

Two unusual new species of *Mezium* spider beetle from Namibia (Coleoptera: Ptinidae) and a proposed new synonymy

T. Keith Philips¹ • Katherine D. Hans¹ • John Irish²

¹ Systematics and Evolution Laboratory, Department of Biology, Western Kentucky University, Bowling Green, Kentucky, USA

² National Museum of Namibia, Windhoek, Namibia

Correspondence: T. K. Philips (keith.philips@wku.edu)

ABSTRACT In this paper, we describe two new and morphologically very distinct species of spider beetle in the genus *Mezium* Curtis from Namibia. One of these species, *Mezium inflatum* Philips, is characterised by a dorsally expanded pronotum formed by a setose covering with an irregular internal “skeletal” scaffold consisting mostly of an air-filled space and the presence of extremely long erect elytral setae. The other, *Mezium nigriaenum* Philips, has very dark coloured elytra with the remaining body parts bronze. Further, the pronotal surface is densely covered with irregularly oval shaped, concave setae reminiscent of the surface of a honeycomb and with elongate appressed setae that converge medially forming a flattened loose tuft. *Mezium pseudaffricanum* is proposed as a junior synonym of *M. africanum*, new records for *M. andreaei* and *M. glabrum* in Namibia are listed, a reassessment of *M. gracilicornis* (Pic) is given, and a distribution map is provided.

KEYWORDS spider beetle; synonymy; diversity; Namibia; Angola; South Africa; caves; variation

INTRODUCTION

Mezium is a well-known spider beetle genus with several species that can be common household pests (Hinton 1941). All species are native to Africa and have been widely distributed worldwide via commerce. Of the 11 known species, seven are endemic to southwestern Africa (Angola, Namibia and South Africa) and were reviewed by Philips and Dickmann (2018). Four of these are restricted to Namibia and were described by Borowski (2009). Bellés (1985) reviewed the *Mezium* species known at that time as well as all the closely related genera that are recognised as belonging to the Gibbiinae.

Notably, southern Africa contains some of the greatest diversity known in the spider beetles with

16 genera with 12 of these endemic to this region (see Irish 1996; Philips and Foster 2004; Borowski 2006a, b, 2009b; Bell and Philips 2008; Akotsen-Mensah and Philips 2009; Smiley and Philips 2011; Trimboli and Philips 2011; Wood and Philips 2013; Philips and Dickmann 2018; Gerner et al. 2019a, b, Gerner and Philips 2021).

Our study of material received from the National Museum of Namibia resulted in the discovery of two new and very distinctive Namibian species that we describe herein. We provide morphological and distributional evidence that *Mezium pseudaffricanum* should be considered a junior synonym of *M. africanum*. Based on additional material of *M. gracilicorne* and a reassessment of population morphologies, we consider that several species are represented and not just a single

widespread species as indicated in Philips and Dickmann (2018). Lastly, we give new distribution records for *M. andreaei* and *M. glabrum*.

MATERIALS AND METHODS

This study is based on the examination of 368 specimens from the National Museum of Namibia located in Windhoek as well as additional material in the collection of the senior author. Paratypes of *Mezium setosum* Borowski from the South African Museum, Cape Town, were also used for comparison with one of the new species. Using a Leica MZ16 dissecting microscope, all known species were examined to compare with these two new species as well as the one potential species representing a synonymy.

Label data for the new species and new distribution records are recorded verbatim (including upper case letters and variants in spelling in some cases) with lines separated by commas. If a second label is present, it is separated from the data on the first by a “/.” Type material is deposited in the National Museum of Namibia, Windhoek (NMNW), the Ditsong Museum, Pretoria (TMSA), the South African National Collection (SANC), and the T. Keith Philips collection (TKPC).

QGIS was used to create distribution maps. The base map layer comprised a Google Satellite Image WMS accessed using the QuickMapServices plugin. Coordinates, in decimal degrees, were used to create the maps and are included at the end of each species record to potentially aid future studies.

Mezium inflatum, n. sp.

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Figures 1 and 5

Diagnosis. This species is characterised by a dorsally inflated pronotum with characteristic anterior and posterior cavities or depressions as well as the presence of elytral setae that are extremely long (Figure 1A, B, C, D, E, G). These two characteristics will easily differentiate this taxon from all other known species. In particular, the inflated pronotum is both very unique and distinct and not known in any other species of *Mezium*.

Description. Length 2.04–3.09 mm. Average 2.64 ± 0.35 mm (n = 10)

Elytra dark, black or brownish black to dark reddish brown in colour, remaining areas of body yellowish light tan.

Head surface covered or nearly so with appressed, ovoid, short, stout setae covering surface or nearly so, slightly more erect near ventral surface and especially below eyes where they extend beyond eye surface; eyes semicircular, projecting, mainly facing laterally; antennae elongate, narrow, length distinctly longer than body length.

Pronotum maximum width about 2/3 of maximum elytral width (1.00:1.45); dense erect setae forming an inflated covering with apices flattened and appearing fused with adjacent setae; pronotal surface smooth, nearly intact except for small scattered openings visible under high magnification; pronotal expansion forming two dorsal peaks at middle divided longitudinally by a groove; near anterior edge with a small transverse cavity and, lateral to that, two similar cavities about 2x width, near posterior margin, surface much less complete with a triangular depression at middle and adjacent, lateral, shallow, ovoid depressions; further laterally on the side smaller depressions occurring near anterior margin with a parallel longitudinal narrow groove running from behind eye to posterior margin near ventral surface.

