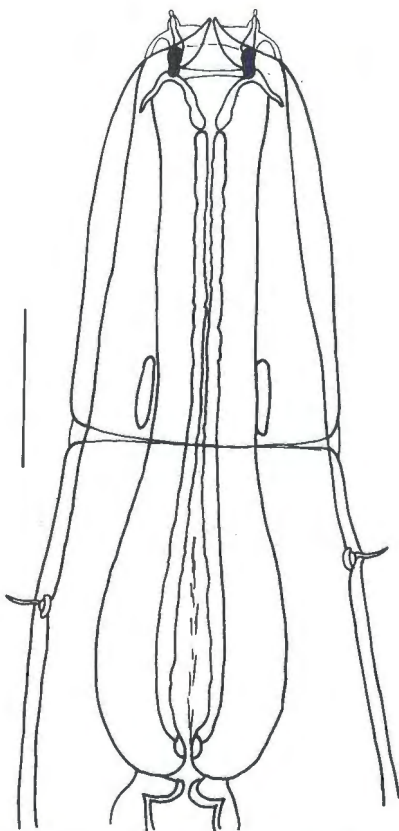


FIG. 2 Ventral view of the anterior end of a male *Oesophagostomum mocambiquae* (Bar length = 0,1 mm)

Sixteen male and 8 female worms from *P. aethiopicus* from the Hoedspruit Nature Reserve, eastern Transvaal (Onderstepoort Helminthological Collection, No. T 2180).

Twenty-four male and 16 female worms from 2 warthogs from the Hoedspruit Nature Reserve.

Additional material, consisting of numerous male and female worms from warthogs from the HNR, have been deposited with the Onderstepoort Helminthological Collection and the collection of the CAB International Institute of Parasitology, St. Albans, Herts, United Kingdom.

Description

As part of this study the type specimens were re-examined and their measurements, together with those of the male and female worms collected from the warthogs from HNR, are listed in Table 1.

Like the females, the males have a flattened mouth collar which is only slightly set off from the rest of the body. The circum-oral papillae are prominent (Fig. 1, 2 & 7a, b) and the amphids are raised slightly above the surface (Fig. 7a, b). The cervical swelling is small and is demarcated posteriorly by the cervical groove into which the excretory pore opens. The nerve ring is situated either just in front or just behind the cervical groove (Fig. 1 & 2). The cervical papillae are long and spike-like (Fig. 2, 7a) and lateral alae are absent. The buccal capsule is cylindrical (Fig. 7a & b). There are 6 triangular external leaf crown elements that extend obliquely forwards (Fig. 1, 2, 7a & b); an internal leaf crown is absent. An

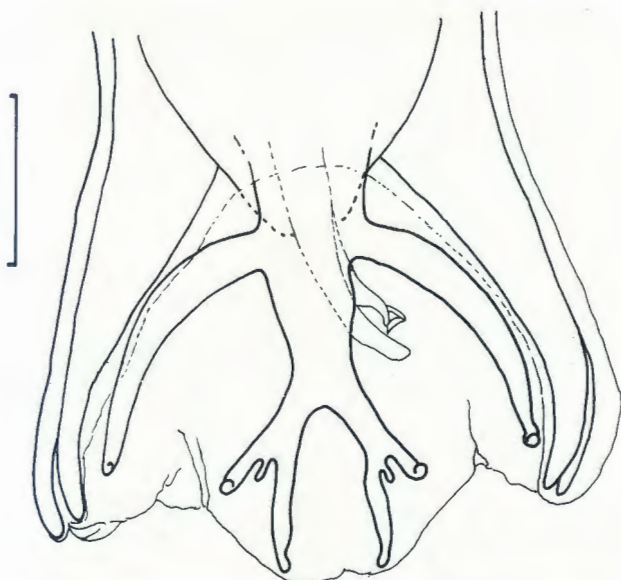


FIG. 3 Dorsal view of the partly opened bursa of *Oesophagostomum mocambiquei* (Bar length = 0,1 mm)



FIG. 4 Lateral view of one half of the bursa of *Oesophagostomum mocambiquei* (Bar length = 0,1 mm)

oesophageal funnel is present and the oesophagus is club-shaped (Fig. 1 & 2).

