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NEW BOLBOCERATINE GENERA FROM SOUTHWESTERN AFRICA (COLEOPTERA: GEOTRUPIDAE)

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With 12 text-figures and one plate

ABSTRACT

Two new genera, endemic in southwestern Africa, are diagnosed: *Prototrupes*, for *Bolboceras copridoides* Kolbe (type-species) and *Bolboceras kochi* Paulian; *Namibiotrupes* for *Namibiotrupes penrithae* sp. nov. The species of *Prototrupes* are keyed, illustrated, and some new material is recorded. *Namibiotrupes penrithae* from the Namib Desert Park is described and illustrated. The two genera are characterized by enlarged antennal clubs.

Southwestern Africa has in its geotrupid fauna some neglected supra-specific endemics, among which are two groups with greatly enlarged, bulbous antennal clubs. Similarly developed antennal clubs are found in the Australian fauna, and I believe that these contribute to the sensory capacities necessary for tracing food (possibly subterranean fungi) in a harsh, arid environment. One of the two African groups shares some more features with those of Australia, and, of course, one wonders whether these similarities are indicative of direct phylogenetic affinity or of parallel evolution. Pending a revision of the Australian fauna (by H. F. Howden et al.), I cannot give an answer to this question and prefer to refrain from speculation. In any case, however, are the three African species with enlarged antennal clubs here treated so different from any bolboceratine group I know, that they can without dispute be placed in genera of their own. A key to the African genera of Bolboceratini would then begin as follows:

1. Antennal club segment 3 very strongly convex externally, "inflated" (figs. 7, 11). General surface of metasternum between middle coxae simply convex, with or without keel on midline. Vertex lacking isolated protrusions (ridges, tubercles). Fore tibia with 5 or 6 external denticles, lacking proximal serration 2
- Antennal club segment 3 flat or slightly convex externally

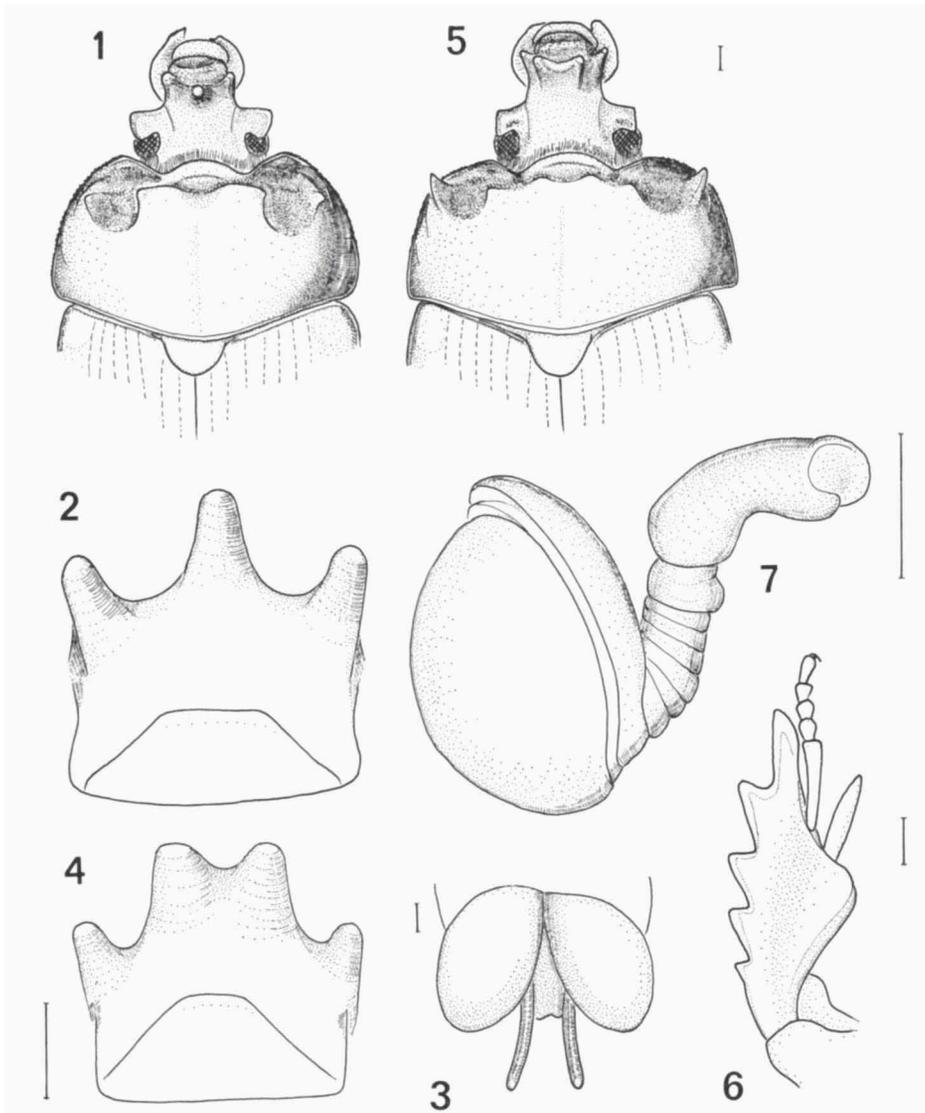
- various genera: cf. incomplete reclassification by Vulcano et al., 1969¹)
2. Fore tibia strongly dilated (fig. 6); tarsal segment 1 of fore leg elongated (fig. 6). Base of elytra with fine ridge. Scutellum transverse, semicircular in outline (figs. 1, 5) *Prototrupes*
- Fore tibia normally dilated; tarsal segment 1 of fore leg not elongated (fig. 9). Base of elytra unmodified. Scutellum deltoid (fig. 8) *Namibiotrupes*

