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## TWO NEW SPECIES OF THE GENUS *SPHAEROTHERIUM* BRANDT, 1833 FROM ZIMBABWE, TOGETHER WITH SOME BIOGEOGRAPHICAL NOTES (DIPLOPODA, ONISCOMORPHA, SPHAEROTHERIIDAE)

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### ABSTRACT

Two new species of pill-millipedes, *Sphaerotherium selindum* and *Sphaerotherium narcissi*, are described from Zimbabwe. This is the first discovery of Sphaerotheriidae in this country. It fills up a 'zoogeographical gap' between the known distribution localities of this genus in South Africa and those in Mozambique, Malawi and Madagascar. Some taxonomic and biogeographical notes are added.

### INTRODUCTION

Amongst the Oniscomorpha or pill-millipedes, only the family Sphaerotheriidae is represented in southern Africa with two genera: *Kylindotherium* Attems, 1926 and *Sphaerotherium* Brandt, 1833. In his review of the Sphaerotheriidae of South-Africa, Schubart (1958) lists 46 species of *Sphaerotherium*. The genus is split into two clearly distinguishable subgenera (*Tetraconosoma* Verhoeff, 1924 and *Sphaerotherium* Brandt, 1833), the number of sensory cones on the antennomere being the distinguishing feature.

African representatives of the family Sphaerotheriidae are known from practically all South African provinces, Mozambique, Malawi and Madagascar (Attems, 1928; De Saussure & Zehntner, 1897-1902; Jeekel, 1974; Jocqué, 1984; Schubart, 1958; Silvestri, 1910; Verhoeff, 1928-1932). In this paper the zoogeographical 'missing link' is added to this distribution pattern by the description of two new species discovered in eastern Zimbabwe.

### ABBREVIATIONS

TL = total length in mm

W = width in mm

L/W = average length/width ratio

MRAC = Musée Royal de l'Afrique Centrale, Tervuren, Belgium (Dr. R. Jocqué)

