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New deltochiline (Coleoptera: Scarabaeidae: Scarabaeinae) taxa associated with hyrax dung in arid south western Namibia

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Abstract

A survey of rock hyrax dung middens along the arid escarpment of southwest Namibia has filled a gap in the range shown by members of the *Byrrhidium* group of flightless dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) belonging to the tribe Deltochilini. The survey discovered a new genus and species, *Ausmontins jacobsi* new genus and species, and a further four new species in two previously described genera, *Namakwanus kamfferi* new species, *Namakwanus minutus* new species, *Namaphilus nubibmontanus* new species and *Namaphilus tirasmontanus* new species. They are described and illustrated in the present paper. This addition of new taxa raises the total complement of the *Byrrhidium* group to seven genera and 19 species. An updated key to all the known species is also provided. It is probable that further taxa await discovery.

Key words: *Byrrhidium* group, *Ausmontins*, *Namakwanus*, *Namaphilus*, new genus, new species, updated key

Introduction

The *Byrrhidium* group (Deschodt *et al*. 2016) of flightless deltochiline dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) currently comprises a total of six genera and 14 species following recent descriptions of new taxa (Scholtz & Howden 1978; Frolov & Scholtz 2003; Frolov 2005; Deschodt *et al*. 2007; Deschodt *et al*. 2011; Moretto 2016), synonymies (Deschodt *et al*. 2016) and a recent revision (Deschodt & Davis 2017). The group is endemic to the arid southwest of Africa and is thought to comprise a monophyletic group of close relatives (Medina 2015, Tarasov & Dimitrov 2016) that are morphologically close in appearance, except for the genus *Dicranocara* Frolov & Scholtz, 2003. Nevertheless, the morphology of the aedeagi of different genera are often clearly divergent, a fact that is supported by illustrations in the present paper that describes five new taxa, raising membership of the *Byrrhidium* group to seven genera and 19 species. We provide an updated key to all the known species in the group.

The *Byrrhidium* group may be divided into two main subgroups on the basis of external dentition on the fore tibiae (Deschodt & Davis 2017). The southerly subgroup shows two protibial teeth and comprises the genera *Byrrhidium* Harold, 1869, *Dicranocara* and *Drogo* Deschodt, Davis & Scholtz, 2016. This subgroup is largely restricted to the arid Succulent Karoo biome in northwest South Africa and southwest Namibia, which receives the greatest proportion of rainfall during winter. The other subgroup shows three small protibial teeth and comprises the genera *Namakwanus* Scholtz & Howden, 1987, *Namaphilus* Deschodt & Davis, 2017 and *Versicorpus* Deschodt, Davis & Scholtz, 2011. This subgroup occurs in rocky terrain in the Namib Desert and arid Namibian Savanna Woodlands where the greatest proportion of rain falls in late summer.

The *Byrrhidium* group and many related deltochiline genera occur along branches that emanate from the basal nodes and show close relationships to the outgroups in the most recent morphological (Tarasov & Génier 2015) and molecular phylogenies (Tarasov & Dimitrov 2016) of the subfamily Scarabaeinae. Nevertheless, in the absence of a time scale, the *Byrrhidium* group must be considered as merely sister to the other crown-group Scarabaeinae. Although the age of the ancestral lineage is unknown, generic separation and speciation between the extant members of the *Byrrhidium* group may be related to the fairly recent onset of aridity (17-16 MYA) resulting from

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south polar glaciation (Senut *et al*. 2009) and upwelling of the cold Benguela Current, which generates a cell of dry air over the southwest coast of Africa (Pickford & Senut 1999). As a result of aridity and flightlessness, the species seem to be localized around concentrations of dung such as those found in rock hyrax, *Procavia capensis* (Pallas, 1766) (Mammalia: Hyracoidea), middens.

As a distribution gap was identified between the occurrence of *Dicranocara* and *Drogo* in southwest Namibia and between *Namaphilus*, *Namakwanus* and *Versicorpus* in south central Namibia, a survey was made in the intervening region along the southwest escarpment. The survey was concentrated on rock hyrax middens (see Fig. 3 for the distribution of rock hyrax) as many species were recorded in association with the assured dung supply in such middens. The survey resulted in the discovery of a new monotypic genus and four other new species in the genera *Namakwanus* and *Namaphilus*, which are described below. The new genus represents the southernmost taxon in the subgroup showing three protibial teeth.

An assessment of the conservation status has also been made for each new species. Although the Extents Of Occurrence (EOO) are unknown, a minimum has been estimated for each species on the basis of area of the mountain blocks in which they were recorded. All species were collected in the vicinity of rock hyrax middens. Although this may represent a specialization that would restrict their Area Of Occupancy (AOO) within the EOO, these species will probably feed on any fresh dung available in this arid and resource scarce environment, since the two taxa described from the Nubib Mountains were also trapped using fresh pig dung baited pitfalls. In the vicinity of rock hyrax middens, the AOO may also be restricted by the occurrence of suitable finer-grained soils, particularly those that are sheltered amongst boulders and remain moist long after rainfall.