Elytra slightly flattened laterally with a pubescent collar at base continuing as five, short, longitudinal clumps of erect setae, not extending beyond 1/10 of elytral length; first – third of clumps continuing posteriorly as the first, third, and fifth of five longitudinal rows of elongate, erect, slender setae; a few more setae on what would be the sixth interval mainly near the elytral apex; setae absent laterally.

Legs elongate, surface completely covered with slightly concave fish-like scales, ovoid in shape; additional scattered more elongate suberect setae along ventral margins; metatibia distinctly longer than metafemur, pro- and mesotibia subequal to respective femora.

Ventral surface covered in rounded or ovoid, scale-like setae similar to those on legs, completely obscuring surface, a few scattered suberect short

and stout setae present, especially around perimeter of abdominal ventrites.

Male genitalia moderately elongate, lateral lobes parallel-sided, except near tip that is narrowly rounded, median lobe narrowed at middle then parallel sided to near apex (Figure 1F).

Variation. Mainly seen in the colour with some specimens having lighter coloured pronota and darker or lighter elytra.

Etymology. The specific name “inflatum” references the greatly expanded or inflated setal covering that is present on the pronotum.

Remarks. This *Mezium* species is certainly one of the most morphologically distinct known, so far, due to the unique dorsally expanded pronotal covering and erect elytral setae that are longer in length than seen in any other species. The inflated pronotal covering is similar to that seen in species of *Meziomorphum* Pic (see Gearner and Philips 2019). All of the non-cave paratype localities have since been destroyed by mining but populations likely exist elsewhere in the area (Figure 5). All paratypes were collected using preservative pitfall traps placed in rocky areas.

The holotype of the species is from Husab Cave while other specimens were collected in nearby localities. Caves or rock shelters often contain areas with accumulated dried mammal dung that can support populations of spider beetles, no doubt including this new species. The male genitalia shape approaches that seen in a population of *M. gracilicorne* from Uri-Hauchab, Namibia (Philips and Dickmann 2018), a locality to the south of Sossusvlei and about 330 km south of where this new species is known.

Type material. Holotype. Namibia:

Husab Cave [22.8095°S, 15.0651°E], NAMIB PARK, SE 2215 Ca, 17.III.1989, J. Irish & E. Marais, in cave. Deposited in the NMNW collection (National Museum of Namibia).

Paratypes: 2 specimens: Lower Dome Gorge. 22°28'S; 15°04'E [22.4667°S, 15.0667°E], Swakopmund Dist., 18 Dec.–15 Jan. 1985, J. Irish; H. Liessner. 1 specimen as previous except 28 Aug.–22 Sep. 1984. 2 specimens: Rössing Mine, 22°28'S; 15°02'E [22.4667°S, 15.0333°E], Swakopmund Dist.,

3–31 July 1984, J. Irish; H. Liessner. 1 specimen as previous except 28 Aug.–25 Sep. 1 specimen as previous except 20 Nov.–18 Dec. 1 specimen as previous except 12 Feb.–1 Mar. 1985. 1 specimen as previous except Rössing, 14 Jan. 1985, E. Griffin
Paratypes deposited in (NMNW-5), (TMSA-1), (SANC-1), and (TKPC-3).

***Mezium nigriaenum*, n. sp.**

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Figures 2 and 5

Diagnosis.

This species can be separated from all others by the dark elytral colour, approaching black, with the remaining body surface distinctly dark bronze (Figure 2A, B, C, D, F). Most similar to *M. setosum*, this new species can easily be diagnosed by a much more elongate body and the lack of robust erect setae on the elytra, legs, and antennae. While both species have similar elongate setae on the pronotum, they are all erect on *M. setosum* while in *M. nigriaenum* they are erect only around the perimeter with those at middle appressed bearing apices that converge dorsally at the center of the pronotum. Lastly, no species of *Mezium* is known to approach the degree of distinct pinching or narrowing at the basal 1/3 of the elytra as seen in this new species.

Description. Length 2.16 mm.

Colour overall very dark, elytra black or nearly so, remaining area of body dark tan to bronze.

Head surface covered with short, slightly concave, scale-like setae; setae less concave on clypeus; antennal length about the same length as body, antennomeres elongate; eyes semicircular, projecting laterally, eye surface facing dorsally, ventral edge with a carina.

Pronotum maximum width about 1/2 maximum elytral width (1.0:1.9); covered by dense solid layer of setae; setal surfaces excavate, especially dorso-medially; setae cup-like, forming rough and irregular surface with a medial peak; in dorsal view long slender erect black setae around perimeter, setae more suberect or appressed on surface at middle with tips converging over medial peak.