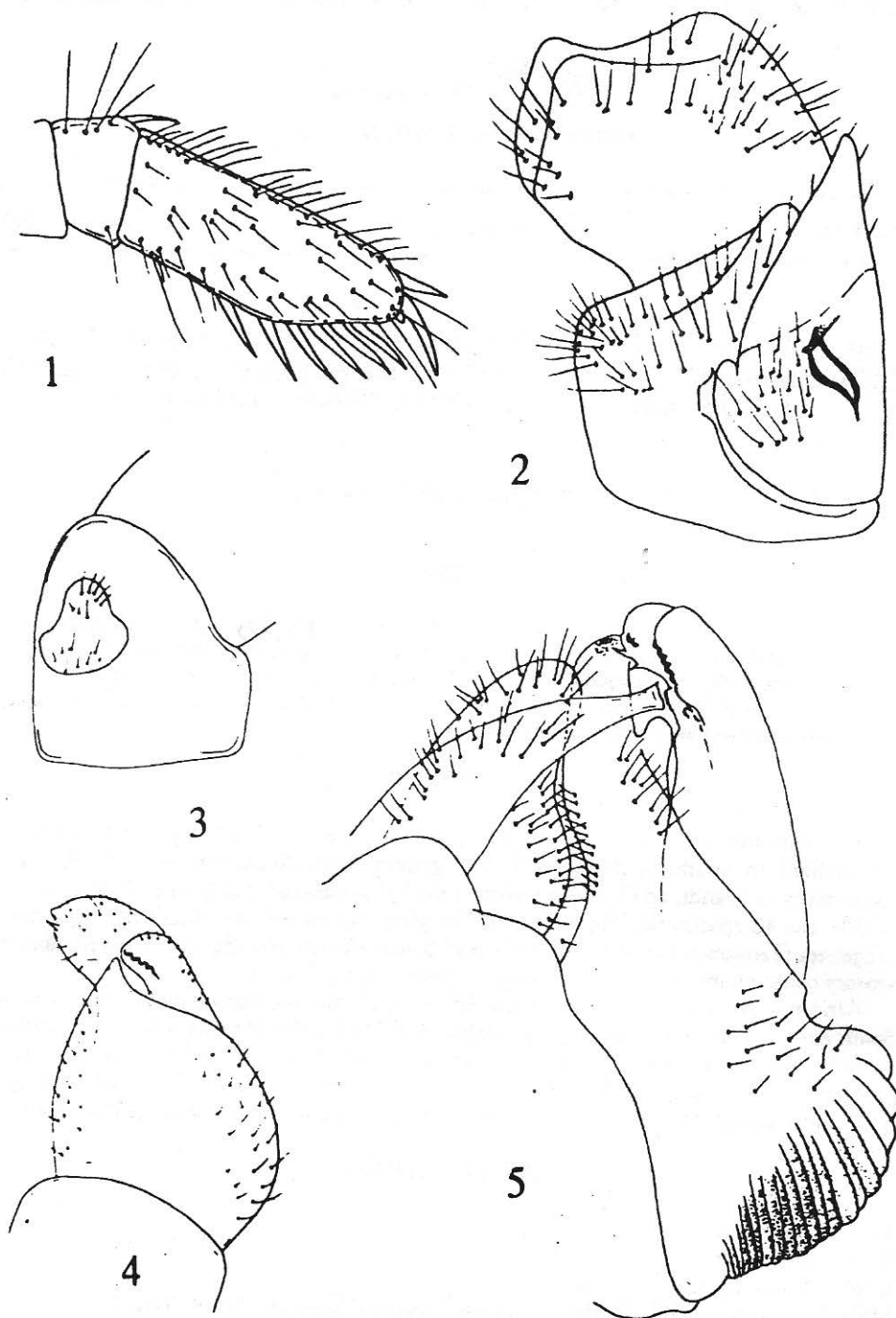


Fig. 1-5. *Sphaerotherium selindum*, n. sp. Fig. 1. Tarsus of male 10th leg. Fig. 2. Female cyphopod. Fig. 3. Male penis. Fig. 4. Male anterior telepod. Fig. 5. Male posterior telepod.

## DESCRIPTIONS

*Sphaerotherium selindum*, new species

Figures 1-5

Type material: Holotype male: ZIMBABWE, Mount Selinda, dense forest of Chirinda, VII.1960, N. Leleup (MRAC 13.884); Paratypes: 1 male, same data as holotype (MRAC 17.192); 22 females+1 juvenile, same data as holotype (MRAC 17.193)

Other material examined: 3 males, 2 females, same data as holotype (MRAC 17.191)

Description: Measurements (n=10): TL = 14.2-26.1, W = 7.0-12.1, L/W = 2.1. Colour: Head and collum pale brown to yellow. Terga, shield and pygidium pale olive green bordered with darker brown especially along posterior margin. As a consequence general appearance is that of a transversely striped species. Antennae pale brown. Underside pale brown to yellow. Legs pale brown becoming darker towards tarsi. Head: covered with punctures each bearing a short setum. Punctures more dense anteriorly towards the clypeus. Ocelli grey to black, in a clear-cut group. Tip of antennae normally with 4 sensitive cones (1 paratype female has 4 cones on left antennae and 5 on right). Collum: smooth, apart from a row of setiferous pits along its anterior margin. Shield: brim relatively narrow, accompanied by a row of longer setae. Lateral part with dense cover of short hairs. Central part smooth. Terga: microreticulation of small pits, otherwise smooth. Pygidium: generally smooth, without hairy fields. In lateral view, male pygidium somewhat depressed in the middle. No median keel. Legs: Tibiae with one dorsal apical spine. From fourth leg onwards, tarsi with 1 dorsal and 6 ventral spines (Fig. 1). Cyphopods: distal segment almost triangular with rounded tip and few hairs (Fig. 2). Penis: inconspicuous, simple, with few hairs (Fig. 3). Anterior telepods: tip of distal part with a small wart accompanied by a small spine. Syncoxite with row of about 5 warts (Fig. 4). Posterior telepods: syncoxite with a long horn, surpassing the basal lobe and narrowing towards its end but with a widened tip. Distal segment bilobed, outer lobe shorter with row of 6 warts, inner lobe somewhat longer with two distinct warts at its tip (Fig. 5).

Name and distribution: named after its type locality, Mount Selinda in Zimbabwe.