Methods and Materials

In this study we examined or loaned specimens housed in the following depositories:

SANC South Africa, Gauteng, Pretoria, South African National Collection of Insects (Riaan Stals)
TMSA South Africa, Gauteng, Pretoria, Ditsong National Museum of Natural History (Ruth Müller)
UPSA South Africa, Gauteng, Pretoria, University of Pretoria (Christian Deschodt)

The colour images were made using a Canon 760D camera body mounted with a Canon MPE 65 mm macro lens and those of the aedeagi using a Leica M165 C microscope and a Leica DMC 2900 digital camera. Image stacking was done using the Helicon remote and Helicon focus software packages.

Taxonomy

Tribal nomenclature

Although the *Byrrhidium* group has, hitherto, been cited as belonging to the tribe Canthonini (Deschodt *et al*., 2011, 2016, Deschodt & Davis 2017) on the basis of common usage (Smith 2006), it is, here, cited as belonging to the tribe Deltochilini on the basis of precedence (Bouchard *et al*. 2011). However, molecular phylogenies (Monaghan *et al*. 2007) have shown that the tribe is polyphyletic and that the *Byrrhidium* group is distantly related (Tarasov & Dimitrov 2016) to the clade containing the genus *Deltochilum* Eschscholtz, 1822 from which the current tribal name is derived.

New genus

***Ausmontins* Deschodt & Davis, new genus**
(Figs. 1A, 2A–B, 3)

Type species: *Ausmontins jacobsi* Deschodt & Davis, new species, here designated

Head. Clypeus bidentate, with two fairly well-developed and forward-pointing teeth. Single minute tooth on lower clypeal margin between dorsal teeth. Clypeogenal suture fairly distinct and straight.

Pronotum. Highly convex. Antero-lateral margin somewhat flattened.

Elytra. Convex and fused. Striae visible.

Sterna. Meso- and metasternum fused, mesometasternal suture well defined, straight. Densely punctate with small punctures.

Protibia. Three teeth at apical outside margin.

Pygidium. Parameres surface shagreened with medium sized faint punctures.

Aedeagus. Symmetrical. Phallobase with normal shape, parameres complexly shaped with three extending spines (see Fig. 2).

Etymology. The gender is masculine. This genus is named after the Aus Mountains, Namibia, an isolated inselberg where the type species of the genus was collected.

Diagnosis. *Ausmontins* new genus clearly falls within the tribe Deltochilini by being dorsally strongly convex, bearing three protibial teeth, the lateral margin of elytra being entire and by fore tarsi being present. It keys out to the genus *Namaphilus* in the key provided by Deschodt & Davis (2017). This new genus can be separated from *Namaphilus* with its standard aedeagus shape, by the very peculiar denticulate and angulate shaped parameres of the aedeagus and by its highly convex habitus.