Genus **Prototrupes** nov.

Generic diagnosis. — Fore tibia strongly dilated (fig. 6), lacking proximal serration; terminal spur large; tarsal segment 1 as long as segments 2-5 combined. Antennal club greatly enlarged because of "inflation" of terminal segment (fig. 7). Elytral base with fine ridge. Head setose; pronotal apex fringed with long setae. Scutellum very wide, semicircular (figs. 1, 5). Middle coxae separated by prow-shaped lobe of metasternum; metasternal disc rhomboid in outline. Prothorax ventrolaterally with fine setiferous ridge running parallel to crenulate pronotal border.

Outline of mandibles (apart from usual lobes) rounded, at most feebly sinuate. Labrum dorsally flat. Outline of clypeus approximately quadratrapeziform; anterior margin with transverse ridge, lateral ridges obsolete; clypeus posteriorly with three or four tubercles on a variably developed general elevation, (para)median protrusion(s) is (are) shifted caudad in small specimens. Frons and vertex lacking further protrusions; vertex gradually declivous laterally. Eye-canths straight in front, angulate or shortly rounded anterolaterally. Eye-canthus and temporal lobe separated. Pronotum with discal and lateral protrusions; lateral declivity with, in addition to denticle, superficial arcuate ridges. Pronotal border completely marginate, laterally serrate. Elytral epipleuron very narrow shortly behind humerus. Elytra with 7 striae between suture and humeral umbone (figs. 1, 5); stria 1 reaching scutellum, 2 obsolescent in front, others reaching base. Elytral interstriae (caudal view) virtually flat. Elytral humerus unmodified. Glabrous polished area on proximal side of club segment 1 well separated from remaining pubescent-punctate surface. Prosternum anteriorly with median and paramedian longitudinal costae, posteriorly unmodified. Middle and hind tibiae with single non-apical arcuate fossorial crest. Parameres small, more or less lobiform, with pair of projections ventrobasally (fig. 3). Colour brown, fore body darker. Body medium-sized to large (length 1.5-2.5 cm). Sexual dimorphism seems present in one species.

¹) Recently I have briefly commented on the generic classification of African Bolboceratini (1977, Ent. Ber., Amst., 37: 78).



Figs. 1-7. *Prototrupes* species; 1-4, *P. copridoides* (1-3, lectotype, 4, ♀ Lake Ngami); 5-7, *P. kochi* (Gorrasis, 5, 6, ♂, 7, ♀). — 1, 5, dorsal contours of fore-body; 2, 4, cephalic protrusions, frontal view; 3, parameres, dorsal view; 6, fore-tibia and tarsus, inferior side; 7, left antenna. — Scale lines = 1 mm, except 3 = 0.1 mm; 1, 5: same scale; 2, 4: same scale.

Type-species. — *Bolboceras copridoides* Kolbe.