The bursa is rather small and compact. The dorsal lobe is longer than the ventral ones (Fig. 3 & 4). The ventral bursal rays are equally long and remain parallel for their entire length (Fig. 4). The anterolateral ray is widely separated from the mediolateral ray; the medio- and posterolateral rays run parallel and remain close to each other for their entire length. There is a distinct swelling on the posterior edge of the main trunk of the lateral rays, slightly cranial to the level of the origin of the posterolateral ray (Fig. 4). The externodorsal rays are of variable thickness, and curve posteriorly and ventrally (Fig. 4). The dorsal ray has a broad origin but tapers considerably before bifurcating, and each bifurcation is divided into lateral and medial branches (Fig. 3 & 5). A small papilla, which is sometimes hardly more than a small protuberance, may be present in a highly variable position between the lateral and

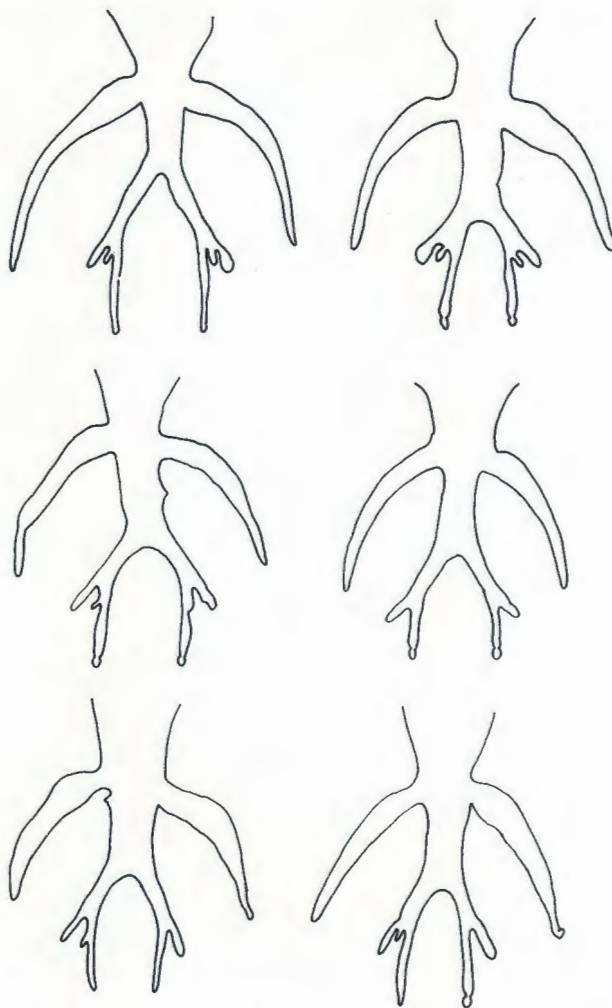


FIG. 5 Variations in the configuration of the dorsal ray of *Oesophagostomum mocambiquei* (Bar length = 0,1 mm)

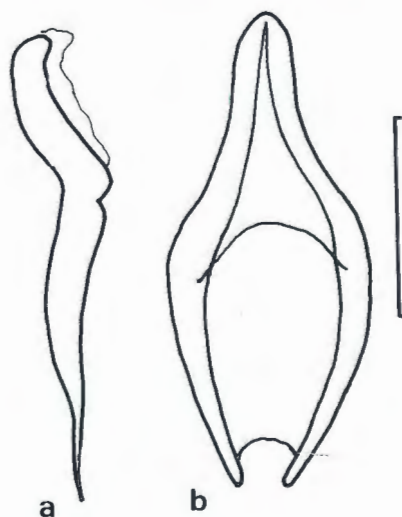


FIG. 6 The gubernaculum of *Oesophagostomum mocambiquei* in (a) lateral and (b) ventral views (Bar length = 0,05 mm)

medial branches, or it may be present on the dorsal ray (Fig. 5). In some males it is absent. In lateral view, the dorsal ray appears to consist of a thinner distal part that fits into a thicker proximal part; the junction of these parts is marked by a distinct crease (Fig. 4).

