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Review of *Namibimydas* Hesse, 1972 and *Nothomydas* Hesse, 1969 (Diptera: Mydidae: Syllegomydinae: Halterorchini) with the description of new species

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ABSTRACT

The Mydidae genera *Namibimydas* Hesse, 1972 and *Nothomydas* Hesse, 1969 are reviewed. Both genera were known from two species each occurring in southern Namibia and western South Africa and are here redescribed. Four new species, all from Namibia, are described herein: *Namibimydas psamminos* sp. n., *Namibimydas stuckenbergi* sp. n., *Nothomydas aquilonius* sp. n., and *Nothomydas picketti* sp. n. A dichotomous key to all species is presented and illustrations and photographs are provided to support the descriptions and future identification. Distribution, occurrence in biodiversity hotspots *sensu Conservation International*, and seasonal incidence are discussed for all species. Information of all four genera of Syllegomydinae: Halterorchini is summarised and photographs of all genera provided. A novel structure of the male terminalia, termed supra-hypandrial sclerite, is described and illustrated.

KEY WORDS: Mydidae, Syllegomydinae, Halterorchini, *Halterorchis*, *Mimadelphus*, *Namibimydas*, *Nothomydas*, Afrotropical, biodiversity hotspots, supra-hypandrial sclerite, identification key.

INTRODUCTION

The southern African Mydidae fauna is the most diverse world-wide both in terms of species numbers and generic diversity. A.J. Hesse's (1969) seminal work on the southern African mydids, in which he described no fewer than 108 new species (106 of which are still valid) and 12 new genera (11 of which are still valid), provided a comprehensive overview of this unique fauna. In a few publications following this extensive work (Hesse 1972, 1974, 1975), he added another 17 new species and 3 new genera. Earlier, Gerstaecker (1868) and Bezzi (1924) studied the then available material and provided the first comprehensive studies and keys to the mydids of the region. Stuckenberg (1955, 1966) added to the knowledge of southern African Mydidae by describing one of the largest species, *Afropleptomydas omeri* (Stuckenberg, 1955) (Syllegomydinae), and one of the most enigmatic species, *Tongamyra miranda* Stuckenberg, 1966 (Megascelinae). The genus *Tongamyra* Stuckenberg, 1966 was initially described in Apioceridae, the sister group of Mydidae (Yeates & Irwin 1996; Irwin & Wiegmann 2001; Dikow 2009), but transferred together with *Megascelus* Philippi, 1865 from Chile and *Neorhaphiomidas* Norris, 1936 from Australia to the Mydidae by Yeates & Irwin (1996).

This study reviews the genera *Namibimydas* Hesse, 1972 and *Nothomydas* Hesse, 1969 placed in Syllegomydinae: Halterorchini, a tribal taxon established by Hesse (1972) who highlighted the morphological similarity of these two genera to *Halterorchis* Bezzi, 1924 and *Mimadelphus* Hesse, 1972. These four genera are represented by few specimens in collections (see below) and new material from several collections, particularly the Namibian National Museum in Windhoek, makes this review, new distributional information of the two genera, and the description of four new species possible.

Our previous knowledge of the species considered here can be summarised as follows:

Namibimydas (Figs 13–20): Hesse (1972) described the genus with its type species *Namibimydas gaerdesi* Hesse, 1972 based on one male and one female specimens collected at Walvis Bay (Erongo Region, Namibia). In 1974, Hesse added a second species, *Namibimydas prinsi* Hesse, 1974, based on a small series of specimens (4♂ and 3♀) collected at Paternoster (Western Cape Province, South Africa) and added notes on the flight behaviour, oviposition behaviour, and natural enemies of this species that were observed by the collector. Both species were collected at or near the Atlantic Ocean.

Nothomydas (Figs 35–42): Hesse (1969) described the genus with its type species *Nothomydas gariepinus* Hesse, 1969 based on a single male specimen collected at Vioolsdrif (Northern Cape Province, South Africa). In 1972, Hesse added a second species, *Nothomydas namaquensis* Hesse, 1972, based on a small series of specimens (5♂ and 1♀) collected at Port Nolloth (Northern Cape Province, South Africa). While Port Nolloth is directly on the Atlantic Ocean coast, Vioolsdrif is much further inland and situated on the Orange River at the border between Namibia and South Africa.

Our knowledge of the two remaining Halterorchini genera is even less complete:

Halterorchis (Fig. 46): Bezzi (1924) described the genus with its type species *Halterorchis inermis* Bezzi, 1924 based on a single female specimen collected at O'Okiep (29°35'42"S 17°52'52"E, Northern Cape Province, South Africa, holotype in SAMC) in his review of the mydids of southern Africa. Hesse (1969) added a second species to this genus, *Halterorchis karooensis* Hesse, 1969, also based on a single female specimen collected at Vogelfontein (32°38'39"S 21°52'56"E, Western Cape Province, South Africa, holotype in SAMC). To date, no additional specimens have been found that can unambiguously be assigned to *Halterorchis* and, unfortunately, the male of the genus remains unknown.

Mimadelphus (Fig. 47): Hesse (1972) described the genus with its type species *Mimadelphus vellosus* Hesse, 1972 based on a single male specimen collected in Namibia (no further locality available, holotype in SMNS). Here again, no additional specimens have so far been located and assigned to this genus and it is unfortunate that no further data are available that would help to elucidate when and where the type specimen was collected.

Bowden (1980) listed all above species in the *Catalogue of Afrotropical Diptera*.

Hesse (1972) described the tribal taxon Halterorchini placing in it the four genera *Halterorchis*, *Mimadelphus*, *Namibimydas*, and *Nothomydas* and provided an identification key to the genera. Hesse based Halterorchini on the reduced number of abdominal segments visible in pinned specimens in which tergite 8 and sternite 8 are hidden beneath segment 7. He further separated the genera in his key based on the length of the proboscis which is rudimentary in *Halterorchis* and *Mimadelphus*, but well-developed and long in *Namibimydas* (except *N. psamminos* sp. n.) and *Nothomydas*.

As can be seen from the above information, the four genera and seven species were represented by 19 specimens in total prior to this study. This review is based on an additional 34 specimens representing some of the previously known species, but also adding four previously unknown species for *Namibimydas* and *Nothomydas*. *Halterorchis* and *Mimadelphus* are excluded from the present study because more specimens, particularly ♂ of the former and ♀ of the latter, need to be available before the

genera can be sufficiently diagnosed and compared to *Namibimydas* and *Nothomydas*. However, photographs of representatives of *Halterorchis* and *Mimadelphus* (Figs 46–47) are provided for reference.

It should be noted that the delimitation, phylogenetic relationships, and the monophyly of Halterorchini has not been tested to date. However, the author is currently preparing a morphological phylogeny of Mydidae world-wide and representatives of both *Namibimydas* and *Nothomydas* are included in this analysis (Dikow in prep.).

MATERIAL AND METHODS

Morphological terminology and abbreviations for setae follow McAlpine (1981), Stuckenberg (1999), Cumming & Wood (2009), and Dikow (2009) except for the term ‘aedeagal epimere’, which is used as described by Hesse (1969). Abdominal tergites are abbreviated in the descriptions with ‘T’, and sternites are abbreviated with ‘S.’ The terms prothoracic, mesothoracic, and metathoracic are abbreviated ‘*pro*’, ‘*mes*’, and ‘*met*’, respectively. The term pubescence (adjective ‘pubescent’) refers to the short, fine microtrichia densely covering certain body parts. Other generalised terms follow the *Torre-Bueno Glossary of Entomology* (Nichols 1989). The species descriptions are based on composites of all specimens and not exclusively on the holotype and are compiled from a character matrix of 148 features assembled with Lucid Builder (version 3.5) and eventually exported as natural language descriptions. When available, species are fully described in the male sex while females are only described with those features that differ. The structure of the male terminalia and female genitalia is only described once for each genus except when species differ and additional species-specific features should be interpreted from the drawings.