Affinities. — In several characters agreeing with Australian forms, possibly because of parallel evolution, as stated in the introduction. *Namibiotrupes*, described below, may also have evolved in a completely independent way. A

detailed phylogenetic qualification of several of the above properties, necessary for a hypothesis regarding the position of *Prototrupes*, seems at present impossible.

Distribution and composition. — Two known species in southwestern Africa (fig. 12).

Bionomics. — Apparently burrowers in soils of generally dry habitats, flying around at night.

Note. — The name *Prototrupes* should be treated as a masculine noun.

Key to species of *Prototrupes*

1. Scutellum densely punctate. Pronotal sides gradually convergent in front (fig. 1); discal protrusions of pronotum, fig. 1; pronotum generally more densely punctate. Eye-canths with sides converging caudad (fig. 1). Elytral striae distinctly impressed. Tarsal segments 2-5 unmodified *copridoides*
- Scutellum virtually smooth. Pronotal sides abruptly convergent in front (fig. 5); discal protrusions of pronotum, fig. 5; pronotum generally shiny, more sparsely punctate. Eye-canths with (sub)parallel sides (fig. 5). Elytral striae scarcely impressed. Tarsi complanate, segments 2-4 of fore tarsi dilated (length/width ratio less than 2) *kochi*

Prototrupes copridoides (Kolbe) comb. nov. (figs. 1-4)

Bolboceras copridoides Kolbe, 1907: 29 (diagnosis, type-loc. Deutsch-Südwest Afrika). Péringuey, 1908: 644 (diagnosis translated). Paulian, 1941: 9 (in key), 13 (diagnosis), 15 (discussion types), figs. 17, 20, 22.

Notes. — Kolbe did not state the number of specimens on which his diagnosis was based, nor did he designate a (holo)type. Paulian discussed the type-material, but did not formally designate a lectotype, which is done here: a male with a 3-tuberculate clypeus, total length ca 23 mm, from "D.S.W. Afrika / Lindt S.G." (blue, handwritten label), "prope /spurium / Pering.// copridianus / n.sp. [indistinctly written]" (white); my lectotype label added; genitalia extracted (fig. 3); kept in Berlin. I did not see on these labels a locality "entre Swakopmund et Windhuk", as Paulian (l.c.) wrote.

The head shows three or four protrusions (figs. 2, 4), variably developed in accordance with total size of the specimens (see generic diagnosis), and, although with the scanty material available one cannot be certain, this dimorphism seems connected with sex. The two males are 3-tuberculate on the head, the four females 4-tuberculate. Total length 17-23 mm.

Material examined. — The type and 5 specimens as follows.

Botswana: Lake Ngami: NE Sehitwa, 15-iv-1972, BM. S. Africa Expedition, at light (2 ♂ ♀, London).

Namibia: Daberas Dunes, v-1953, Koch (1 ♀, Pretoria).

South Africa: Buguberg ($28^{\circ}37'S-21^{\circ}45'E$), 21-ii-1961, Vári (1 ♂, Pretoria); Kalahari Gemsbok Park: Twee Rivieren, 22-v-1972, Prozesky (1 ♀, Pretoria).

Prototrupes kochi (Paulian) comb. nov. (figs. 5-7)

Bolboceras kochi Paulian, 1952: 59 (diagnosis), figs. 1-4.

Notes. — Paulian selected a holotype from the 23 specimens he saw, but gave no type-locality. I examined some specimens labelled paratype from two of the three localities he mentioned, not from Brandkaross.

This species is strongly variable in size and development of cephalic and pronotal protrusions, but a dimorphism like in *P. copridoides* seems to be absent. Total length 15.5-23 mm.

Material examined. — 24 ♂ ♀ (partly sexed).

Namibia: between Aus/Kubub, v-1953, Koch (1, Pretoria); Gorrasis 99¹) ($25^{\circ}19'S-15^{\circ}56'E$), 25-31-i-1974 (12 ♂ ♀, Windhoek, Leiden); Maltahöhe: Sesriem, 5-8-iv-1972 (2, Windhoek); Obib Dunes ($28^{\circ}10'S-18^{\circ}48'E$), 17-ix-1973, Endrödy-Younga, dune, night (2, Pretoria); do. ($28^{\circ}02'S-16^{\circ}37'E$), 16-20-ix-1973 (1, Windhoek); do. 54 miles NE Oranjemund, 19-xi-1962, Brown & Fürst (1, Pretoria); Okahandya, 3-xii-1957, Gaerden (1, Windhoek); Rosh Pinah ($28^{\circ}02'S-16^{\circ}50'E$), 14-ix-1973, at night (1, Windhoek).