*Sphaerotherium narcisssei*, new species

Figures 6-10

Type material: Holotype male: ZIMBABWE, Melsetter, 64 km N of Chipinga, VII.1960, N. Leleup (MRAC 13.886); Paratypes: same data as holotype (MRAC 17.194).

Description: Measurements (n=5): TL = 14.1-19.0, W = 6.5-9.1, L/W = 2.2. Colour: Head pale brown, collum somewhat darker brown. Terga, shield and pygidium dark olive green contrasting with deep brown borders. Brown margins becoming wider towards the middle in some specimens forming a wide triangle. The species has a green-brown transversely striped general appearance. Antennae pale brown. Underside pale brown to yellow. Legs pale brown, tarsi darker. Head: surface very irregular due to granulations and covered with white hairs. Ocelli grey to black, in a clear-cut group. Tip of antennae with 4 sensitive cones. Collum: smooth apart from a row of setiferous pits along its anterior margin. Shield: brim broad, depression filled with white hairs and a row of longer, black setae. Terga: dense microreticulation of small pits. Pygidium: surface irregular, with central field of setiferous pits. In lateral view, male pygidium somewhat depressed in the middle. No median keel. Legs: Tibiae without dorsal apical spine. From fourth leg onwards, tarsi with 1 dorsal and 5 ventral spines (Fig. 6). Cyphopods: cone shaped, with rounded tip (Fig. 7). Penis: inconspicuous, simple, with few hairs (Fig. 8). Anterior telepods: more slender than in *S. selindum*, distal part with a small spine and a small wart at its tip. Syncoxite with basal spine below row of about 5 warts (Fig. 9). Posterior telepods: Syncoxite with a long, bottle