The female genitalia and male terminalia were first excised and macerated in 10 % potassium hydroxide (KOH) at 55 °C followed by neutralisation in acetic acid and rinsing in distilled water. They were temporarily stored in 75 % ethanol for examination and illustration and eventually sealed in polyethylene genitalia vials containing 100 % glycerine and attached to the specimen’s pin. The male terminalia of the holotype of *Nothomydas aquilonius* sp. n. had been macerated for too long several years ago and were stained in Chlorazol Black in order to darken the cuticle. Morphological features were illustrated using a 10×10 ocular grid on a Olympus SZ60 stereo microscope and later digitally converted to vector graphics using Adobe Illustrator software. The setation on male terminalia is not shown. Wing length was measured from the tegula to the distal tip of the wing. Photographs of pinned specimens were taken with a Olympus E-30 digital SLR, a 50 mm macro lens (equivalent of 100 mm focal length in 35 mm photography), and a 25 mm extension tube. The specimens were illuminated by a LED ring-light fitted with a dome for even and soft light. All specimen photographs were deposited in Morphbank::Biological Imaging and permanent links to the full-size images are included in the figure captions. These images are automatically harvested by the Encyclopedia of Life and available under the respective species page.

In recording data for type specimens as well as non-type specimens, information is given (where available) in a standard manner, *i.e.*, locality, geographic co-ordinates, elevation, date of collection (month indicated in lower case Roman numerals where hyphens indicate missing entries for day, month, year), habitat information, sampling protocol (if other than hand netting), collector, and depository. Each specimen is listed

with a unique AAM specimen number that will allow the re-investigation as well as provide a unique Life Science Identifier (LSID). The distribution is illustrated in a distribution map with all localities plotted, for which co-ordinates were available, and the type locality is plotted with an open symbol. The specimen occurrence data are available on GBIF as data-set #14003 (persistent URL <http://data.gbif.org/datasets/resource/14003/>). The electronic shape-files of the Biodiversity Hotspots were obtained from Conservation International (2005; <http://www.conservation.org/Documents/cihotspotmap.pdf>). The electronic key was deposited in the IdentifyLife archive and is also available at http://www.mydidae.tdvia.de/online_keys. All taxon names were registered in ZooBank (Pyle & Michel 2008; see Table 1).

Institutions providing specimens are listed below, together with the abbreviations used in the text when citing depositories, and the people who kindly assisted:

- AMGS – Albany Museum, Grahamstown, South Africa (A. Kirk-Spriggs, S. Gess);
- BMNH – The Natural History Museum, London, UK (E. McAlister);
- NMSA – KwaZulu-Natal Museum, Pietermaritzburg, South Africa (B. Muller, J. Londt);
- NMNW – National Museum of Namibia, Windhoek, Namibia (A. Kirk-Spriggs);
- SAMC – Iziko South African Museum, Cape Town, South Africa (M. Cochrane);
- SMNS – Staatliches Museum für Naturkunde, Stuttgart, Germany (H.-P. Tschorsnig);
- USNM – United States National Museum, Smithsonian Institution, Washington DC, USA;
- ZMUC – Natural History Museum of Denmark, Zoological Museum, Copenhagen, Denmark (T. Pape).

TAXONOMY

The 25 genera of southern African mydids cannot be distinguished reliably based on the key published by Hesse (1969: 10), which is difficult to use. Although I have studied representatives of all genera and I am working on a new key for the forthcoming Manual of Afrotropical Diptera (Dikow in prep.), the scope of this manuscript does not allow for inclusion of a key to separate the Halterorchini genera from others. All Halterorchini genera are illustrated with colour photographs in this article to allow future identifications (Figs 13, 37, 46, 47).

Namibimydas and *Nothomydas* share a number of unique characteristics, particularly the male terminalia are distinctive, which are not known from other Syllegomydinae to date. In addition to the generic diagnoses, the following features are present in males of both taxa (Figs 10, 32): (1) abdominal sternite 8 strongly sclerotised and pointing ventrally (perpendicular to antero-posterior axis), (2) abdominal tergite 8 laterally elongated, sometimes partly overlapping with gonocoxite-hypandrial complex, (3) gonocoxite-hypandrial complex antero-dorsally with a unique bilobed sclerite (ventral to subepandrial plate) here termed supra-hypandrial sclerite (see Discussion), and (4) aedeagus with two thin and elongate prongs.

Genus *Namibimydas* Hesse, 1972

Figs 1–21, 43

Namibimydas Hesse, 1972: 158. Type species: *Namibimydas gaerdesi* Hesse, 1972 by orig. des.

ZooBank LSID: see Table 1.

Diagnosis: The genus is distinguished from other Syllegomydinae by its large size with a wing length of 11.2–17.7 mm, the generally grey colour caused by pubescence and dense white setation, the cylindrical metathoracic femora (not expanded), and structures of the male terminalia.

Description:

Male.

Abdomen and terminalia (Figs 1–12): T1–7 well-developed, entirely sclerotised, T8 posteromedially weakly sclerotised, with anterior transverse sclerotised bridge connecting lateral sclerites; T7–8 anteriorly with 2 lateral apodemes; S6 regular, without any special setation posteromedially, S8 not plate-like, medially narrow (broad laterally) and protruding ventrally (perpendicular to antero-posterior axis), not fused to T8 dorsolaterally; epandrium formed by two sclerites, separated medially and only joining anteriorly, distally in dorsal view blunt, evenly rounded; subepandrial sclerite without lateral or median protuberances; hypandrium strongly concave, laterally compressed, entirely sclerotised ventrally (forming a single sclerite), entirely fused with gonocoxite, forming a gonocoxite-hypandrial complex, supra-hypandrial sclerite absent in *N. gaerdesi* (Fig. 1) and present in *N. prinsi*, *N. psamminos* sp. n., and *N. stuckenbergi* sp. n. (Figs 4, 7, 10); gonocoxite dorsoventrally flattened (same height throughout, expanded laterally and medially), without median or lateral protuberance, gonocoxal apodeme absent; 2 functional aedeagal prongs, extremely long and thin, mediodistally free, parallel or diverging laterally, distally straight or only diverging slightly laterally; aedeagal epimere absent; lateral ejaculatory process absent; ejaculatory apodeme formed by single dorsoventrally oriented plate; ventro-median margin of dorsal aedeagal sheath heavily sclerotised (appearing entirely closed); dorsal aedeagal sheath long, sperm sac entirely covered; sperm sac appearing more-or-less heavily sclerotised.

Female.

Abdomen and genitalia (Fig. 21): Densely arranged anteriorly directed setae present on T6–8 and S6–8; T8 with broad anterior rectangular apodeme; T9 formed by wide, rectangular sclerite with median protuberance; T9+10 entirely fused, T10 divided into 2 heavily sclerotised acanthophorite plates, 5–9 acanthophorite spines per plate; 2 spermathecae, all equally large, formed by more-or-less expanded weakly sclerotised ducts; individual spermathecal duct long; S9 (furca) formed by 1 sclerite, ring-like (joined anteriorly and posteriorly), anterior furcal apodeme present, 2 lateral projections forming divided apodeme, lateral furcal apodeme absent, median furcal bridge absent.

Namibimydas gaerdesi Hesse, 1972

Figs 1–3, 13, 14, 21, 43

Namibimydas gaerdesi: Hesse 1972: 161.