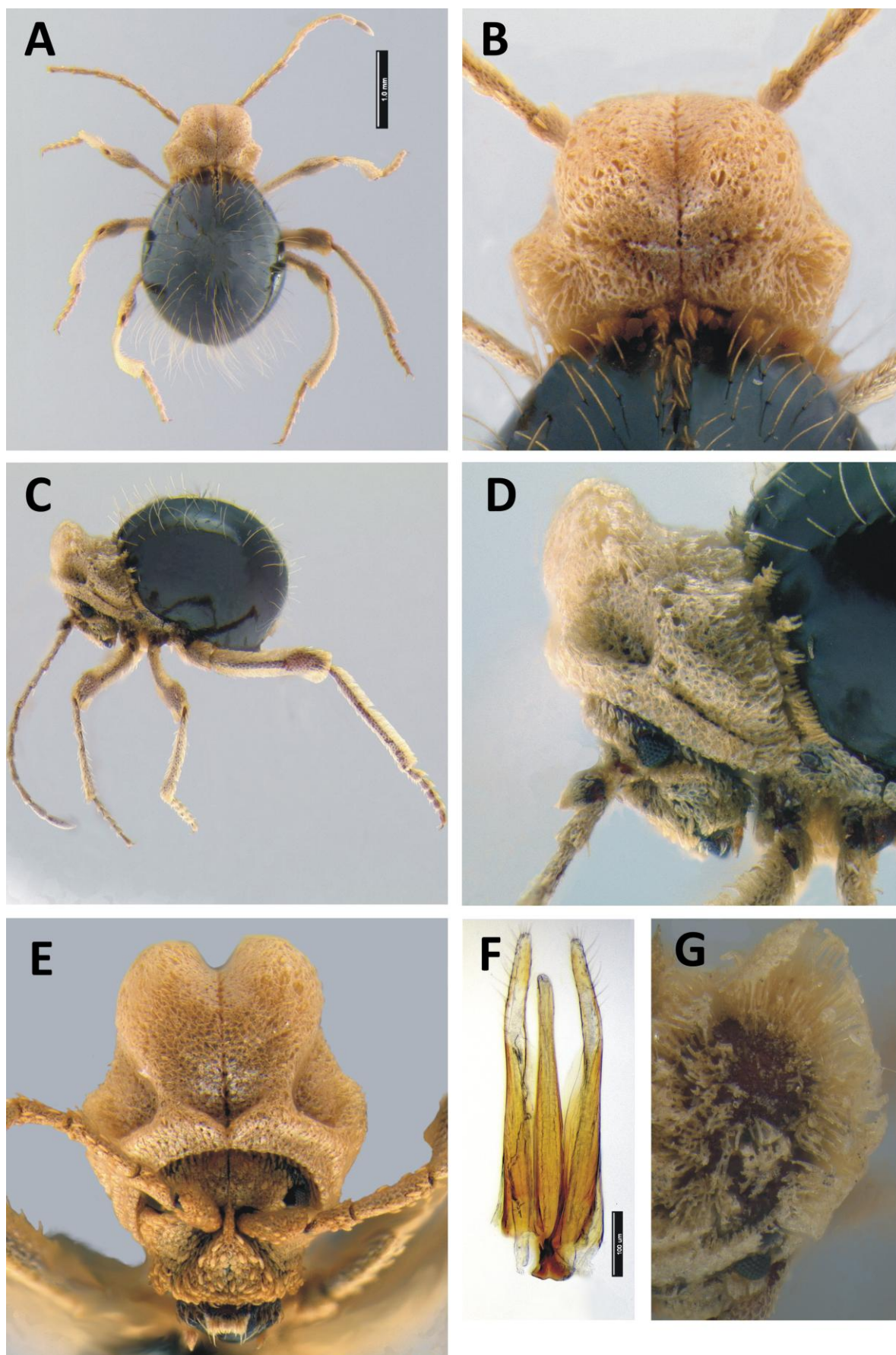


Figure 1 *Meziium inflatum* Philips. A) dorsal habitus; B) close-up view of pronotum and elytra base; C) lateral view; D) close-up lateral view of pronotum; E) frontal view of head and pronotum; F) male genitalia; G) close-up lateral view of part of the pronotum showing the interior of the pronotal setal covering.

Elytra elongate with setae absent, surface smooth but very finely and irregularly cracked in somewhat longitudinal lines appearing cell-like; elytra laterally flattened or pinched in anterior 1/3 near pronotum, creating rounded carinae at dorso-lateral edge; lateral margin slightly concave near middle; elytral suture also carinate with carina expanded in width at apex, apex recurved with small longitudinal carinae near suture at margin; pubescent collar at base absent.

Legs elongate, surface completely covered with ovoid, fish-like scales similar to those on head; additional scattered, more elongate, suberect setae along margins; metatibia and mesotibia distinctly longer than respective femora, protibia subequal to profemur.

Ventral surface covered in rounded or ovoid scale-like setae, similar to those elsewhere but more flattened, completely obscuring surface; a few scattered suberect short and narrow setae present.

Genitalia is not exposed and the only known specimen was not dissected. Species in the genus do not show external sexual dimorphism, so the sex is unknown.

Type material. Holotype. Namibia: Marienfluss, 4–8 km S. Otjinungwa, SE 1712 Ac, 21–22 Nov. 1970 / H10483. Deposited in the NMNW collection (National Museum of Namibia).

Etymology. The specific name from Latin refers to the very dark elytra with the remaining body parts bronze in colour.

Remarks. The type locality is in the Marienfluss Valley close to the Kunene River (4–8 km S) that separates Angola from Namibia (Figure 5). The individual may have been collected within or around the vegetation in the Otjindjangi riverbed or, and perhaps more likely, in the adjacent rocky areas that also match the species' dark body colour. The estimated coordinates at 6 km (halfway between 4 km and 8 km) south of the Kunene along the established route are: 17.3143°S, 12.4385°E.

Mezium setosum Borowski 2009 is very similar to this new species with a dark body colour but morphological evidence (see diagnosis) supports *M. nigriaenum* as a distinct species. *Mezium setosum*

is based on specimens collected in two localities (Cayimaeis and Warmbad (currently known as Warmquelle)) about 250 km south from the locality of *M. nigriaenum*. Both species are currently known from within the Kaokoveld ecoregion or the political area known as the Kunene Region in northwestern Namibia.