South Africa: Little Namaland: Holgat, 22-xi-1948, Koch & Van Son (1 paratype, Pretoria); Oograbies, 30-viii-1950, Koch & Van Son (2 paratypes, Pretoria).

Genus **Namibiotrupes** nov.

Generic diagnosis. — Antennal club greatly enlarged, mainly because of "inflation" of terminal segment (fig. 11), especially near flagellar attachment; proximal side of club segment 1 entirely pubescent. Lobe of metasternum separating middle coxae simply bulbous; entire outline of metasternal disc plus lobe pyriform, lacking isolated protrusions. Elytral base unmodified. Scutellum deltoid (fig. 8).

Outline of mandibles (apart from usual lobes) symmetrically arcuate (fig. 8). Outline of clypeus (fig. 8) approximately trapeziform. Clypeus (bi)tuberculate; anterior margin with transverse ridge. Frons and vertex lacking isolated protrusions; vertex gradually declivous laterally. Eye-

¹) Dr. M.-L. Penrith (Windhoek, letter of 3rd November 1975) provided notes on the habitat of this long series: "Gorrasis is an interesting area on the edge of the south central Namib desert. The western part of the farm has vegetated/partially vegetated red sand dunes. The rest consists of grassy (or, in dry seasons, barren) sand plains with thorny vegetation mainly along dry river beds and small rocky hills. The specimens of Geotrupidae were collected at light on a hot cloudy night in a sandy area at the foot of some rocky hills and close to a dry river course. As this area is at least 10 km from the nearest dunes I doubt if the specimens came from there, although the specimens from Obib were collected on partially vegetated dunes." Judged from what is known of the general ecology of the region, similar descriptions would be applicable to other *Prototrupes* localities.

canthus straight in front; eye-canthus and temporal lobe separated. Pronotum with discal protrusion, laterally limited by cavities. Pronotal border completely marginate. Elytral epipleuron gradually narrowing to apicosutural angle. Elytra with 7 striae between suture and humeral umbone (fig. 8); stria 1 reaching side of scutellum, others reaching base. Elytral interstriae (caudal view) virtually flat. Elytral humerus unmodified. Prosternum anteriorly with paramedian costae, intervening surface transversely convex; prosternum posteriorly unmodified. Fore tibia normally dilated, with five external denticles, lacking proximal serration; terminal spur (fig. 9) longer than tarsal segment 1. Middle and hind tibiae with single non-apical, arcuate fossorial crest. Parameres small, more or less lobiform (fig. 10). Colour brown, fore body darker. Body medium-sized (length 1-1.5 cm). — Female sex unknown.

Type-species. — *Namibiotrupes penrithae* sp. nov.

Affinities. — Problematic, because the "inflation" of the antennal club may have evolved independently from *Prototrupes* and other Bolboceratini (see introduction and under *Prototrupes*).

Distribution and composition. — One species from Namibia (fig. 12).

Bionomics. — Unknown, but presumably similar to those of *Prototrupes*.