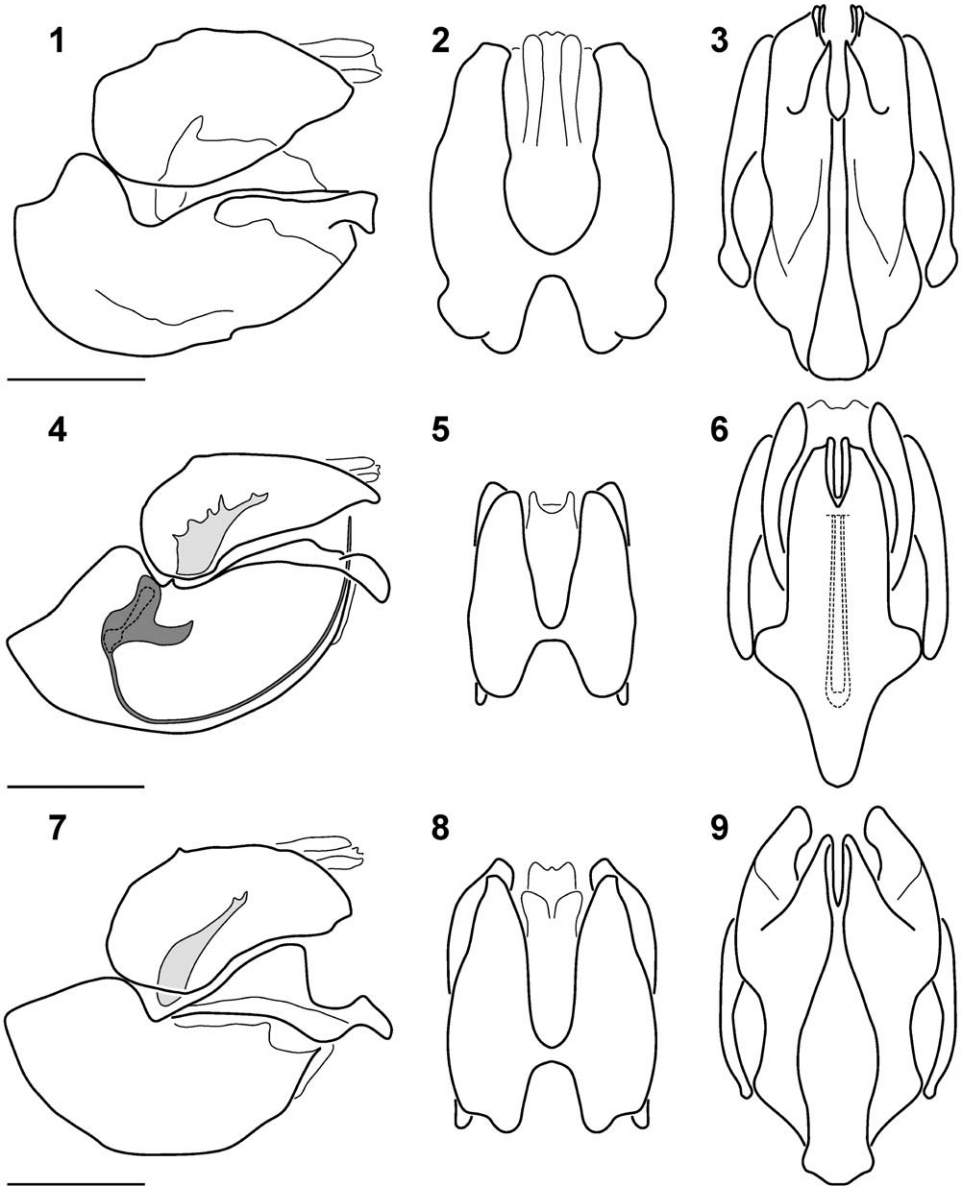
ZooBank LSID: see Table 1.

Diagnosis: The species is distinguished from congeners by the long proboscis that extends beyond the distal tip of the postpedicel (Fig. 13), the long abdominal setation in both males and females, the yellowish mystax (Figs 13, 14), and its apparent distribution in coastal (or near coastal) habitats from Swakopmund to Sandwich Bay in Namibia (Fig. 43).

Redescription:

Male.

Head: Black, in general densely grey pubescent; width distinctly greater than thorax, interocular distance on vertex larger than at ventral eye margin, vertex between com-



Figs 1–9. Male terminalia of *Namibimydas* spp.: (1–3) *Na. gaerdesi* (AAM-000859): (1) lateral, (2) dorsal, (3) ventral; (4–6) *Na. psamminos* sp. n. (AAM-000867): (7) lateral, (8) dorsal, (9) ventral; (7–9) *Na. stuckenbergi* sp. n. (AAM-000853): (10) lateral, (11) dorsal, (12) ventral. Aedeagus dark grey, supra-hypandrial sclerite light grey. Scale lines = 1 mm.

pound eyes more-or-less horizontally straight, medially only slightly below dorsal eye margin, parafacial area less than half the width of central facial gibbosity; facial gibbosity distinct, well-developed and discernible in lateral view; mystax white to yellowish, covering entire facial gibbosity; frons entirely grey pubescent, vertex entirely grey pubescent, postgena apubescent; setation: vertex white, frons white, *ocp* setae white, *pocl* macrosetae light brown; ocellar triangle apubescent; proboscis brown, long, projecting well-beyond fronto-clypeal suture and beyond tip of postpedicel; labellum small, as wide as prementum, about quarter length of prementum, unsclerotised laterally; maxillary palpus cylindrical, light brown, as long as pedicel.

Antenna: Brown, scape and pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal 0.4, symmetrically bulbous in distal 0.6, $\geq 5.0\times$ as long as scape and pedicel combined; apical 'seta-like' sensory element situated apically in cavity on postpedicel.

Thorax: Brown, predominantly grey pubescent; scutum medially dark brown, laterally brown, surface entirely smooth, lightly grey pubescent, broad sublateral stripes (interrupted postsuturally) and narrow paramedial stripes (not reaching posterior margin) apubescent, scutal setation comprised of long white setae with distinct rows of long *dc* setae and dense lateral scutal setae; *dc* setae pre- and postsuturally white, *acr* setae present, lateral scutal setae white, *npl* setae 0, *spal* setae 0, *pal* setae 0; postpronotal lobe light brown, grey pubescent; proepisternum, lateral postpronotum, and postpronotal lobe long white setose; scutellum grey pubescent, asetose, apical scutellar setae absent; mesopostnotum, anatergite, and katatergite grey pubescent, mesopostnotum asetose, anatergite asetose, katatergite long white setose; katatergite more-or-less flat; anterior anepisternum asetose, supero-posterior anepisternum long white setose; posterior anepimeron long white setose, katepimeron long white setose; metanepisternum grey pubescent, asetose, metepimeron more-or-less flat, same colour as T1, grey pubescent, long white setose.

Leg: Light brown and brown, setation white setose, brown macrosetose; *pro*, *mes*, and *met* coxa lightly grey pubescent, long white setose; *met* trochanter setose medially; femur brown, *met* femur more-or-less cylindrical, only slightly wider than *pro* and *mes* femur, in distal half macrosetose, 1 anteroventral and 1 posteroventral row of macrosetae, posteroventrally long white, erect setose and setae arranged in distinct row; *pro*, *mes*, and *met* tibia straight, *met* tibia cylindrical, ventral keel absent, lateroposteriorly long white, erect setose and setae arranged in distinct row; *pro* and *mes* tarsomere 1 longer than tarsomere 2, but less than combined length of tarsomeres 2–3, *met* tarsomere 1 as long as combined length of tarsomeres 2–3; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; empodium absent.