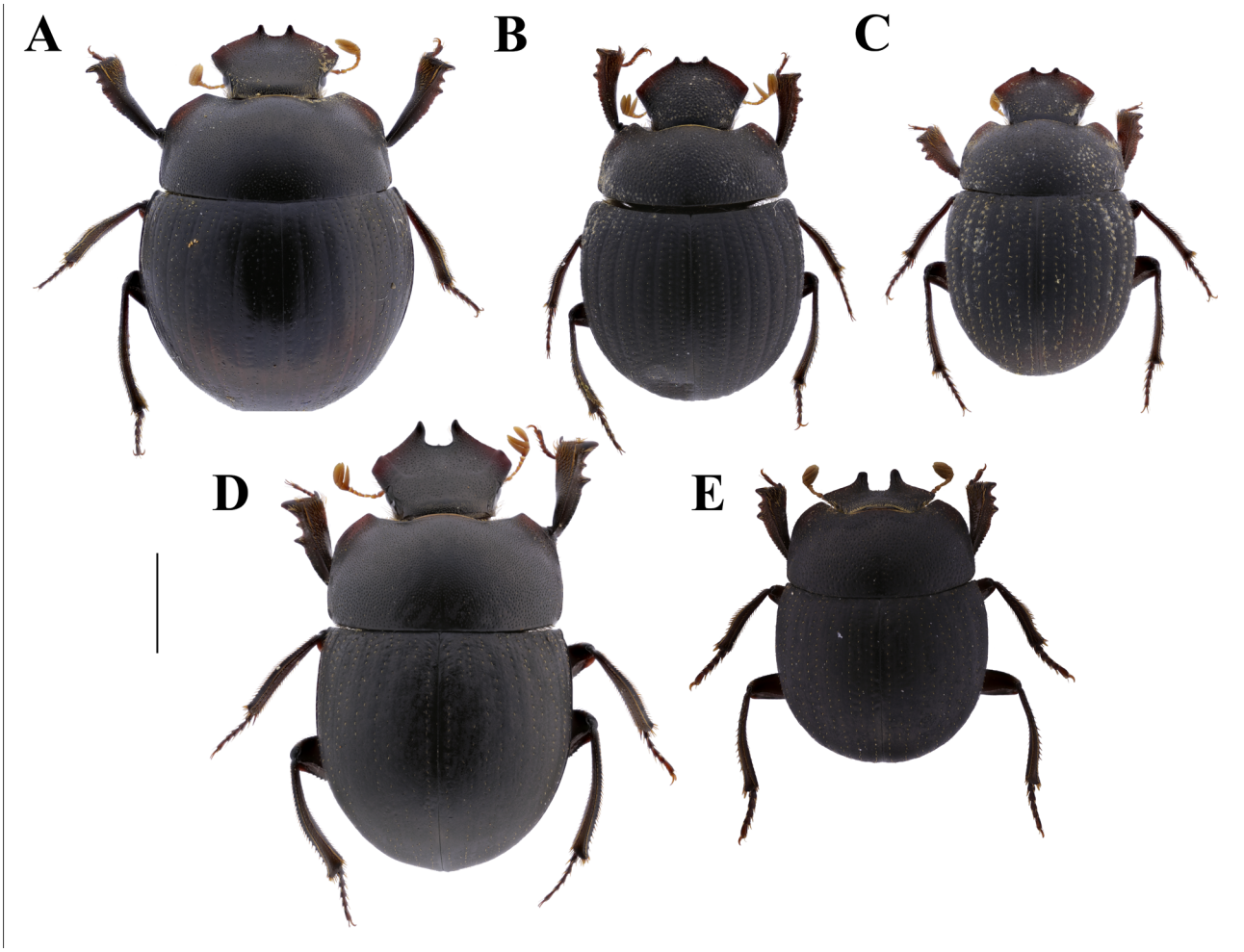

FIGURE 1. A, *Ausmontins jacobsi* Deschodt & Davis, new genus and species; B, *Namaphilus tirasmontanus* Deschodt & Davis, new species; C, *Namaphilus nubibmontanus* Deschodt & Davis, new species; D, *Namakwanus kamfferi* Deschodt & Davis, new species; E, *Namakwanus minutus* Deschodt & Davis, new species. Scale bar = 2 mm.