It is possible or even quite likely that *M. nigriaenum* is sympatric with the more widespread species, *Mezium gracilicorne* Pic. The latter is known from both further south as far as northern South Africa and north of the Kunene River in Angola; populations are known from both coastal areas and mountainous inland regions.

***Mezium africanum* Borowski**

Mezium pseudaffricanum Borowski, **new synonymy**
Figures 3, 4 and 5

The potential of these two species as actually representing only a single species was previously discussed in Philips and Dickmann (2018). Additional material from Namibia has helped determine that both should be recognised as a single species as earlier suspected.

The type series of *M. africanum* was represented by three cave (höhle) localities. Specimens from one type locality, Merkerhöhle, were not available for examination. Specimens from the other two type localities, Uhlenhorsthöhle and Uhlmannhöhle, were also not examined although one should note that they are actually from the same cave with two named entrances. However, specimens from Marchenhöhle (Figure 3) were examined and this cave is only about 280 m distant from one of the above cave openings (Figure 4). Further, those specimens match the description very well in morphology, including the relatively distinct median pronotal basal tufts as well as the base with relatively white appressed setae and elytra with erect setae from the base to the apex. Specimens seen from Hellwegshöhle (Figure 3), in particular, would be characterised as *M. africanum*. Although the erect elytral setae are not as numerous, they certainly continue beyond the midpoint of the elytra as is characteristic of this species noted in Borowski (2009).

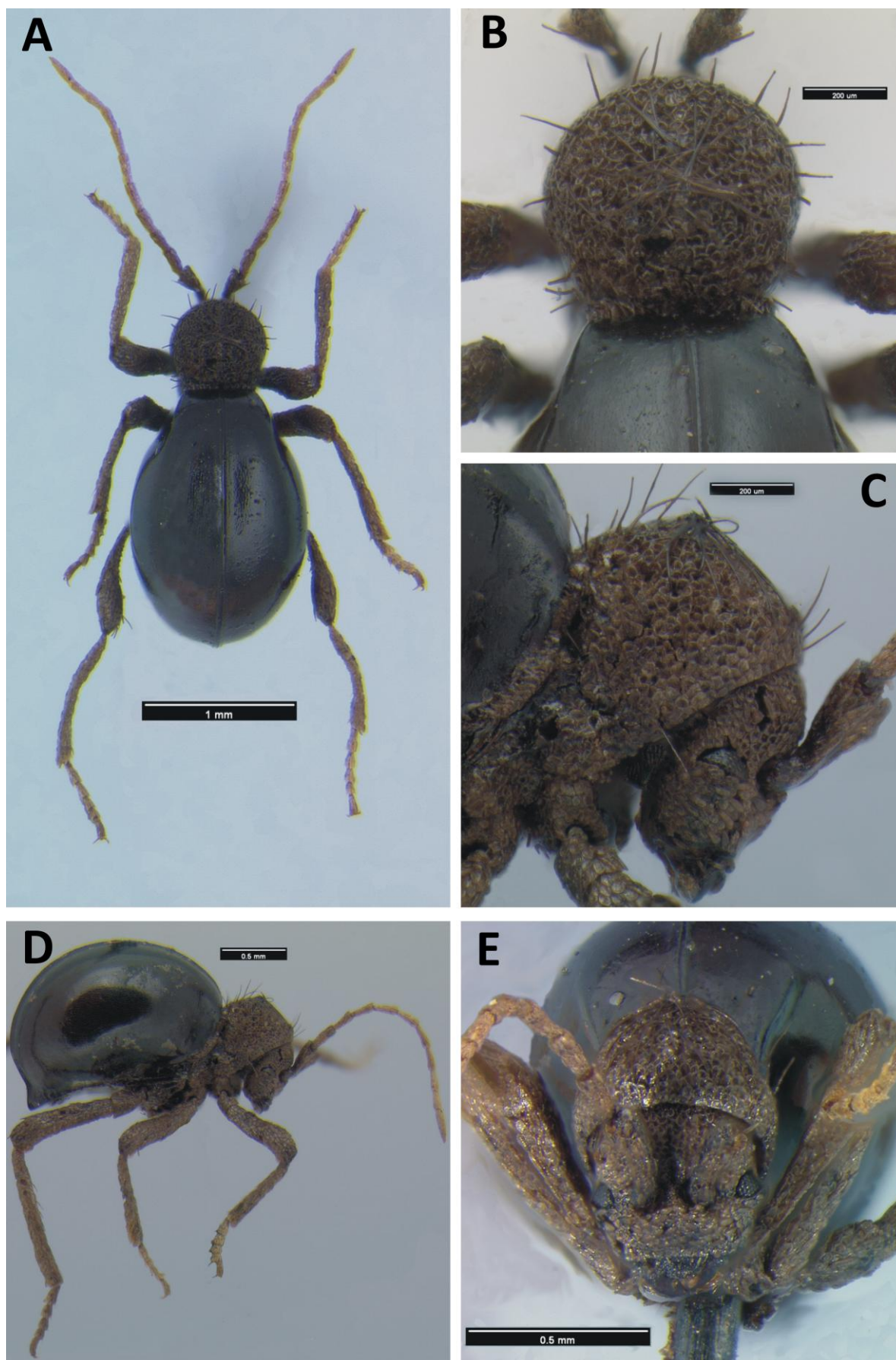


Figure 2 *Meziium nigriaenum* Philips. A) dorsal habitus; B) close-up view of pronotum and elytra base; C) lateral view of pronotum; D) lateral view; E) frontal view of head and pronotum.