Wing: Length 13.8–15.2 mm; hyaline throughout, veins light yellow, microtrichia absent; cells r_1 , r_4 , r_5 , m_3 , and *cup* closed; C terminates at junction with R_1 ; R_4 terminates in R_1 ; R_5 terminates in R_1 ; stump vein (R_3) at base of R_4 present, short not reaching R_2 ; R_4 and R_5 widest apart medially; *r-m* distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 straight at *r-m* (not curving anteriorly), M_1 (or M_1+M_2) terminates in R_1 ; CuA_1 and CuA_2 split proximally to *m-cu* (cell m_3 narrow proximally); M_3+CuA_1 do not terminate together in C; A_1 undulating, cell a_1 wide, A_1 and wing margin further apart proximally than distally; alula well-developed, very large and partly overlapping with scutellum medially; haltere light brown.

Abdomen: Brown; setation comprised of dense long white setae, surface entirely smooth; T1–7 brown; T1–7 long white setose; T1 apubescent, T2–7 grey pubescent; S1–7 brown; S1 asetose, S2–7 sparsely white setose; S predominantly apubescent; T2–4 parallel-sided and not constricted waist-like; bullae on T2 black, transversely elongate, surface entirely smooth, T2 surface anterior to bullae smooth.

Terminalia (Figs 1–3): Supra-hypandrial sclerite absent (see Remarks).

Female.

Thorax: Scutum predominantly grey pubescent, broad sublateral stripes (interrupted postsuturally) and narrow paramedial stripes (not reaching posterior margin) apubescent. *Wing*: Length 15.0–17.7 mm. *Abdomen*: Scattered white setose; T1 and anterior half of T2 long white setose, remaining T short white setose; bullae on T2 black, small and circular. *Genitalia*: 6–7 acanthophorite spines per plate.

Material examined: NAMIBIA: *Erongo*: 1♂ 1♀ Swakopmund, 5 km E, 22°40'51"S 14°35'10"E, riverbed with *Tamarix* (Tamaricaceae), 4.ii.1978, O. Lomholdt (AAM-000865–AAM-000866, ZMUC); 1♂ 1♀ Swakop River mouth, 22°41'25"S 14°31'30"E, coastal and riverbed dunes, 8–9.ii.1974, L. Lyneborg (AAM-000859–AAM-000860, ZMUC); 1♂ 1♀ Swakopmund, S side Swakop River mouth, 22°41'33"S 14°31'37"E, 9 m, sandy river bed and vegetated dunes, resting on sand, 3.ii.2012, T. Dikow (AAM-007366–AAM-007367, USNM); 1♂ Walvis Bay, 22°57'27"S 14°30'19"E, 24.i.1940 (holotype, SMNS); 1♀ Walvis Bay, 20.i.1939 (allotype, SMNS); 1♀ Sandwichhafen (= Sandwich Harbour), 23°22'04"S 14°30'04"E, 19.i.1939 (AAM-003841, SMNS).

Type locality and distribution: Walvis Bay (22°57'27"S 14°30'19"E), Namibia (Fig. 43, GBIF resource #14003). Not known to occur in any biodiversity hotspot.

Remarks: When Hesse (1972) studied the specimens from the SMNS on which he based the new species description, he apparently did not study the female from Sandwichhafen also deposited in the SMNS. This specimen was studied by myself in October 2010 during a visit to the SMNS. The absence of a supra-hypandrial sclerite in this species is quite surprising. It is possible that this sclerite has been fused with the dorso-lateral margin of the gonocoxite-hypandrial complex and therefore forming a “roof” closing this structure dorsally (Fig. 1).

The species was recently collected at the Swakop River mouth by myself and observed to fly around the vegetated hummocks as shown in the habitat photograph in Fig. 44. One specimen was collected resting on dead, grey vegetation low above the ground where it is well-camouflaged by its overall grey coloration (see Fig. 13).

Namibimydas prinsi Hesse, 1974

Figs 10–12, 15, 16, 43

Namibimydas prinsi: Hesse 1974: 26.

ZooBank LSID: see Table 1.

Diagnosis: The species is distinguished from congeners by the lack of ventral macrosetae on the metathoracic femora, the short abdominal setation in females (Fig. 16), and its apparent distribution in coastal habitats in the far south-western Western Cape Province of South Africa (Fig. 43).

Redescription:

Male.

Head: Black, in general densely grey pubescent; width distinctly greater than thorax, interocular distance on vertex larger than at ventral eye margin, vertex between com-

pound eyes more-or-less horizontally straight, medially only slightly below dorsal eye margin, parafacial area more than half width of central facial gibbosity; facial gibbosity distinct, well-developed and discernible in lateral view; mystax white, covering entire facial gibbosity; frons entirely grey pubescent, vertex entirely grey pubescent, postgena lightly grey pubescent; setation: vertex white, frons white, *ocp* setae white, *pocl* macrosetae light brown; ocellar triangle apubescent; proboscis brown, long, projecting well-beyond fronto-clypeal suture, reaching half length of postpedicel; labellum small, as wide as prementum, about quarter length of prementum, unsclerotised laterally; maxillary palpus cylindrical, light brown, as long as pedicel.

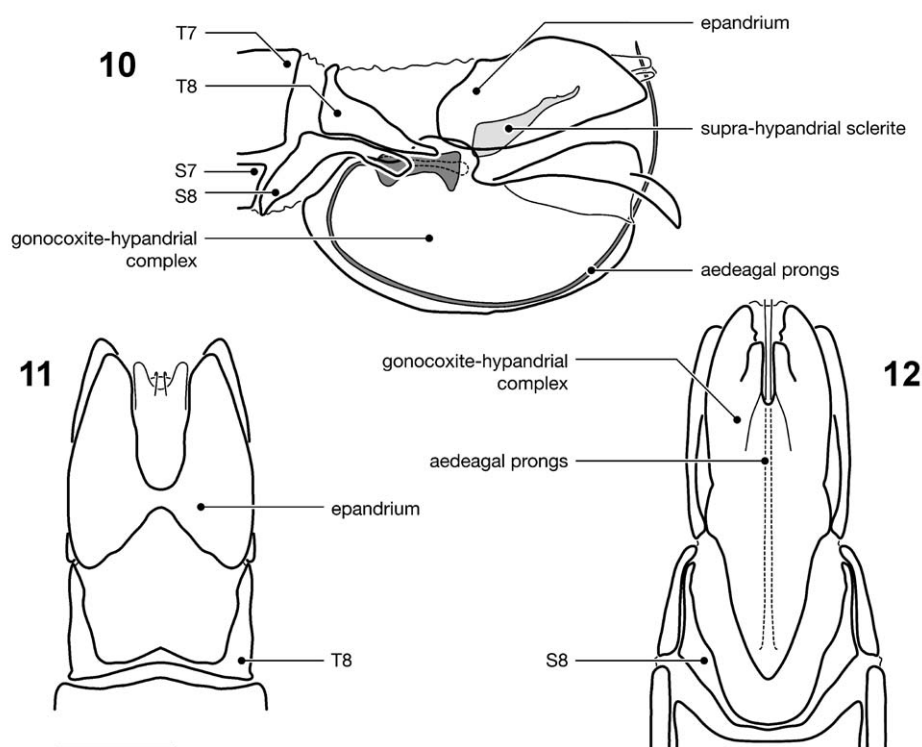
Antenna: Brown, scape and pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal 0.4, symmetrically bulbous in distal 0.6, $\geq 4.0\times$ as long as combined length of scape and pedicel; apical 'seta-like' sensory element situated apically in cavity on postpedicel.