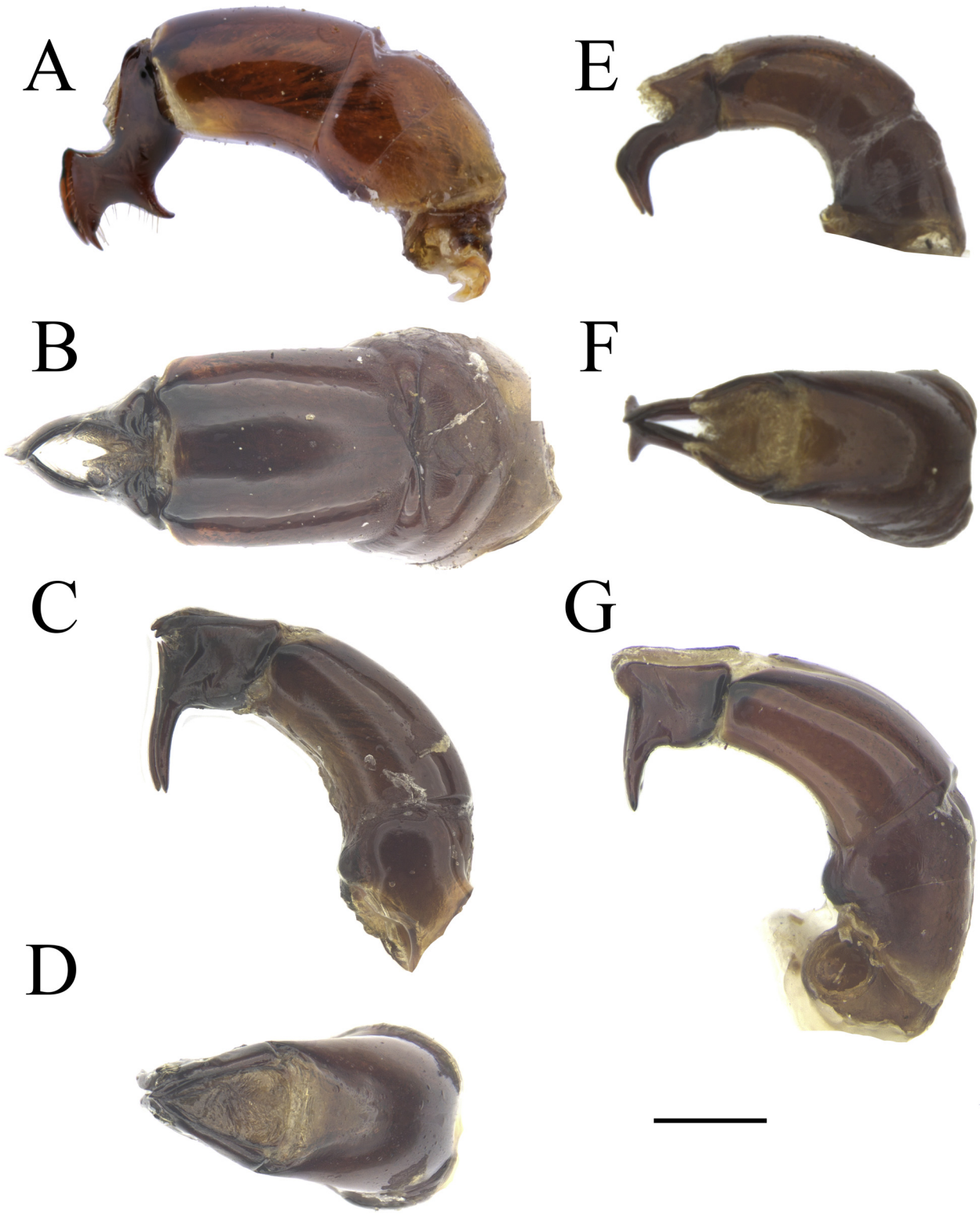

FIGURE 2. Lateral (A, C, E, G) and dorsal (B, D, F) view of the aedeagi. A, B, *Ausmontins jacobsi* Deschodt & Davis, new genus and species; C, D, *Namaphilus nubibmontanus* Deschodt & Davis, new species; E, F, *Namakwanus minutus* Deschodt & Davis, new species; G, *Namaphilus endroedyi* (Deschodt, Davis & Scholtz, 2011) for comparison with *Namaphilus nubibmontanus* Deschodt & Davis, new species. Scale bar = 0.5 mm.

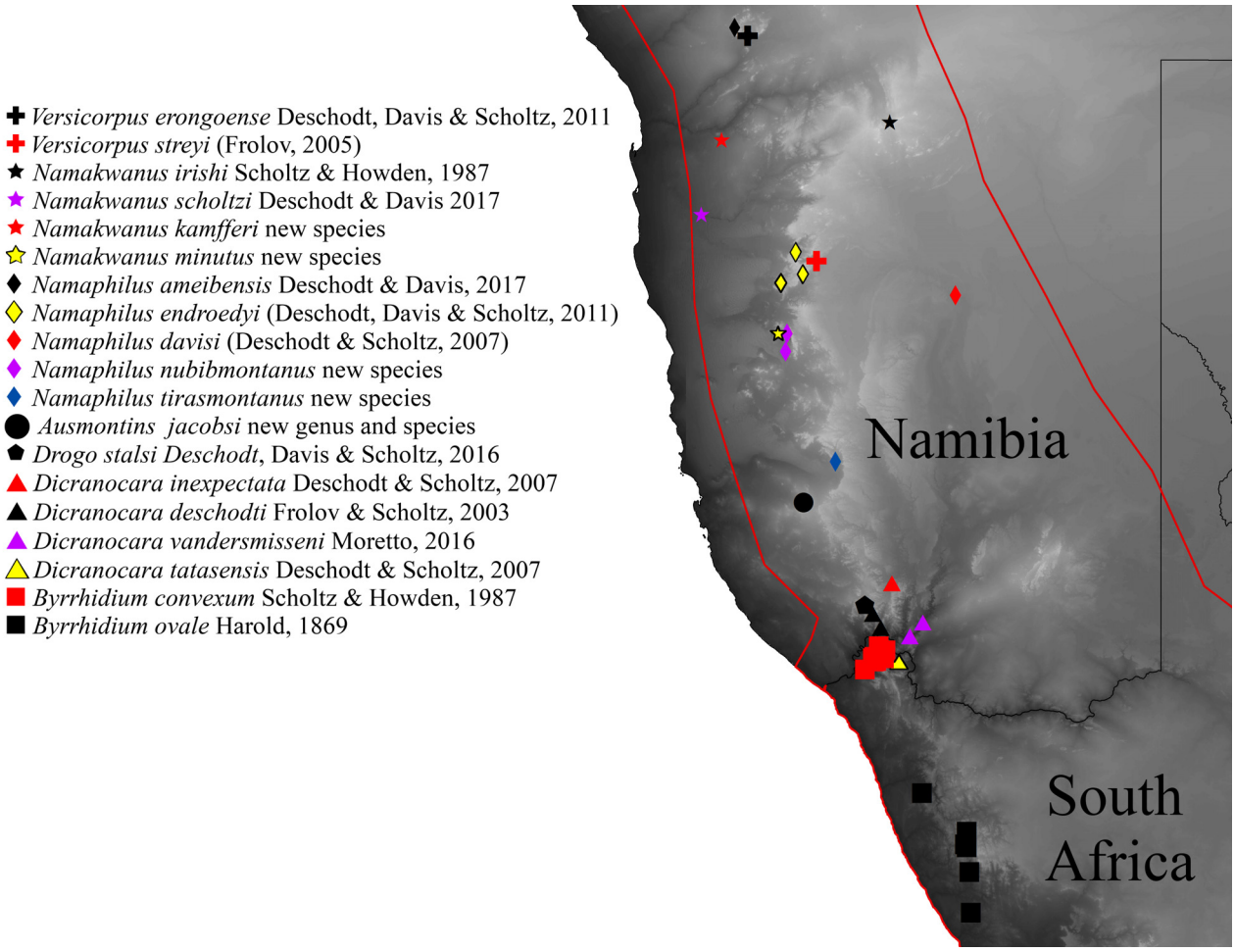

FIGURE 3. Map showing the localities of all the new and known deltochiline genera and species. The two red lines indicate the area where rock hyrax (shapefile supplied by IUCN 2012) might occur in suitable habitat.