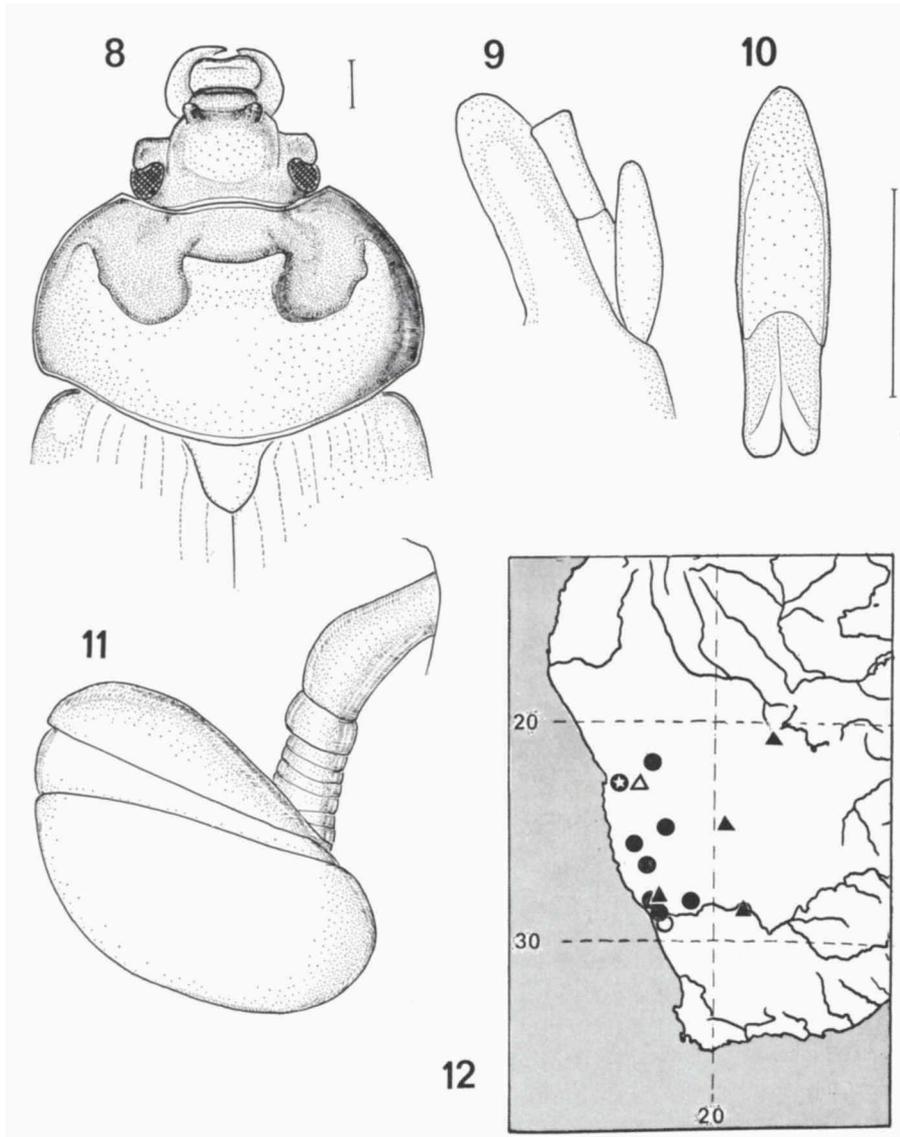
Note. — The name *Namibiotrupes* should be treated as a masculine noun.

***Namibiotrupes penrithae* sp. nov. (figs. 8-11, plate 1)**

Description (holotype, male). — Approximate length 13.5, width 8, height 7 mm. Head, prothorax, fore legs medium-brown; elytra, venter, middle and hind legs light-brown; pilosity yellowish. Habitus, pl. 1.

Labrum virtually straight in front, sides widely rounded, surface coarsely rugulate-punctate, feebly costate. Cephalic contours, fig. 8. Clypeus with pair of tubercles connected by ridge; surface rugulate-punctate in front, densely punctate behind; anterior ridge convex (frontal view), lateral ridges obsolescent, but genal section distinctly raised. Clypeofrontal suture indistinct. Frons between eyes subcallose, abundantly punctate; diameters of punctures medially ca. 0.04 mm, densities 12-14 / 0.1 sq. mm; punctation laterally coarser, denser. Vertex densely punctate. Eye-canthus with rounded anterolateral angle, margin sharply raised; surface concave, abundantly punctate; frontolateral ridge extending to halfway eyes. Maximum length of head (exclusive of labrum and mandibles) 2.70, width 3.65 mm; ratio l/w 0.74.

Pronotal contours, fig. 8. Pronotum with biangulate-carinate discal protrusion; anterior declivity of protrusion steep; lateral cavities superiorly limited by bidentate or undulate ridge; disc shallowly impressed; pronotum marginate on all sides. Pronotal punctation double (magnification $\times 50$), diameters of primary punctures three times those of secondary punctures;



Figs. 8-11. *Namibiotrupes penrithae*, holotype. — 8, dorsal contours of fore-body; 9, tip of left fore-tibia; 10, phallus, dorsal; 11, left antenna. Scale lines = 1 mm; 9-11: same scale.