The type series of *M. pseudaffricanum* include three cave localities (Verloren, Aigamas, and Arnhem). Specimens were examined from these three caves and from four other locations (see Figures 3 and 5) that include three caves (Hellwegshöhle, Mooihoekgrot, and Münsterland) as well as Brandberg. All specimens from these latter localities largely agree with the description of this species.

Regarding characters used in the identification key in Borowski (2009), one primary difference between the two species is the presence of erect elytral setae throughout the elytral surface in *M. africanum*. In contrast, these setae are absent or have a limited presence on the elytral basal region in *M. pseudaffricanum*. The amount of erect elytral setation can be a variable character within species of *Mezium*. For example, a large population sample of *M. affine* from Tunisia has some individuals lacking any elytral setae that is not due to abrasion while other specimens have a complete set covering the surface. Examined specimens determined as *M. pseudaffricanum* show variability in the amount of elytral setation; i.e., some have the entire basal half bearing erect setae (e.g., some individuals from the Aigamas type locality) whereas in others they are absent or occur only on the basal 1/4 (e.g., some individuals from the Arnhem type locality). Likewise, in some cases, specimens identified as *M. africanum*, based on the pronotal morphology, have elytra that are only partially covered instead of fully covered with erect setae.

The pronotal differences between *M. africanum* and *M. pseudaffricanum* initially appeared to be distinct with the former, in contrast to the latter, having a dense setal covering that lacks bare areas between and within the longitudinal setae ridges. Specimens examined from Hellwegshöhle have this dense pronotal setal covering as do specimens from Märchenhöhle. Both these caves are close to two of the three type localities of *M. africanum* including Uhlenhorsthöhle (also known as the Uisib Uhlenhorst Cave on the Uisib farm) and Uhlmann Cave. But, notably, the Hellwegshöhle specimens have a sparse elytral setal covering, only at the base as in *M. pseudaffricanum*. This appears to be a blend of the characteristics that would otherwise separate them into two different species.

Male genitalia as illustrated in Borowski (2009) do support the separation of these populations into two separate species. But at least one other single species has a similar range in male genitalic differences. *M. glabrum* (found only in southern Namibia) contains populations that are very similar externally in morphology, but in contrast, the male genitalia have a range in morphology. This is particularly seen in their length, a degree of variability that is strikingly similar to that seen in *M. africanum* and *M. pseudaffricanum* (see Philips and Dickmann 2018: Figures 7C, D and E; Borowski 2009: Figures 12 and 14). Male genitalia within species of *Mezium* appear to be more variable than one would expect and should be used with some level of caution. The variability is likely due to small population size and genetic drift effects as well as reduced gene flow between populations that can lead to more rapid male genitalic divergence compared to the likely slower evolving external morphology.

In summary, these populations are best considered as a single, slightly morphologically variable species across several external characters, such as the degree of erect elytral setae and pronotal morphology as well as internal male genitalic characteristics. Overall, although the populations have been hypothesised as two species, their similar and sometimes overlapping external characteristics indicate that, in fact, they represent only a single species.

New localities in Namibia for *M. africanum* not recorded in either Borowski (2009) or Philips and Dickmann (2018) are as follows: Hellwegshöhle (19.4376°S, 17.7515°E); Märchenhöhle (19.5559°S, 17.2351°E); Mooihoekgrot (20.1424°S, 15.8810°E); and Münsterlandhöhle (20.2393°S, 15.8831°E). For location clarification, the species is reported from Arnhem Cave in Namibia with the coordinates 22.7013°S, 18.0965°E. The approximate coordinates given in Philips and Dickman (2018) are close but those given in Borowski (2009) are more distant from the actual cave and no cave apparently exists in the latter location.

Mezium andreaei

This species was previously known only from the Richtersveld region in Northwest South Africa. A