New species

Ausmontins jacobsi Deschodt & Davis, new species

(Figs. 1A, 2A–B, 3)

Type material. Holotype male: Klein Aus Vista, Namibia, S26.660429° E16.238527°, 12.iii.2017 1482m, D.H. Jacobs (TMSA). Paratypes: four specimens (one male and three unsexed), same data as holotype (1 SANC; 1 TMSA; 2 UPSA).

Description: Holotype male: Medium sized beetle. Measurements with head inflexed, 7.37 mm (long) × 5.57 mm (wide) × 3.98 mm (high).

Head. Clypeus bidentate, with two well-developed forward pointing teeth, area between teeth straight. One very small tooth on lower clypeal margin between dorsal teeth. Clypeogenal suture fairly distinct and straight. Clypeal surface clearly and densely punctate with small punctures which are separated by about one puncture diameter.

Pronotum. Convex; surface shagreened (or sharkskin like) with two distinct puncture types; (1) small, clear, regular ovoid punctures somewhat organised in lines each separated by about one puncture length and two to three puncture widths; (2) larger, clear round and deeper set punctures, each separated by about three to four puncture diameters.

Elytra. Fused together, strongly convex with surface shagreened. Striae shallow but clearly visible, punctate with punctures about three to four puncture diameters apart. Punctures on interstriae forming somewhat regular rows, punctures about four puncture diameters apart, each with a single very short and thin recurved seta.

Sterna. Prosternum surface shagreened and covered with medium punctures, punctures separated by less than one puncture diameter. Meso- and metasternum fused, mesometasternal suture more or less straight. Surface of mesosternum shagreened with small punctures, punctures separated by less than one puncture diameter. Metasternum same as mesosternum but punctures slightly smaller.

Protibia. Inner margin for first two thirds more or less straight with no denticles, last third bulbous. Very short, fairly regular spaced setae on inner margin. Tibial apex blunt with small spatulate spur above tarsus. Underside of tibial apex with slightly downward curving spatulate process. Three teeth at apical third of outer margin. First two thirds of outer margin from joint irregularly serrated.

Mesotibia. Slightly curving inward. Outer and inside margin smooth with single row of closely arranged tan setae. Dorsal surface flat and shagreened with single row of densely arranges tan setae, ventral surface with two rows of densely arranged tan setae.

Metatibia. Slightly curving inward. Outside and inside margin smooth with single row of closely arranged tan setae, row of setae on inside less dense in first half. Dorsal and ventral surface same as for mesotibiae.

Pygidium. Surface shagreened with medium sized faint punctures.

Aedeagus. Parameres symmetrical, see Fig. 2.

Female. No significant differences were noted.

Etymology. This species is named after Dr Dawid Jacobs who collected the type series.

Diagnosis. This species can easily be separated from all other hyrax associated deltochiline species by the following suite of characters: three teeth on outside fore tibial margin, short teeth on the clypeus, angulate and denticulate aedeagus and very convex body. It is larger than any known *Namaphilus* species with which it could otherwise be confused.

Distribution, conservation status and potential threats. Because of flightlessness and probable low vagility, this species may be restricted to the isolated Aus Mountains just southwest of Aus in Namibia, an area that is used primarily for grazing of livestock and recreation. Although it may be dependent on the middens of hyrax colonies, a number remain in the area of collection. Therefore, *A. jacobsi* new species is probably not facing any current threats. However, it should be assessed as Data Deficient (DD) as the EOO is unknown. It could be as small as 120 km^2 (area of the Aus Mountains).

Namaphilus nubibmontanus Deschodt & Davis, new species

(Figs. 1C, 2C–D, 3–4)

Type material. Holotype male: Nubib Mountain, Namibia, S24.885184° E16.065035°, 14.iii.2017 1184m, Deschodt, Jacobs & Davis (TMSA). Paratypes: Three specimens (unsexed), same data as holotype, (2 SANC, 1 UPSA); one female: Losberg, Namibia, S25.073295° E16.048717°, 15.iii.2017, C. Deschodt & A. Davis (UPSA).

Description: Holotype male: Medium sized beetle. Measurements with head inflexed, 5.22 mm (length) × 3.90 mm (width) × 2.80 mm (height).

Head. Clypeus bidentate and surface shagreened; clypeal margin between teeth slightly concave. One very small tooth on lower clypeal margin between dorsal teeth. Clypeogenal suture indistinct and fairly straight. Clypeal surface faintly punctate.

Pronotum. Convex, and completely covered by small faint punctures, separated by about one and a half lengths of their own diameter. About half of the punctures associated with very short tan setae.

Elytra. Convex with surface shagreened. Elytra fused. Striae unclear. Very faint punctures associated with short and recurved setae on interstriae, all distributed in double rows, except for interstriae adjoining elytral suture, where the punctures are aligned in a single row.