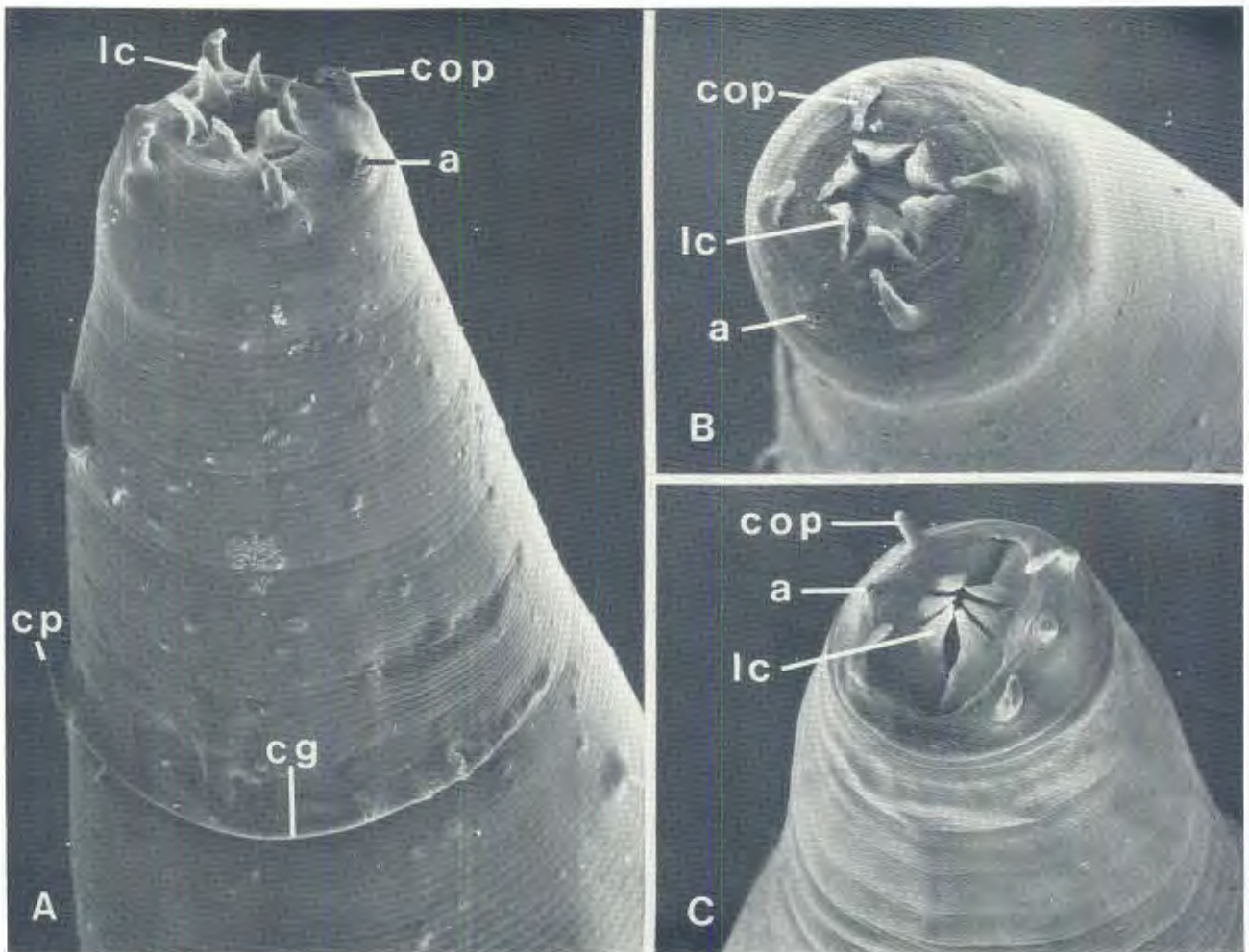


FIG. 7 (a) Ventral view of a male *Oesophagostomum mocambiquei*
 (b) En face view of the head of a male *Oesophagostomum mocambiquei* showing the round mouth opening
 (c) The head of a male *Oesophagostomum mwanzae*, showing the oval mouth opening
 a = amphid cp = cervical papillae
 cg = cervical groove cop = circum-oral papillae
 lc = leaf crown

The spicules are long and slender and terminate in curved points that are enclosed in membranous alae. Transversely striated alae are present along their median margins. The gubernaculum is undulated in lateral view, but broadly diamond-shaped in dorsal or ventral views (Fig. 6). The genital cone is simple.

Apart from slight differences in the principal measurements of the type specimens, and thus the females of the species, Ortlepp's (1964) description is accurate.

For comparative purposes, the head of *O. mwanzae*, which has an oval buccal capsule, is illustrated in Fig. 7c.