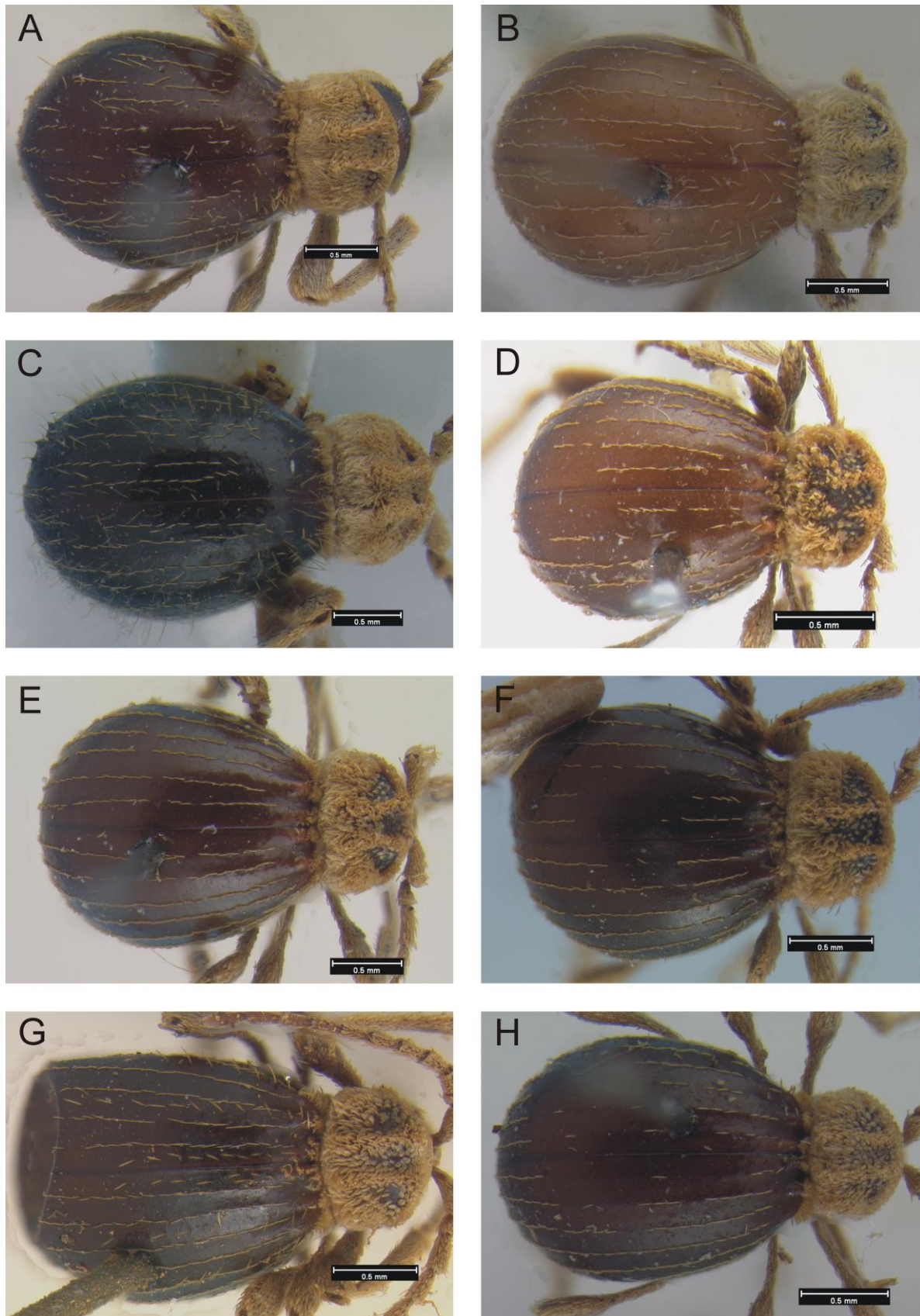


Figure 3. Specimens of *M. africanum* (and its junior synonym *M. pseudaffricanum*) from the north to the south A) Hellwegshöhle (19.4376°S, 17.7515°E); B) Aigamas (19.4596°S, 17.2831°E); C) Märchenhöhle (19.5559°S, 17.2351°E); D) Mooihoekgrot (20.1424°S, 15.8810°E); E) Münsterlandhöhle (20.2393°S, 15.8831°E); F) Brandberg (21.13°S, 14.55°E, Note these coordinates are located in the center of this massif as a more precise locality is unknown); G) Arnhem Cave (22.7013°S, 18.0965°E); H) Verloren Cave (23.1479°S, 16.3383°E).

single specimen appears externally conspecific with those from South Africa from W. Lorelei in the Lüderitz District, Namibia was discovered in material from the NMNW collection. No further locality data was given but coordinates west of Mt. Lorelei (28.0524°S, 16.9497°E) near the Orange River are likely close to where the beetle was found. The Orange River separating Namibia from South Africa is certainly a barrier but not an insurmountable one as populations of what one might call "*M. gracilicorne*" (see comments under that species) are known from both sides of the river. Dispersal across the river is likely due to individuals being washed from one bank to the other during periodic floods that can occur in the area.

Mezium glabrum

New localities not included in Borowski 2009 or Philips and Dickmann (2018) are as follows: South Africa, Goegap (29.68389°S, 17.94583°E) and Namibia, Bethanian District (27.900°S, 17.317°E) and Aurusberg (27.68°S, 16.37°E).

Mezium gracilicorne

As defined in Philips and Dickmann (2018), this species presents issues of morphological variation that imply the numerous populations potentially represent just a single morphologically variable species. To some degree, variation in these populations appears in combinations that lead to