Sterna. Prosternum shagreened with large shallow indistinct punctures, almost touching. Meso- and metasternum fused, mesometasternal suture slightly curved anteriorly. Surface of mesosternum shagreened with clear, medium-sized punctures, punctures separated by at least one puncture diameter. Surface of metasternum shagreened with a few very faint punctures.

Protibia. Inside margin forming bulbous widening distal half of protibia and with no denticles, short tan setae present along the margin. Dorsal surface shagreened, irregularly punctate and with carina extending lengthwise. Tibial apex blunt with small spatulate spur. Tarsi attached under spur close to inner margin of tibia. Ventral surface

shagreened with sinuous carina from inside margin of second half to middle of apex. Three teeth at apical third of outer margin, distal two thirds serrated.

Mesotibia. Fairly straight, with smooth margins and with five rows of short tan setae. Apically with two spurs. Tarsi with short tan setae, ending with two claws.

Metatibia. Fairly straight, with smooth margins and five rows of short tan setae. Tarsi with short tan setae, ending with two claws.

Pygidium. Surface shagreened with large shallow punctures.

Aedeagus. Parameres symmetrical, see Fig. 2.

Female. There is no variation between males and females of this species.

Etymology. This species is named after the Nubib Mountain range, the inselberg where the type series was collected.

Diagnosis. This new species is similar in appearance to *Namaphilus endroedyi* (Deschodt, Davis & Scholtz, 2011) but the aedeagi (Fig. 2) are clearly different.

Distribution, conservation status and potential threats. This species may be restricted to the isolated Nubib Mountains in Namibia. As hyrax colonies remain protected in the area of collection within the Namibrand Nature Reserve, *N. nubibmontanus* new species is probably not facing any current threats. However, it should be assessed as Data Deficient (DD) as the EOO is unknown. This species could encompass a geographic area as small as 1100 km^2 (area of the Nubib Mountains).

Namaphilus tirasmontanus Deschodt & Davis, new species

(Figs. 1C, 3–4)

Type material. Holotype female: Tirasberg Conservancy, S26.231242° E16.571429°, 13.iii.2017 1363m, C. Deschodt & A. Davis (TMSA).

Additional material examined. Various disarticulated body parts of different specimens from the same site mounted on a single card (UPSA).

Description: Holotype female: Medium sized beetle. Measurements with head inflexed, 5.84 mm (length) × 4.44 mm (width) × 3.32 mm (height).

Head. Clypeus bidentate, with two small teeth that are well separated; clypeal margin between teeth straight with minute irregularities. Surface somewhat dull. One very small tooth on lower clypeal margin between dorsal teeth. Clypeogenal suture indistinct but straight. Clypeal surface shagreened and punctate.

Pronotum. Convex, coarsely shagreened, medium ovate punctures with associated short setae covering pronotum, punctures separated by less than one puncture diameter.

Elytra. Convex. Elytra fused. Striae very shallow but visible, faintly punctate. Irregular and faint punctures with medium length associated setae in double rows on all interstriae except on those adjoining elytral sutures bearing a single row of punctures. Edges of punctures forming low undulations.

Sterna. Prosternum with large shallow round punctures. Meso- and metasternum fused, mesometasternal suture straight. Surface of mesosternum shagreened with clear, medium-sized shallow punctures. Surface of metasternum shagreened with punctures slightly smaller and closer together than on mesosternum.

Protibia. Inside margin slightly curved inward with no denticles. Tibial apex blunt with small spatulate spur next to inside corner. Tarsi attached under spur and close to inner margin of tibia. Three teeth at apical outer margin. Proximal two thirds of outer margin from joint serrated. Dorsal and ventral surface shagreened and punctate.

Mesotibia. Fairly straight, with smooth margins and with five rows of short tan setae. Apically with two short spurs. Tarsi with short tan setae, ending with two claws.

Metatibia. Fairly straight, with smooth margins and with five rows of short tan setae. Tarsi with short tan setae, ending with two claws.

Pygidium. Surface shagreened with medium shallow punctures, some with associated setae.

Male. Unknown.

Etymology. This species is named after the Tiras Mountain range, the inselberg mountain complex where the holotype type specimen was collected.

Diagnosis. The longer setae on the elytra and slight undulations on the elytra will distinguish this species from *Namaphilus endroedyi* and *Namaphilus nubibmontanus* new species.

Distributions, ecology, conservation status and potential threats. This species may be restricted to the isolated Tiras Mountains in Namibia. As hyrax colonies remain protected in the area of collection within the Tiras Conservancy, *N. tirasmontanus* new species is probably not facing any current threats. However, it should be assessed as Data Deficient (DD) as the EOO is unknown. Its distribution area could be as small as 150 km^2 (area of the Tiras Mountains).

Namakwanus kamfferi Deschodt & Davis, new species

(Figs. 1D, 3)

Type material. Holotype female: Bloedkoppe, Namibia, S22.843909° E15.376124°, 17.iii.2017 739m, C. Deschodt & A. Davis (TMSA). One female paratype with same data as holotype (UPSA).