DISCUSSION

Ortlepp (1964) described 2 new *Oesophagostomum* species from warthogs as *O. mocambiquei* and *O. santos-diasi*, using the c-cedilla and a hyphen respectively. Horak *et al.* (1988) disregarded the c-cedilla in the species name *mocambiquei* but retained the hyphen in the name *santos-diasi*. Under the code of International Zoological Nomenclature, diacritic marks, including hyphens, are not allowed, and the species names are corrected here to *Oesophagostomum mocambiquei* and *Oesophagostomum santosdiasi*.

During this study it was found that the larger the total individual worm burden, the smaller the worms tended to be, and vice versa. This probably explains the differences in some of the measurements of the type specimens and those examined during this study. It also explains the rather wide range of the principal measurements of the worms examined during this study (Table 1).

No characteristic differences in the configuration of the bursa and its associated rays exist between the different *Oesophagostomum* spp. from warthogs. The protuberance on the median branch of the dorsal ray was illustrated and commented on by Daubney (1926) in *Oesophagostomum roubaudi* Daubney, 1926 and *O. mwanzae*, and is also present in *O. mocambiquei*.

O. mocambiquei closely resembles *O. santosdiasi* in the principal measurements. The most outstanding difference between the males of these two species is the shape of the buccal capsule, which is round in *O. mocambiquei* but oval in *O. santosdiasi*, similar to that of *O. mwanzae*.

Twelve *Oesophagostomum* spp. have so far been recovered from the large intestines of warthogs in Africa. They are *Oesophagostomum aethiopicum* Duthy, 1947, *Oesophagostomum eurycephalum*

Goodey, 1924, *Oesophagostomum farchai* Troncy, Graber & Thal, 1972, *Oesophagostomum goodeyi* Daubney, 1926, *O. mocambiqui*, *Oesophagostomum mpwapwae* Duthy, 1947, *O. mwanzae*, *Oesophagostomum oldi* Goodey, 1924, *O. roubaudi*, *O. santosdiasi*, *Oesophagostomum simpsoni* Goodey, 1924, and *Oesophagostomum yorkei* Thornton, 1924. There is, however, some doubt as to the correctness of the collection data, since Duthy (1947) reported that *O. mpwapwae*, *O. mwanzae*, *O. simpsoni* and *O. yorkei* were present in helminth collections from elephant, *Loxodonta africana*, and Goodey (1924) stated that *O. eurycephalum*, *O. mwanzae*, *O. oldi* and *O. simpsoni* were found in helminth collections from roan antelope, *Hippotragus equinus*. The fact that the records have been made cannot be ignored (Round, 1968) and they are therefore included in the list.

Of the worms listed above, only *O. mocambiqui*, *O. mwanzae*, *O. santosdiasi* and *O. simpsoni* have been found in warthogs in South Africa (Ortlepp, 1964; Horak *et al.*, 1988), while *O. mpwapwae*, *O. mwanzae* and *O. roubaudi* were recovered from warthogs from Namibia (Horak, Biggs, Hanssen & Hanssen, 1983). The differences between these 6 species are summarized in Table 2 and a simplified key for the identification of the *Oesophagostomum* spp. of warthogs in South Africa and Namibia is given below.

A simplified key to the *Oesophagostomum* spp. of warthogs in South Africa and Namibia.

Females

1. Tail bent dorsalwards 2
Tail straight 5
2. Mouth capsule cylindrical *O. mocambiqui*
Mouth capsule oval 3
3. Oesophageal valves present *O. mwanzae*
Oesophageal valves absent 4
4. Vagina about 1 mm long *O. santosdiasi*
Vagina not longer than 0,26 mm *O. roubaudi*
5. Mouth capsule cylindrical *O. mpwapwae*
Mouth capsule oval *O. simpsoni*

Males

1. Mouth capsule oval 2
Mouth capsule round 5

2. Oesophageal valves present *O. mwanzae*
Oesophageal valves absent 3
3. Spicules 2,4 to 2,7 mm long *O. santosdiasi*
Spicules less than 1,5 mm long 4
4. Oesophagus short and wide with parallel sides
..... *O. simpsoni*
Oesophagus club-shaped *O. roubaudi*
5. Spicules more than 3 mm long *O. mpwapwae*
Spicules less than 3 mm long *O. mocambiqui*

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