Thorax: Brown, predominantly grey pubescent; scutum uniformly brown, surface entirely smooth, lightly grey pubescent, scutal setation comprised of long white setae with distinct rows of long dorsocentral setae and dense lateral scutal setae; *dc* setae pre- and postsuturally white, *acr* setae present, lateral scutal setae white, *npl* setae 0, *spal* setae 0, *pal* setae 0; postpronotal lobe brown, grey pubescent; propisternum, lateral postpronotum, and postpronotal lobe long white setose; scutellum grey pubescent, aseptose, apical scutellar setae absent; mesopostnotum, anatergite, and katatergite grey pubescent, mesopostnotum aseptose, anatergite long white setose, katatergite long white setose; katatergite more-or-less flat; anterior anepisternum aseptose, supero-posterior anepisternum long white setose; posterior anepimeron long white setose, katepimeron long white setose; metanepisternum grey pubescent, aseptose, metepimeron more-or-less flat, same colour as T1, grey pubescent, long white setose.

Leg: Light brown, setation predominantly white; *pro*, *mes*, and *met* coxa lightly grey pubescent, long white setose; *met* trochanter setose medially; femur light brown, *met* femur more-or-less cylindrical only slightly wider than *pro* and *mes* femur, in distal half without ventral macrosetae, posteroventrally long white, erect setose and setae arranged in distinct row; *pro*, *mes*, and *met* tibia straight, *met* tibia cylindrical, ventral keel absent, lateroposteriorly long white, erect setose and setae arranged in distinct row; *pro* and *mes* tarsomere 1 longer than tarsomere 2, but less than combined length of tarsomeres 2–3, *met* tarsomere 1 as long as combined length of tarsomeres 2–3; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; empodium absent.

Wing: Length 11.2–12.5 mm; hyaline throughout, veins light yellow, microtrichia absent; cells r_1 , r_4 , r_5 , m_3 , and *cup* closed; C terminates at junction with R_1 ; R_4 terminates in R_1 ; R_5 terminates in R_1 ; stump vein (R_3) at base of R_4 present, short not reaching R_2 ; R_4 and R_5 widest apart medially; $r-m$ distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 curves slightly anteriorly at $r-m$, M_1 (or M_1+M_2) terminates in R_1 ; CuA_1 and CuA_2 split proximally to $m-cu$ (cell m_3 narrow proximally); M_3+CuA_1 do not terminate together in C; A_1 undulating, cell a_1 wide, A_1 and wing margin further apart proximally than distally; alula well-developed, very large and partly overlapping with scutellum medially; haltere light brown.

Abdomen: Brown; setation comprised of dense long white setose, surface entirely smooth; T1–7 brown with narrow yellow posterior margin; T1–7 long white setose;



Figs 10–12. Male terminalia of *Namibimydas prinsi* (paratype) with features labelled: (10) lateral, (11) dorsal, (12) ventral. Aedeagus dark grey, supra-hypandrial sclerite light grey. Scale line = 1 mm.

T1 apubescent, T2–7 grey pubescent; S1–7 brown; S1 asetose, S2–7 sparsely white setose; S predominantly apubescent; T2–4 parallel-sided and not constricted waist-like; bullae on T2 black, transversely elongate, surface entirely smooth, T2 surface anterior to bullae smooth.

Terminalia (10–12): Supra-hypandrial sclerite present.

Female.

Head: *Pocl* macrosetae yellow; labellum about 0.2 length of prementum. *Antenna:* $\geq 5.0\times$ as long as combined length of scape and pedicel. *Leg:* *met* femur posteroventrally sparse long white, erect setose and setae arranged in distinct row; *met* tibia lateroposteriorly sparse long white, erect setose and setae arranged in distinct row; *met* tarsomere 1 less than combined length of tarsomeres 2–3. *Wing:* Length 12.3–12.7 mm; M1 straight at *r-m* (not curving anteriorly). *Abdomen:* Setation dense, very short white setose; T1–7 brown; T1 and antero-lateral corners of T2–3 long white setose, remaining T short white setose; S1–7 predominantly asetose; bullae on T2 black, oval. *Genitalia:* 6–7 acanthophorite spines per plate.

Material examined: SOUTH AFRICA: *Western Cape:* 3 ♀ 4 ♂ Paternoster, 32°48'25"S 17°53'01"E, 13.ii. 1973, A. Prins (holotype and paratypes, SAMC).

Type locality and distribution: Paternoster (32°48'25"S 17°53'01"E), South Africa (Fig. 43, GBIF resource #14003). Biodiversity hotspot: endemic to Cape Floristic Region.

Namibimydas psamminos sp. n.

Figs 4–6, 17, 18, 43

ZooBank LSID: see Table 1.

Etymology: From Greek *psamminos* (of sand), referring to the apparent distribution along the eastern edge of the Namib desert sand dunes.

Diagnosis: The species is distinguished from congeners by the short proboscis that does not extend beyond the fronto-clypeal suture, the short and sparse abdominal setation in both males and females (Figs 17, 18), and its apparent distribution at the eastern edge of the Namib Desert sand dunes in Namibia (Fig. 43).

Description:

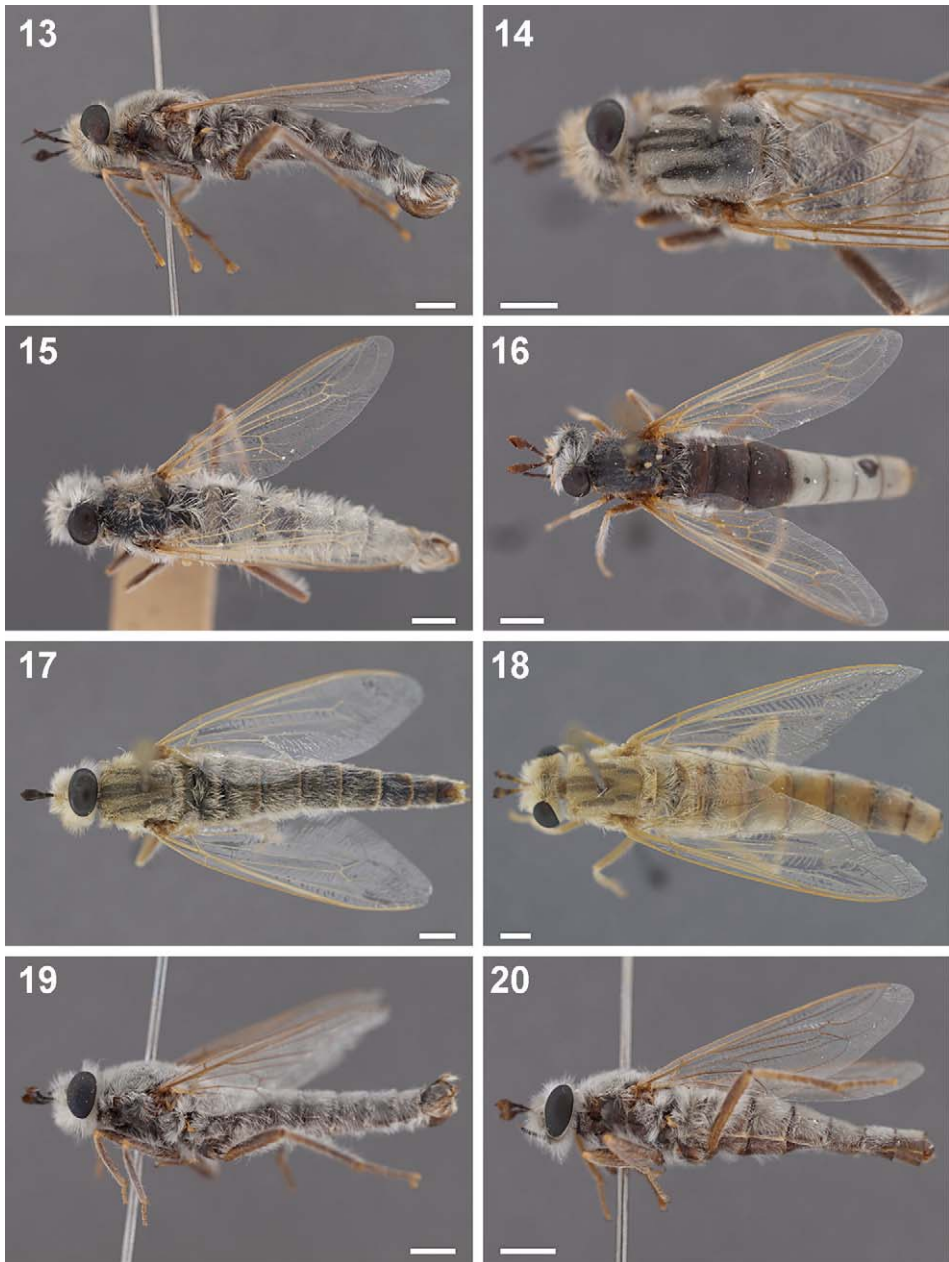
Male.