Additional material examined. Various disarticulated body parts of different specimens from the same site as holotype, mounted on a single card; two elytra and two pronota from different beetles, Bloedkoppe, Namibia, S22.844586° E15.376308°, 745m 13.06.2013, Deschodt Jacobs Kamffer, collected dead from hyrax dung (UPSA).

Description: Holotype female: Medium sized beetle. Measurements with head inflexed, 7.50 mm (length) ×5.01 mm (width) ×3.86 mm (height).

Head. Clypeus bidentate, with two well-developed slightly upturned teeth, clypeal margin between teeth more or less straight. Teeth longer than distance between them. One very small tooth on lower clypeal margin, between dorsal teeth, while a second even smaller median tooth on the upper clypeal margin. Clypeogenal suture distinct and straight. Clypeal surface clearly punctate. Surface shagreened and clearly punctate.

Pronotum. Convex, small but clear punctures separated by about one and a half to two lengths of their own diameter. Pronotal surface shagreened with sculpture free midline extending across pronotum.

Elytra. Convex. Elytra fused. Striae very shallow and faint, faintly punctate. Irregular and very faint punctures on interstriae.

Sterna. Prosternum shagreened with large shallow punctures. Meso- and metasternum fused, mesometasternal suture straight. Surface of mesosternum shagreened with clear, medium-sized punctures. Surface of metasternum shagreened with clear medium sized punctures.

Protibia. Inner margin fairly straight with no denticles. Tibial apex blunt with short, spatulate downward-curving spur close to inside corner. Tarsi attached under spur. Setae on inner margins of tarsi short and tan. Three teeth at apical outside margin of second half. First half of outer margin from joint smooth.

Mesotibia. Fairly straight with smooth margins. Apically with two short spurs. Tarsi with short tan setae, ending with two claws.

Metatibia. Fairly straight with smooth margins. Tarsi with short tan setae, ending with two claws.

Pygidium. Surface shagreened with large, shallow and closely spaced punctures.

Male. Unknown.

Etymology. This species is named after Mr Dewald Kamffer to remind him of the day of its discovery when he was present in the flesh but very absent in other faculties.

Diagnosis. The pronotal punctures of *Namakwanus kamfferi* new species are smaller than those of *N. scholtzi* Deschodt & Davis, 2017 and only of a single size. The most proximal denticle of the front tibia is much larger in *Namakwanus kamfferi* new species than in *N. scholtzi*.

Distributions, ecology, conservation status and potential threats. This species may be restricted to the isolated Blutkoppe and Langer Heinrich Mountains in the Namib Desert, Namibia. As hyrax colonies remain protected in the area of collection within the Namib-Naukluft Park, *N. kamfferi* new species is probably not facing any current threat although the Langer-Heinrich Uranium mine lies within its predicted EOO and AOO. This species should be assessed as Data Deficient (DD) as the EOO is unknown. Its distribution area could be as small as 100 km^2 (combined area of the Blutkoppe and Langer Heinrich Mountains).

FIGURE 4. Typical terrain of the Nubib Mountains at the type locality of *Namaphilus nubibmontanus* Deschodt & Davis, new species and *Namakwanus minutus* Deschodt & Davis, new species. Image taken by ALVD at Namibrand Nature Reserve, 14 March 2017.

Namakwanus minutus Deschodt & Davis, new species

(Figs. 1E, 2E–F, 3–4)

Type material. Holotype male: Nubib Mountain, Namibia S24.885184° E16.065035°, 14.iii.2017 1184m, Deschodt, Jacobs & Davis (TMSA). Two female paratypes with same data as holotype (UPSA).

Description: Holotype male: Medium sized beetle. Measurements with head inflexed, 4.93 mm (length) × 3.86 mm (width) × 2.75 mm (height).

Head. Clypeus bidentate, with two well-developed upturned teeth, clypeal margin between teeth curved. One very small tooth on lower clypeal margin between dorsal teeth. Clypeogenal suture fairly distinct and straight. Clypeal surface clearly punctate.

Pronotum. Convex, surface shagreened, small and oval punctures covering the pronotal surface, punctures separated by about one to one and a half the length of their own diameter.

Elytra. Convex, surface shagreened. Striae very shallow but visible, faintly punctate. Irregular and very faint punctures associated with short setae on interstriae.

Sterna. Prosternum with large and very close punctures. Meso- and metasternum fused, mesometasternal suture straight. Surface of mesosternum shagreened with faint, medium-sized shallow punctures. Surface of metasternum shagreened with a few faint punctures.

Protibia. Inside margin more or less straight with no denticles. Tibial apex blunt with a small spatulate spur. Tarsi attached under spur close to inner corner of tibia. Setae on inner margins of tarsi short. Apical outer margin of protibiae with three teeth. Distal third of outer margin somewhat serrated, middle third smooth.

Mesotibia. Fairly straight, with smooth margins and five rows of short tan setae. Apically with two short spurs. Tarsi with short tan setae, ending with two claws.

Metatibia. Fairly straight, with smooth margins and five rows of short tan setae. Tarsi with short tan setae, ending with two claws.

Pygidium. Surface shagreened with large shallow punctures.

Female. As for all *Namakwanus* species the female clypeus is slightly smaller than the male.