Fig. 12. Approximate distribution in southwestern Africa of: *Prototrupes copridoides*, triangles; *P. kochi*, circles; *Namibiotrupes penrithae*, circle with asterisk. Open symbols, detailed location uncertain.

primary punctures sparse on disc, largely concentrated on lateral declivities; secondary punctures with diameters of ca. 0.03 mm, densities ca. 8/0.1 sq. mm.

Median length of pronotum 4.75, maximum width 7.7 mm; ratio l/w 0.62. Scutellum (fig. 8) deltoid-semielliptic, virtually impunctate ($\times 50$).

Elytra strongly, evenly convex; juxtasutural punctures indistinct. Discal striae of elytra superficially impressed, with infuscated, evenly spaced punctures, their diameters ca. 0.05 mm, separated by 1-2 times this diameter. Interstriae scarcely convex (caudal view), with numerous fine punctures; diameters on discal interstriae ca. 0.03 mm, densities ca. 10/0.1 sq. mm. Sutural length of elytra 6.0, maximum width combined 7.8 mm; ratio l/w 0.77.

Phallus, fig. 10.

Antennal club segments 1 and 3 strongly convex (fig. 11). Terminal segment of both labial and maxillary palpi compressed-dilated. Sides of propectus "swollen" (visible in plate 1). Fore tibia with five external denticles, their size decreasing proximad; inferior side with dental and internal row of setae, and a fine carina extending from base to terminal denticle; terminal spur (fig. 9) reaching tarsal segment 2. Femora with some setae-bearing ridges, lacking further notable details. Middle and hind tibiae each with a single non-apical fossorial elevation, its crest arcuate; number of fossorial spines along crest on right middle tibia 22, on right hind tibia 24; internal side with two rows of long setae; terminal spurs of middle and hind tibiae long, subparallel, spinose; superior spur of middle tibia inferior spur of hind tibia with truncate apex, apex of others rounded; spurs all reaching apex of tarsal segment 2; metatarsi of middle and hind legs abundantly setose.

Material examined. — Holotype only, from the Gorob Mine in the Namib Desert Park (grid code SE2315Cb), 16-17-iii-1974, Windhoek museum no. H18019.

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Our staff artist, A. Bos, made the habitus drawing of *Namibiotrupes*.

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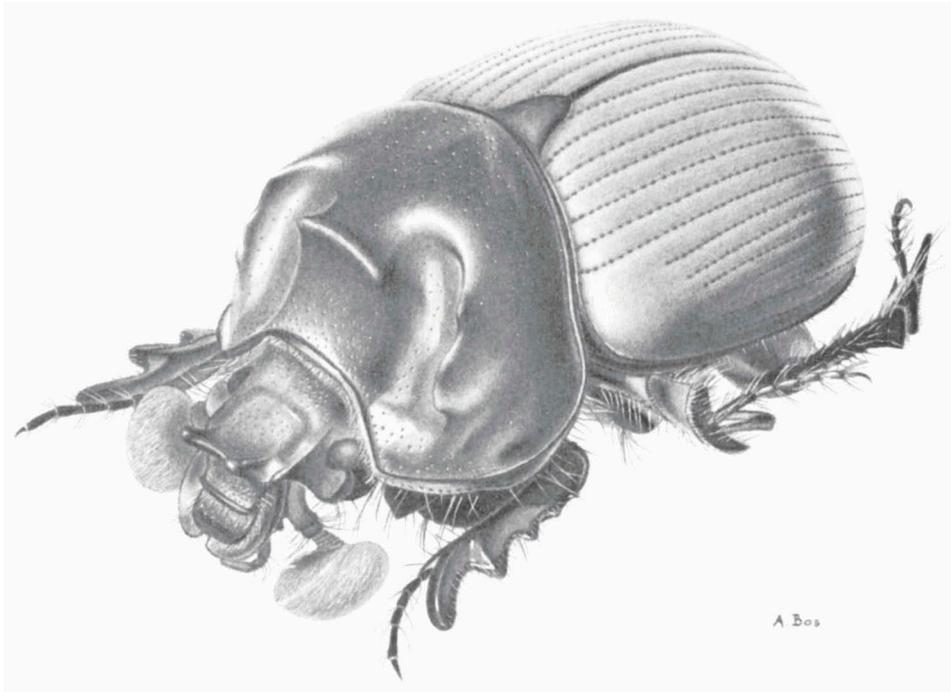


Plate I. *Namibiotrupes penrithae*, a novelty from the Namib Desert Park.