Head: Black, in general grey pubescent; width distinctly greater than thorax, interocular distance on vertex larger than at ventral eye margin, vertex between compound eyes more-or-less horizontally straight, medially only slightly below dorsal eye margin, parafacial area about as wide as half the width of central facial gibbosity; facial gibbosity distinct, well-developed and discernible in lateral view; mystax white, covering entire facial gibbosity; frons entirely grey pubescent, vertex entirely grey pubescent, postgena apubescent; setation: vertex white or yellow, frons white or yellow, *ocp* setae white, *pocl* macrosetae yellow; ocellar triangle apubescent; proboscis brown, short, about half length of oral cavity; labellum small, as wide as prementum, about half length of prementum, unsclerotised laterally; maxillary palpus cylindrical, light brown, as long as pedicel.

Antenna: Brown, scape and pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal 0.4, symmetrically bulbous in distal 0.6, $\geq 4.0\times$ as long as combined length of scape and pedicel; apical ‘seta-like’ sensory element situated apically in cavity on postpedicel.

Thorax: Brown, predominantly grey pubescent; scutum uniformly brown, surface entirely smooth, lightly grey pubescent, broad sublateral stripes (interrupted postsuturally) and narrow paramedial stripes (not reaching posterior margin) darker grey pubescent, scutal setation comprised of long white setae with distinct rows of long dorsocentral setae and dense lateral scutal setae; *dc* setae pre- and postsuturally white, *acr* setae present, lateral scutal setae white, *npl* setae 0, *spal* setae 0, *pal* setae 0; postpronotal lobe light brown, grey pubescent; proepisternum, lateral postpronotum, and postpronotal lobe long white setose; scutellum grey pubescent, asetose, apical scutellar setae absent; mesopostnotum, anatergite, and katatergite grey pubescent, mesopostnotum asetose, anatergite long white setose, katatergite long white setose; katatergite more-or-less flat; anterior anepisternum asetose, supero-posterior anepisternum long white setose; posterior anepimeron long white setose, katapimeron long white setose; metanepisternum grey pubescent, asetose, metepimeron more-or-less flat, same colour as T1, grey pubescent, long white setose.

Leg: Light brown, setation predominantly white; *pro*, *mes*, and *met* coxa lightly grey pubescent, long white setose; *met* trochanter setose medially; femur light brown, *met* femur more-or-less cylindrical only slightly wider than *pro* and *mes* femur, in distal half macrosetose, 1 anteroventral and 1 posteroventral row of macrosetae, posteroventrally sparse long white, erect setose and setae arranged in distinct row; *pro*, *mes*, and *met*



Figs 13–20. Images of *Namibimydas* spp.: (13, 14) *Na. gaerdesi*: (13) ♂ lateral (AAM-000860, Morphbank: #704363), (14) ♀ dorsal (AAM-000866, #704367); (15, 16) *Na. prinsi*, dorsal: (15) ♂ paratype (#704373), (16) ♀ paratype (#704376); (17, 18) *Na. psamminos* sp. n., dorsal: (17) ♂ holotype (AAM-007360, #796746), (18) ♀ paratype (AAM-007363, #796749); (19, 20) *Na. stuckenbergi* sp. n., lateral: (19) ♂ holotype (AAM-000858, #704391), (20) ♀ paratype (AAM-000855, #704394). Scale lines = 2 mm.

tibia straight, *met* tibia cylindrical, ventral keel absent, lateroposteriorly sparse long white, erect setose and setae arranged in distinct row; *pro* and *mes* tarsomere 1 longer than tarsomere 2, but less than combined length of tarsomeres 2–3, *met* tarsomere 1 as long as combined length of tarsomeres 2–3; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; empodium absent.

Wing: Length 14.6–15.9 mm; hyaline throughout, veins light yellow, microtrichia absent; cells r_1 , r_{4+5} , m_3 , and *cu*₁ closed; C terminates at junction with R_1 ; R_4 terminates in R_1 ; R_5 terminates in R_1 ; stump vein (R_3) at base of R_4 present, short not reaching R_2 ; R_4 and R_5 widest apart medially; *r-m* distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 curves slightly anteriorly at *r-m*, M_1 (or M_1+M_2) terminates in R_1 ; CuA_1 and CuA_2 split proximally to *m-cu* (cell m_3 narrow proximally); M_3+CuA_1 do not terminate together in C; A_1 undulating, cell a_1 wide, A_1 and wing margin further apart proximally than distally; alula well-developed, very large and partly overlapping with scutellum medially; haltere light brown.

Abdomen: Brown and light brown; setation comprised of dense short white setose, surface entirely smooth; T1 brown, yellow posterior margin, T2–3 light brown, anteriorly brown and posteriorly with yellow margin, T4–7 light brown with yellow posterior margin; T1 and anterior half of T2 long white setose, remaining T short white setose; T1 apubescent, T2–7 grey pubescent; S1–7 light brown; S1 asetose, S2–7 sparsely white setose; S predominantly apubescent; T2–4 parallel-sided and not constricted waist-like; bullae on T2 black, oval, surface entirely smooth, T2 surface anterior to bullae smooth.

Terminalia (Figs 4–6): Supra-hypandrial sclerite present.

Female.

Head: Brown, vertex and frons white setose. *Antenna*: Postpedicel $\geq 5.0\times$ as long as combined length of scape and pedicel. *Wing*: Length 15.5–17.1 mm. *Abdomen*: T1 brown, T2–7 brown with yellow posterior margin. *Genitalia*: 5–6 acanthoporphite spines per plate.

Holotype: ♂ NAMIBIA: *Hardap*: Namib-Skeleton Coast National Park, Sesriem, Elim Dune, 24°27'28"S 15°46'37"E, 826 m, vegetated dune, resting on dead vegetation + sand, 9.ii.2012, T. Dikow (AAM-007360, NMNW).

Paratypes: NAMIBIA: *Erongo*: 1♂ Homeb, 16 km ESE Gobabeb (23), 23°38'12"S 15°10'55"E, 23–25.i.1972, BMNH Southern Africa Expedition (AAM-000867, BMNH). *Hardap*: 1♀ Sesriem 137, 24°29'00"S 15°48'00"E, 5–8.iv.1972 (AAM-003056, NMNW); 2♂ 2♀ Namib-Skeleton Coast National Park, Sesriem, Elim Dune, 24°27'28"S 15°46'37"E, 826 m, vegetated dune, resting on dead vegetation + sand, T. Dikow, 9.ii.2012 (AAM-007361–AAM-007364, NMNW, USNM); 1♂ Namib-Skeleton Coast National Park, Sesriem, Elim Dune, 24°27'35"S 15°46'21"E, 839 m, vegetated dune, resting on dead vegetation + sand, 10.ii.2012, T. Dikow (AAM-007365, USNM).

Type locality and distribution: Namib-Skeleton Coast National Park, Elim Dune near Sesriem (24°27'28"S 15°46'37"E), Namibia (Fig. 43, GBIF resource #14003). Not known to occur in any biodiversity hotspot.