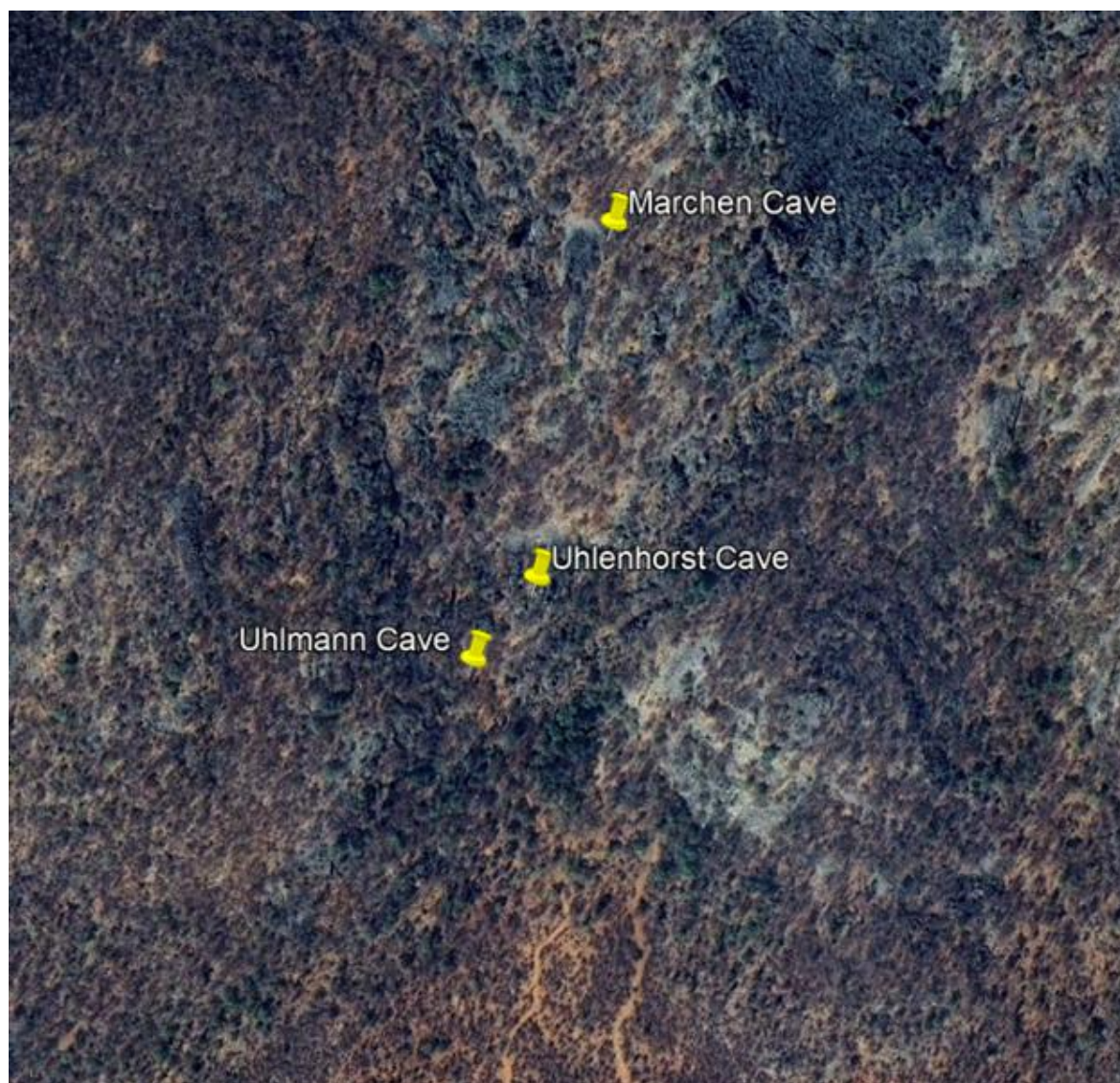


Figure 4. Google Earth image of the two type localities, Uhlmann and Uhlenhorst Caves (the latter also known as Unisib Cave) of *M. africanum* that are actually two entrances to the same cave. A third locality, Märchen Cave, is about 280 m from one of the other cave openings and specimens examined from this cave match the description in Borowski (2009).