Etymology. The specific epithet refers to its small size.

Diagnosis. *Namakwanus minutus* new species is the smallest known *Namakwanus* species. Thus, it can easily be separated from these species as the other constituent species of *Namakwanus* are more or less the same larger size.

Distributions, ecology, conservation status, and potential threats. This species may be restricted to the isolated Nubib Mountains in Namibia. As hyrax colonies remain protected in the area of collection within the Namibrand Nature Reserve, *N. minutus* new species is probably not facing any current threats. However, it should be assessed as Data Deficient (DD) as the EOO is unknown. Its distribution area could be as small as 1100 km^2 (area of the Nubib Mountains).

Updated key to all the known species in the *Byrrhidium* group

1. Fore tibia with three external denticles . . . 2
- Fore tibia with two external denticles . . . 13

2 (1). Habitus relatively large and elongate. . . . *Versicorpus* Deschodt, Davis & Scholtz, 2011 . . . 3
- Habitus smaller and convex . . . 4

3 (2). Mesometasternal suture curving forward. Prosternum with large punctures. Erongo Mountain . . . *Versicorpus erongoense* Deschodt, Davis & Scholtz, 2011
- Mesometasternal suture straight. Prosternum with small punctures. Tsondab Mountain . . . *Versicorpus streyi* (Frolov, 2005)

4 (2). Clypeal horns as long as, or longer than, distance between them . . . *Namakwanus* Scholtz & Howden, 1987 . . . 5
- Clypeal horns shorter than distance between them . . . 8

5 (4). Small species, shorter than 5mm . . . *Namakwanus minutus* Deschodt & Davis, new species
- Larger species, longer than 6mm . . . 6

6 (5). Space between clypeal horns about one and a half time more at base than the width of a single horn at apex. Clypeal horns not upturned and slightly pointing inward at the apex. Windhoek area . . . *Namakwanus irishi* Scholtz & Howden, 1987
- Space between clypeal horns about two times more at base than the width of a single horn at apex. Clypeal horns more . . . upturned and slightly pointing inward at the apex. Namib desert 7

7 (6). Pronotum with punctures varying in size. Distribution range . . . *Namakwanus scholtzi* Deschodt & Davis, 2017
- Pronotum with punctures of a single size. Distribution range . . . *Namakwanus kamfferi* Deschodt & Davis, new species

8 (4). Habitus highly convex. Parameres with two downward pointing spikes. Distribution range . . . *Ausmontins jacobsi* Deschodt & Davis, new genus and species
- Habitus not highly convex. Parameres with a single downward pointing spike ... *Namaphilus* Deschodt & Davis, 2017 ... 9

9 (8). Pronotal punctures elongate. Area between clypeal teeth somewhat arcuate. Distribution range . . . *Namaphilus ameibensis* Deschodt & Davis, 2017
- ronotal punctures round. Area between clypeal teeth more or less straight . . . 10

10 (9). Pronotal punctures very clear with area between them shagreened. Setae medium length Tiras Mountain range . . . *Namaphilus tirasmontanus* Deschodt & Davis, new species
- Pronotal punctures less clear with area between them smooth or not shagreened. Setae short . . . 11

11 (10). Parameres with median bulbous protrusion transformed to spiked. Nubib Mountain range . . . *Namaphilus nubibmontanus* Deschodt & Davis, new species
- Parameres with median bulbous protrusion round . . . 12

12 (11). Tips of parameres notched in frontal view. Naukluft Mountains to the south of the Tsondab River canyon . . . *Namaphilus endroedyi* (Deschodt, Davis & Scholtz, 2011)
- Tips of parameres without notches in frontal view. Hardap Dam area . . . *Namaphilus davisi* (Deschodt & Scholtz, 2007)

13 (1). Clypeus clearly bidentate with clypeal horns long ... *Dicranocara* Frolov & Scholtz, 2003 ...14
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14 (13). Aedeagus without lateral horns on parameres . . . 15
- Aedeagus with lateral horns on parameres . . . 16

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- Apex of parameres slender. Southern Richtersveld, Boom River . . . *Dicranocara deschodti* Frolov & Scholtz, 2003

16 (14). Parameres with side horns extending somewhat sideways, tip curved downwards. Richtersveld National Park in South Africa. . . . *Dicranocara tatasensis* Deschodt & Scholtz, 2007
- Parameres with side horns slightly forward, tip not curved downwards. Fish River Canyon . . . *Dicranocara vandersmisseni* Moretto, 2016

17 (13). Clypeal horns short. Mesometasternal suture not well defined. South of Orange River. . . . *Byrrhidium* Harold, 1869 ... 18
- Clypeal horns medium length. Mesometasternal suture well defined. North of Orange River . . . *Drogo stalsi* Deschodt, Davis & Scholtz, 2016

18 (17). Parameres with side protrusions. Fore tibia with outer teeth parallel. Richtersveld in South Africa . . . . . *Byrrhidium convexum* Scholtz & Howden, 1987

\- Parameres plain with no side protrusions. Fore tibia with outer teeth diverging. Namaqualand . . . . . *Byrrhidium ovale* Harold, 1869

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