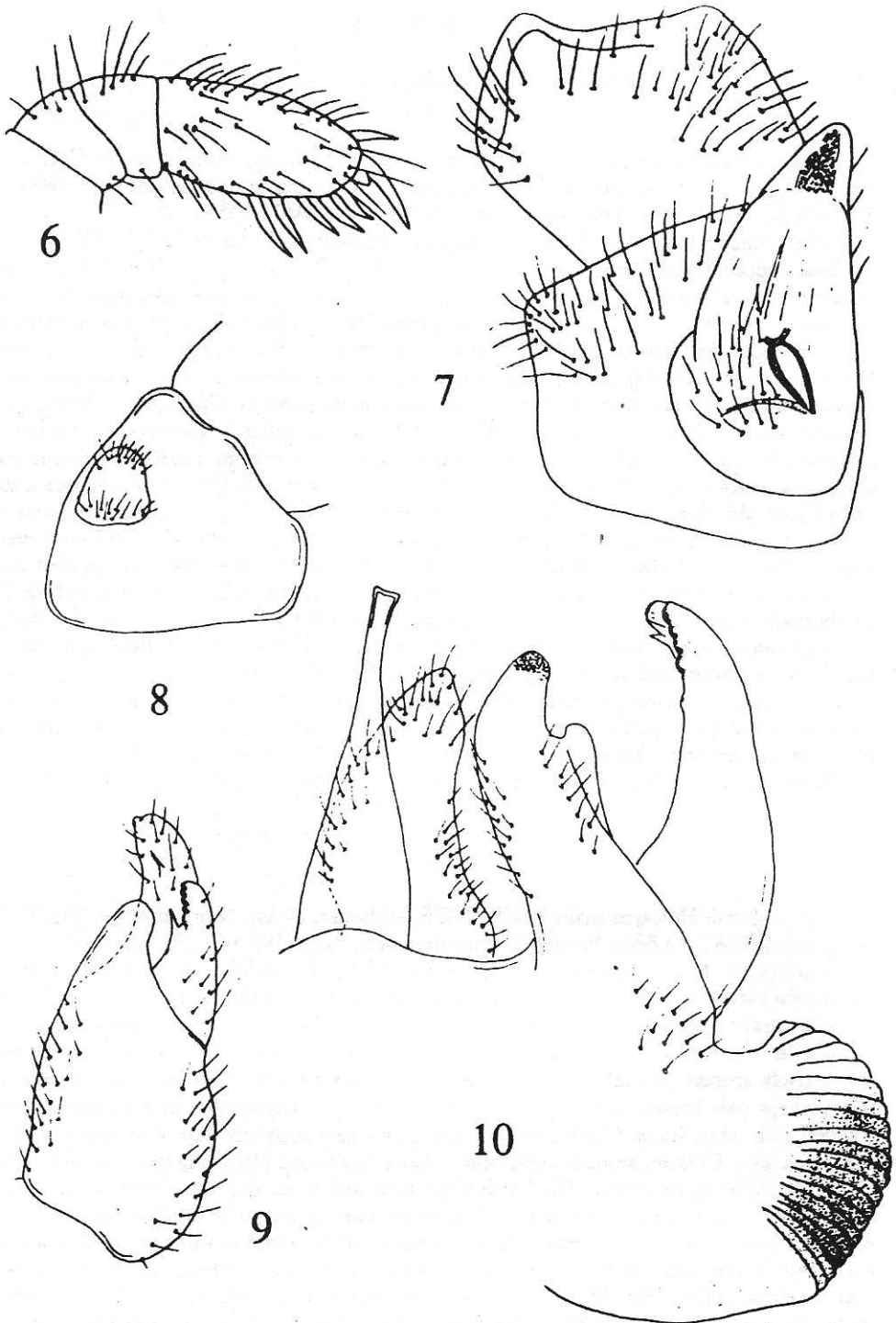


Fig. 6-10. *Sphaerotherium narcisssei*, n. sp. Fig. 6. Tarsus of male 10th leg. Fig. 7. Female cyphopod. Fig. 8. Male penis. Fig. 9. Male anterior telepod. Fig. 10. Male posterior telepod.

shaped horn, surpassing the basal lobe, narrowed towards the tip. Distal segment bilobed, outer lobe shorter with row of 4 to 5 warts, inner lobe somewhat longer with two small spines at its crenated tip (Fig. 10).

Name: named after its collector, Narcissus Leleup, who made extensive collections in Africa.

Distribution: Zimbabwe.

#### TAXONOMIC POSITION

The most recent attempt in supraspecific classification of the family is by Jeekel (1974). This author redefined the subfamily Sphaerotheriinae on the basis of female characters: the structure of the vulva and the absence of a stridulatory apparatus. The African genera *Sphaerotherium* and *Kylindotherium* are characterized by the typical strongly developed male stridulatory apparatus consisting of several chitinized ridges situated on the posterior telepods (see Fig. 5, 10). Both genera were therefore grouped into the tribe Sphaerotheriini Brandt, 1833 (see Hoffman, 1979; Jeekel, 1974).

*Sphaerotherium selindum* and *S. narcissi* both belong to the subgenus *Tetraconosoma* Verhoeff, 1924 based upon the presence of four sensory cones on the antennomere.

*S. selindum* lacks a median keel on the terga and has one dorsal, tibial spine. Therefore it can be included in group II in the sense of Schubart (1958). Only *S. kitharistes* Attems, 1928, the only species known from a nearby locality in Mozambique, has the same combination of characters. However, *S. selindum* clearly differs from *S. kitharistes* by the unkeeled pygidium and the structure of the anterior and posterior telepods.

*S. narcissi* also lacks a median keel on the terga as well as dorsal, tibial spines on the legs. Therefore it fits within group I in the sense of Schubart (1958). On the basis of the broad rim of the shield and the granulated pygidium, it resembles *S. granulatum* Pocock, 1895. However the telepods of both species are clearly different. Moreover, *S. granulatum* is only known from the Cape province, Port Elizabeth, South Africa, some 1800 km more to the south, a large distance for this kind of slowly dispersing and hygrophilous animals.

#### BIOGEOGRAPHICAL NOTES

The two species described here represent the first records of Sphaerotheriidae in Zimbabwe. The genus *Sphaerotherium* reaches its highest diversity in the coastal areas of South Africa (Fig. 11). Material is known from practically all South African provinces as far north as north-eastern Transvaal, just north of the Tropic of Capricorn (Schubart, 1958). This distribution pattern seems to fit within the limits of the 500 mm isohyet encompassing the coastal areas of southern Africa as given by Van Bruggen (1978). This illustrates that these pill-millipeds seem to require conditions of high humidity (Jocqué, 1984). Such a coastal distribution pattern is also known for several other invertebrates living mostly in forests (Lawrence, 1953).