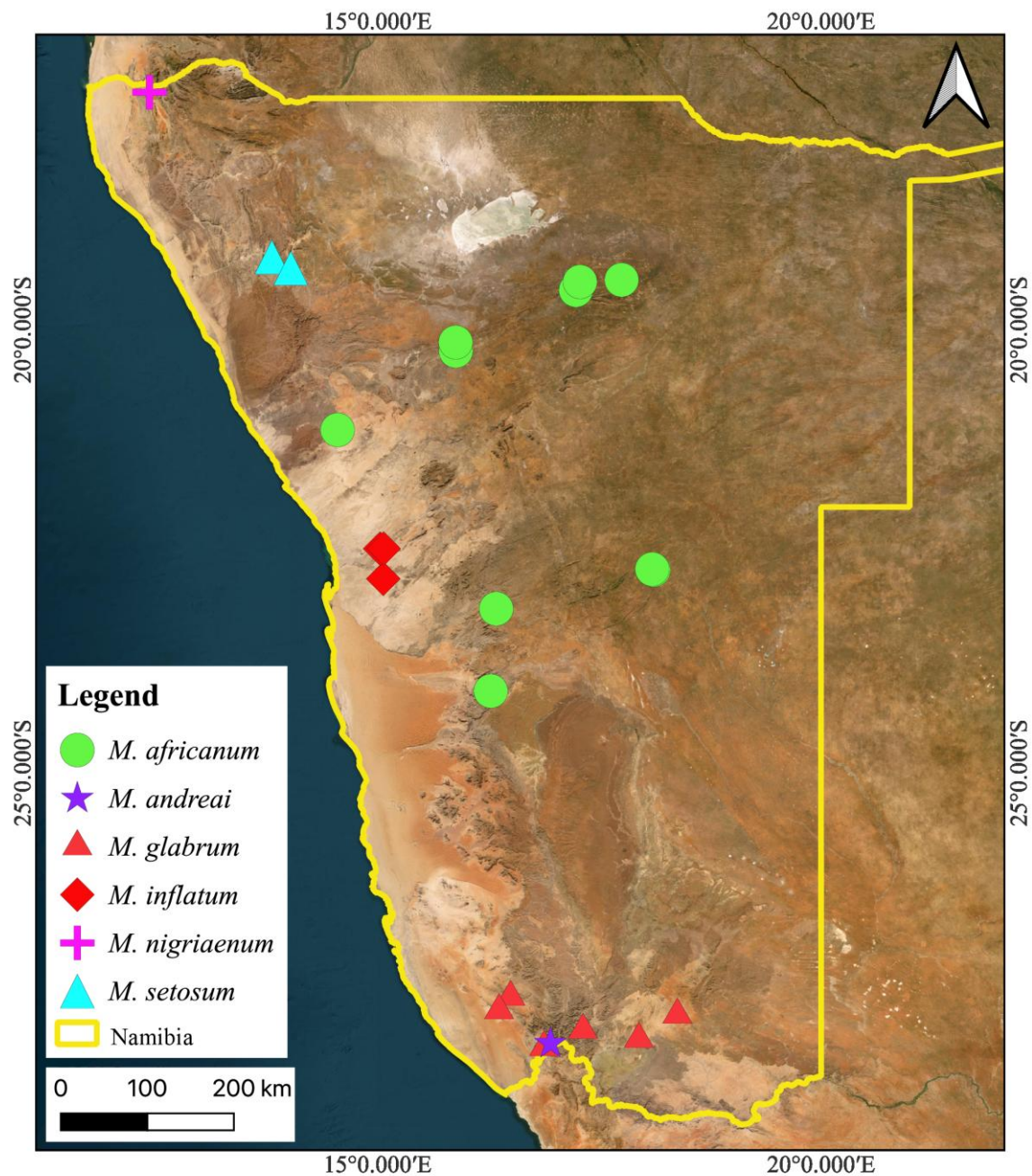


Figure 5. Map with the distributions of the species of *Meziium* known from Namibia. Note that the records of *M. gracilicorne* are not included. This taxon, previously recorded throughout western and central Namibia (see Philips and Dickmann, 2018), represents a species complex that will be defined in a subsequent publication.

confusion and difficulty regarding the definition of species limits. This is particularly true in the study of pronotal morphology that may be related to the effects of allometric growth. These issues led to Philips and Dickmann (2018) hypothesising that the populations represented a single highly variable species. However, upon further study of specimens, evidence suggests that *M. gracilicorne* actually represents a complex of species. These taxa will be defined in a forthcoming paper.

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REFERENCES

- Akotsen-Mensah C and Philips TK (2009) Description of a new genus and eight species of spider beetles (Coleoptera: Ptinidae) from South Africa. *Zootaxa* 2160: 51–67.
- Bell KL and Philips TK (2008) A revision of the South African myrmecophile *Diplocotidus* (Coleoptera: Ptinidae). *African Entomology* 16: 33–40.
- Bellés, X (1985) Sistemática, filogenia y biogeografía de la subfamilia Gibbiinae (Coleoptera: Ptinidae). *Treballs del Museum de Zoologia* 3: 1–94.
- Borowski J (2006a) *Hiekeptinus uhligi* – a new genus and species from South Africa (Coleoptera, Ptinidae). *Annals of Warsaw Agricultural University, Forestry and Wood Technology* 60: 3–6.
- Borowski J (2006b) *Scaleptinus* – a new genus for *Ptinus sericans* (Péringuey, 1888) and *Ptinus squamulosus* (Pic, 1908) and description of two new species belonging to the new genus (Coleoptera, Ptinidae). *Annals of Warsaw Agricultural University, Forestry and Wood Technology* 60: 17–23.
- Borowski J (2009a) The spider beetles of the continental Africa (Coleoptera: Ptinidae). Part I - Genus *Mezium* Curtis. *Studies and reports of District Museum Prague-East Taxonomical Series* 5: 1–10.
- Borowski J (2009b) The spider beetles of the continental Africa. Part II-*Dignomorphus danielssoni* n. gen. and n. sp. from South Africa (Coleoptera: Ptinidae). *Genus* 20: 257–261.
- Gearner OM, Philips TK and Koniar P (2019a) New species of the bizarre South African endemic genus *Meziomorphum* Pic (Coleoptera: Ptinidae). *Annals of the Ditsong National Museum of Natural History* 8: 137–149.
- Gearner OM, Philips TK and Neidlinger RH (2019b) A revision of *Eutaphroptinus* Borowski (Coleoptera: Ptinidae). *Tijdschrift voor Entomologie* 162 (1): 33–39.
- Gearner OM and Philips TK (2021) *Notaferrum* n. gen. (Coleoptera: Ptinidae): the first known spider beetle associated with weaver ants. *Zoosystema* 43 (2): 29–36.
- Hinton HE (1941) The Ptinidae of economic importance. *Bulletin of Entomological Research* 31: 331–381.
- Irish J (1996) The southern African genera *Stethomezium* Hinton, *Meziomorphum* Pic and *Lepidomezium* Bellés (Coleoptera: Ptinidae, Gibbiinae). *Navorsinge van die Nasionale Museum* 12: 317–334.
- Philips TK and Dickmann RL (2018) A New Species of *Mezium* Curtis (Coleoptera: Ptinidae) from South Africa with Notes on the Genus and Species Limits. *Coleopterists Bulletin* 72: 317–330.
- Philips TK. And Foster D (2004) *Cryptopeniculus nigrosetus* n.g., n. sp. (Coleoptera: Ptinidae) from the Namaqualand region of South Africa. *Zootaxa* 577: 1–11.
- Smiley ME and Philips TK (2011) Review of the South African spider beetle genus, *Pseudomezium* Pic, 1897 (Coleoptera: Ptinidae: Ptininae). *African Entomology* 19: 572–596.
- Trimboli SR and Philips TK (2011) Description of a new species of *Meziomorphum* Pic (Coleoptera: Ptinidae) from the Western Cape region of South Africa. *Coleopterists Bulletin* 65: 109–114.
- Wood MV and Philips TK (2013) *Carinomezium* (Coleoptera: Ptinidae): A new genus from the Namaqualand region of South Africa. *Tijdschrift voor Entomologie* 156: 11–19.