Remarks: This species has been labelled previously as a new species and as a holotype by J. Bowden (unpublished) who named it *Mesomydas syncrasis* based on the male from Homeb deposited in the BMNH (see image at Morphbank #704382, note: ♂ *terminalia* previously removed). Since neither the generic nor the specific name have ever been published, they have no standing in nomenclature. Bowden was apparently unaware that the specimen he studied was congeneric with *Namibimydus*, which might

be because this species, in contrast to all other known *Namibimydas* species, has a short proboscis and Hesse (1972) in describing the genus highlighted the fact that the proboscis is long.

At the start of this project only two specimens of this new species were known, i.e., the Homeb specimen referred to above and the Sesriem ♀ paratype (see image at Morphbank, #704386). Through field work conducted by myself in February 2012, eight specimens (six listed above plus one male preserved in 95 % ethanol and one male in Kahle's fluid) were collected on the partly vegetated sand dune named Elim Dune in the Namib-Skeleton Coast National Park (24°27'28"S 15°46'37"E, habitat in Fig. 45) near Sesriem. The flies were flying very fast during the period between 9:00 a.m. to 1:00 p.m. (I did not visit this same dune in the afternoon) and were difficult to catch. I estimate that I only caught every fourth specimen I saw often after a prolonged chase with the fly very seldom interrupting its flightpath. The males were more active and appeared to fly from one vegetated hummock to another one in search for females. When a female, which were observed to rest close to the base of the plants in the shade, were encountered by the males both of them flew high into the air and could not be followed anymore. The flight behaviour of the males was very similar to aculeate Hymenoptera who often have a sustained, meandering flight low above the surface. The species was not encountered on a similarly vegetated dune some 18.5 km further SW along the road to Sossusvlei (24°36'17"S 15°40'10"E, 780 m) that was visited shortly after a series of specimens had been collected at Elim Dune.

***Namibimydas stuckenbergi* sp. n.**

Figs 7–9, 19, 20, 43

ZooBank LSID: see Table 1.

Etymology: The species is named after and dedicated to the memory of Diptera systematist and taxonomist Brian Roy Stuckenberg, who contributed in many great ways to Afrotropical dipterology (Kirk-Spriggs 2012).

Diagnosis: The species is distinguished from congeners by the long proboscis that extends beyond the fronto-clypeal suture, but does not reach the tip of the postpedicel (Fig. 20), the entirely white mystax (Figs 19, 20), the long abdominal setation in both males and females, and its apparent distribution in coastal (or near coastal) habitats around Lüderitz in Namibia (Fig. 43).

Description:

Male.

Head: Black, in general densely grey pubescent; width distinctly greater than thorax, interocular distance on vertex larger than at ventral eye margin, vertex between compound eyes more-or-less horizontally straight, medially only slightly below dorsal eye margin, parafacial area less than half the width of central facial gibbosity; facial gibbosity distinct, well-developed and discernible in lateral view; mystax white, covering entire facial gibbosity; frons entirely grey pubescent, vertex entirely grey pubescent, postgena lightly grey pubescent; setation: vertex white, frons white, *ocp* setae white, *pocl* macrosetae yellow; ocellar triangle apubescent; proboscis brown, long, projecting well-beyond fronto-clypeal suture, reaching half of length of postpedicel; labellum

small, as wide as prementum, about quarter length of prementum, unsclerotised laterally; maxillary palpus cylindrical, light brown, as long as pedicel.

Antenna: Brown, scape and pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal 0.4, symmetrically bulbous in distal 0.6, $\geq 5.0\times$ as long as combined length of scape and pedicel; apical 'seta-like' sensory element situated apically in cavity on postpedicel.

Thorax: Brown, predominantly grey pubescent; scutum medially dark brown, laterally brown, surface entirely smooth, lightly grey pubescent, broad sublateral stripes (interrupted postsuturally) and narrow paramedial stripes (not reaching posterior margin) darker grey pubescent, scutal setation comprised of long white setae with distinct rows of long dorsocentral setae and dense lateral scutal setae; *dc* setae pre- and postsuturally white, *acr* setae present, lateral scutal setae white, *npl* setae 0, *spal* setae 0, *pal* setae 0; postpronotal lobe brown, grey pubescent; proepisternum, lateral postpronotum, and postpronotal lobe long white setose; scutellum grey pubescent, asetose, apical scutellar setae absent; mesopostnotum, anatergite, and katatergite grey pubescent, mesopostnotum asetose, anatergite asetose, katatergite long white setose; katatergite more-or-less flat; anterior anepisternum asetose, supero-posterior anepisternum long white setose; posterior anepimeron long white setose, katepimeron long white setose; metanepisternum grey pubescent, asetose, metepimeron more-or-less flat, same colour as T1, grey pubescent, long white setose.

Leg: Light brown and brown, setation white setose, brown macrosetose; *pro*, *mes*, and *met* coxa lightly grey pubescent, long white setose; *met* trochanter setose medially; femur brown, *met* femur more-or-less cylindrical only slightly wider than *pro* and *mes* femur, in distal half macrosetose, 1 anteroventral and 1 posteroventral row of macrosetae, posteroventrally long white, erect setose and setae arranged in distinct row; *pro*, *mes*, and *met* tibia straight, *met* tibia cylindrical, ventral keel absent, lateroposteriorly long white, erect setose and setae arranged in distinct row; *pro* and *mes* tarsomere 1 longer than tarsomere 2, but less than combined length of tarsomeres 2–3, *met* tarsomere 1 as long as combined length of tarsomeres 2–3; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; empodium absent.

Wing: Length 13.2–14.9 mm; hyaline throughout, veins light brown, microtrichia absent; cells r_1 , r_4 , r_5 , m_3 , and *cup* closed; C terminates at junction with R_1 ; R_4 terminates in R_1 ; R_5 terminates in R_1 ; stump vein (R_3) at base of R_4 present, short not reaching R_2 ; R_4 and R_5 widest apart medially; *r-m* distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 straight at *r-m* (not curving anteriorly), M_1 (or M_1+M_2) terminates in R_1 ; CuA_1 and CuA_2 split proximally to *m-cu* (cell m_3 narrow proximally); M_3+CuA_1 do not terminate together in C; A_1 undulating, cell a_1 wide, A_1 and wing margin further apart proximally than distally; alula well-developed, very large and partly overlapping with scutellum medially; haltere light brown.

Abdomen: Brown; setation comprised of dense long white setose, surface entirely smooth; T1–7 brown; T1–7 long white setose; T1 apubescent, T2–7 grey pubescent; S1–7 brown; S1 asetose, S2–7 sparsely white setose; S predominantly apubescent; T2–4 parallel-sided and not constricted waist-like; bullae on T2 black, transversely elongate, surface entirely smooth, T2 surface anterior to bullae smooth.

Terminalia (Figs 7–9): Supra-hypandrial sclerite present.

Female.

Wing: Length 12.5–15.2 mm. *Abdomen:* Setation dense short white setose, T1 and anterior half of T2 long white setose, remaining T short white setose; bullae on T2 black, small and circular. *Genitalia:* 9 acanthophorite spines per plate.

Holotype: ♂ NAMIBIA: *Karas:* Agate Beach, 10 km N Lüderitz, 26°36'22"S 15°10'42"E, 3 m, low coastal vegetated dunes, M. and B. Irwin, 18.ii.1974 (AAM-000858, NMSA).

Paratypes: NAMIBIA: *Karas:* 2♀ 3♂ Agate Beach, 10 km N Lüderitz, 26°36'22"S 15°10'42"E, 3 m, low coastal vegetated dunes, M. & B. Irwin, 18.ii.1974 (AAM-000853–AAM-000857, NMSA); 1♀ 3♂ Agate Beach, 10 km N Lüderitz, 3 m, low coastal vegetated dunes, 18.ii.1974, L. Lyneborg (AAM-000861–AAM-000864, ZMUC).