More than 1000 km more to the north, *Sphaerotherium transzambeziacum* was discovered by Jocqué (1984) in Malawi, Mount Mulanje (Fig. 11). This record expanded the distribution area of the genus suddenly far beyond the Zambezi river, to about 16°S.

In between both areas, Malawi and Transvaal, only one old record is known: *Sphaerotherium kitharistes* Attems, 1928 from Macequece in Central Mozambique. The discovery of two species in eastern Zimbabwe further fills this zoogeographical gap (Fig. 11).

Beside the relative abundance of *Sphaerotherium* in coastal South Africa, several isolated localities are now known from mountain forest relics. Assuming that *Sphaerotherium* depends on humid conditions and that the species have low dispersing capacity, their distribution pattern supports the hypothesis that some montane forest relics of Malawi, central

Mozambique and eastern Zimbabwe, were once connected to the subtropical forests of South Africa (Axelrod & Raven, 1978; Endrödy-Younga, 1978; Jocqué, 1984). From a zoogeographical point of view, *Sphaerotherium selindum* and *S. narcissi* can thus be considered as Cape elements. An investigation of the soil fauna of other unexplored forest relics in the area might provide more evidence in this context.

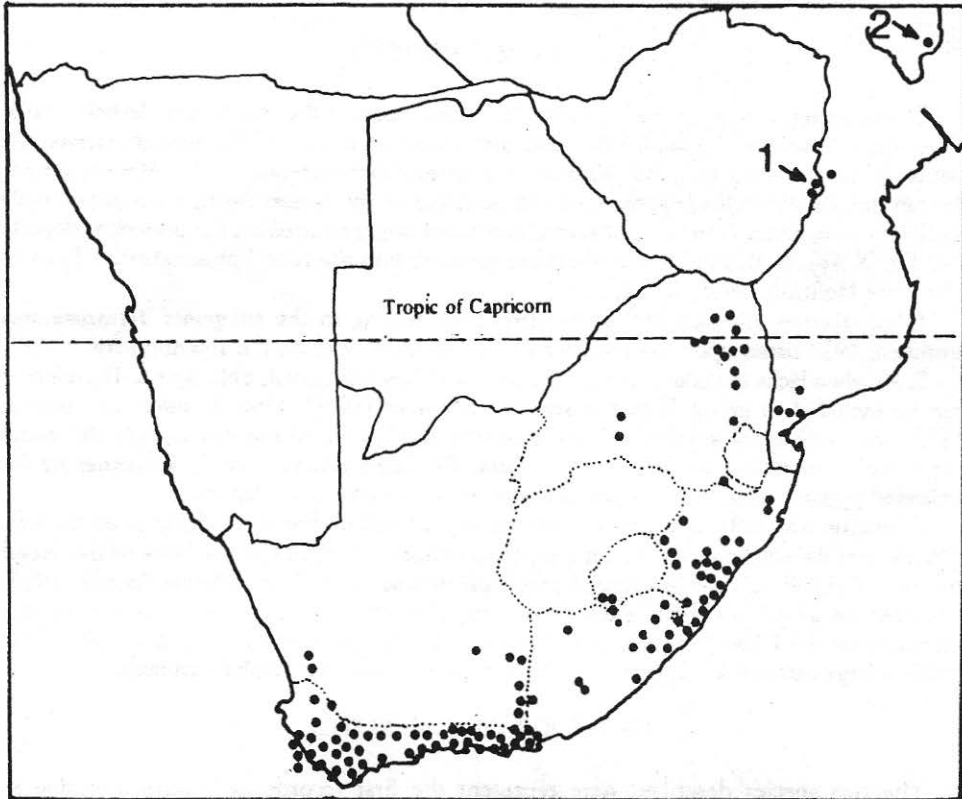


Fig. 11. Distribution of *Sphaerotherium* in continental Africa (adapted from Schubart, 1958). Arrow 1: capture localities in Zimbabwe of the two new species described in this paper. Arrow 2: Mount Mulanje, type locality of *S. transzambeziacum* in southern Malawi (see Jocqué, 1984).

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