Other material examined: NAMIBIA: *Karas:* 1♂ Khoichab Pan, 26°17'58"S 15°32'51"E, 20.i.1966 (AAM-003016, NMNW); 1♂ Diaz Point Beach, 26°38'06"S 15°05'27"E, pitfall trap, 13–26.xi.1993, E. Marais (AAM-000885, NMNW).

Type locality and distribution: Agate Beach (26°36'22"S 15°10'42"E), Namibia (Fig. 43, GBIF resource #14003). Biodiversity hotspot: inside and outside of Succulent Karoo.

Remarks: The geographic co-ordinates for the Diaz Point Beach specimen in NMNW are given as 26°37'S 15°05'E on the label, but this less-accurate position falls in the Atlantic Ocean north of the actual Diaz Point Beach.

Nothomydas Hesse, 1969

Figs 22–42, 43

Nothomydas: Hesse 1969: 290. Type species: *Nothomydas gariepinus* Hesse, 1969, by orig. des.

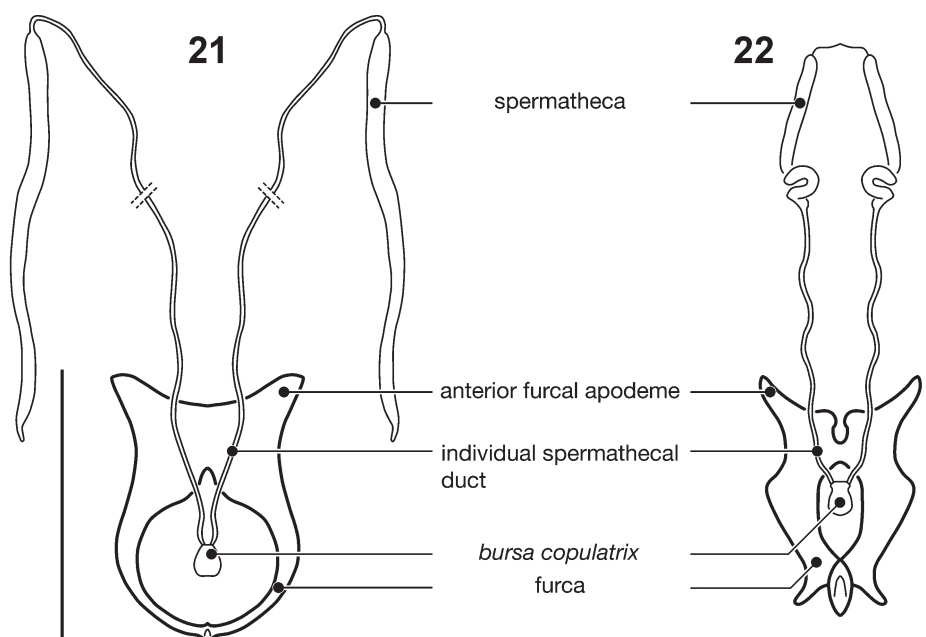
ZooBank LSID: see Table 1.

Diagnosis: The genus is distinguished from other Syllegomydinae by its small size with a wing length of 5.5–8.9 mm, the long proboscis that extends beyond the tip of the postpedicel, the entirely transparent wings, the slender legs, the anteriorly directed setae on abdominal tergites 4–8 in females, and structures of the male terminalia.

Description:

Male.

Abdomen and terminalia (Figs 23–34): T1–7 well-developed, entirely sclerotised, T8 posteromedially weakly sclerotised, with anterior transverse sclerotised bridge connecting lateral sclerites; T7–8 anteriorly with 2 lateral apodemes; S6 regular, without any special setation posteromedially, S8 not plate-like, medially narrow (broad laterally) and protruding ventrally (perpendicular to antero-posterior axis), not fused to T8 dorsolaterally; epandrium formed by two sclerites, separated medially and only joining anteriorly, distally in dorsal view pointed with single tip posteromedially (*N. aquilonius* sp. n., *N. gariepinus*) or pointed with bifid tip posteromedially (*N. namaquensis*, *N. picketti* sp. n.); subepandrial sclerite without lateral or median protuberances; hypandrium strongly concave, cup-shaped, entirely sclerotised ventrally (forming a single sclerite), entirely fused with gonocoxite, forming a gonocoxite-hypandrial complex, supra-hypandrial sclerite present; gonocoxite dorsoventrally flattened (same height throughout, expanded laterally and medially), without median or lateral protuberance, gonocoxal apodeme absent; 2 functional aedeagal prongs, extremely long and thin, mediodistally free, parallel or diverging laterally, distally straight or only diverging slightly laterally; aedeagal epimere present, distally simple, evenly rounded;



Figs 21, 22. Female genitalia in dorsal view (anterior on top): (21) *Namibimydas gaerdesi* (AAM-000866), (22) *Nothomydas namaquensis* (paratype). Scale lines = 1 mm.

lateral ejaculatory process absent; ejaculatory apodeme formed by single dorsoventrally oriented plate; ventro-median margin of dorsal aedeagal sheath heavily sclerotised (appearing entirely closed); dorsal aedeagal sheath long, sperm sac entirely covered; sperm sac appearing more-or-less heavily sclerotised.

Female.

Abdomen and genitalia (Fig. 22): Densely arranged anteriorly directed setae present on T3–8 and S3–8; T8 with broad anterior rectangular apodeme; T9 formed by wide, rectangular sclerite with median protuberance; T9+10 entirely fused, T10 divided into 2 heavily sclerotised acanthophorite plates, 5–6 acanthophorite spines per plate; 2 spermathecae, all equally large, formed by more-or-less expanded weakly sclerotised ducts; individual spermathecal duct long; S9 (furca) formed by 1 sclerite, ring-like (joined anteriorly and posteriorly), anterior furcal apodeme present, 2 lateral projections forming divided apodeme, lateral furcal apodeme absent, median furcal bridge absent.

***Nothomydas aquilonius* sp. n.**

Figs 23–25, 35, 36, 43

ZooBank LSID: see Table 1.

Etymology: From Greek *aquilonius* (northern), referring to the distribution of this species representing the northernmost record of *Nothomydas* to date.

Diagnosis: The species, known only from a single male, is distinguished from congeners by the apubescent scutum (Fig. 35), the posteromedially grey pubescent abdominal

tergites 2–7 (tergites otherwise apubescent), and the proximally grey pubescent scutellum while it is apubescent distally.

Description:

Male.

Head: Brown, in general grey pubescent; width distinctly greater than thorax, interocular distance on vertex larger than at ventral eye margin, vertex between compound eyes more-or-less horizontally straight, medially only slightly below dorsal eye margin, parafacial area less than half the width of central facial gibbosity; facial gibbosity distinct, well-developed and discernible in lateral view; mystax white, covering facial gibbosity except for narrow median dorso-ventral area; frons medially apubescent, laterally grey pubescent, vertex apubescent, postgena apubescent; setation: vertex white, frons white, *ocp* setae white, *pocl* macrosetae absent; ocellar triangle apubescent; proboscis brown, long, projecting well-beyond fronto-clypeal suture and beyond tip of postpedicel; labellum small, as wide as prementum, about quarter length of prementum, unsclerotised laterally; maxillary palpus cylindrical, brown, minute.

Antenna: Brown, scape and pedicel white setose dorsally, asetose ventrally; postpedicel cylindrical in proximal half, symmetrically bulbous in distal half, $\geq 3.0\times$ as long as combined length of scape and pedicel; apical 'seta-like' sensory element situated apically in cavity on postpedicel.

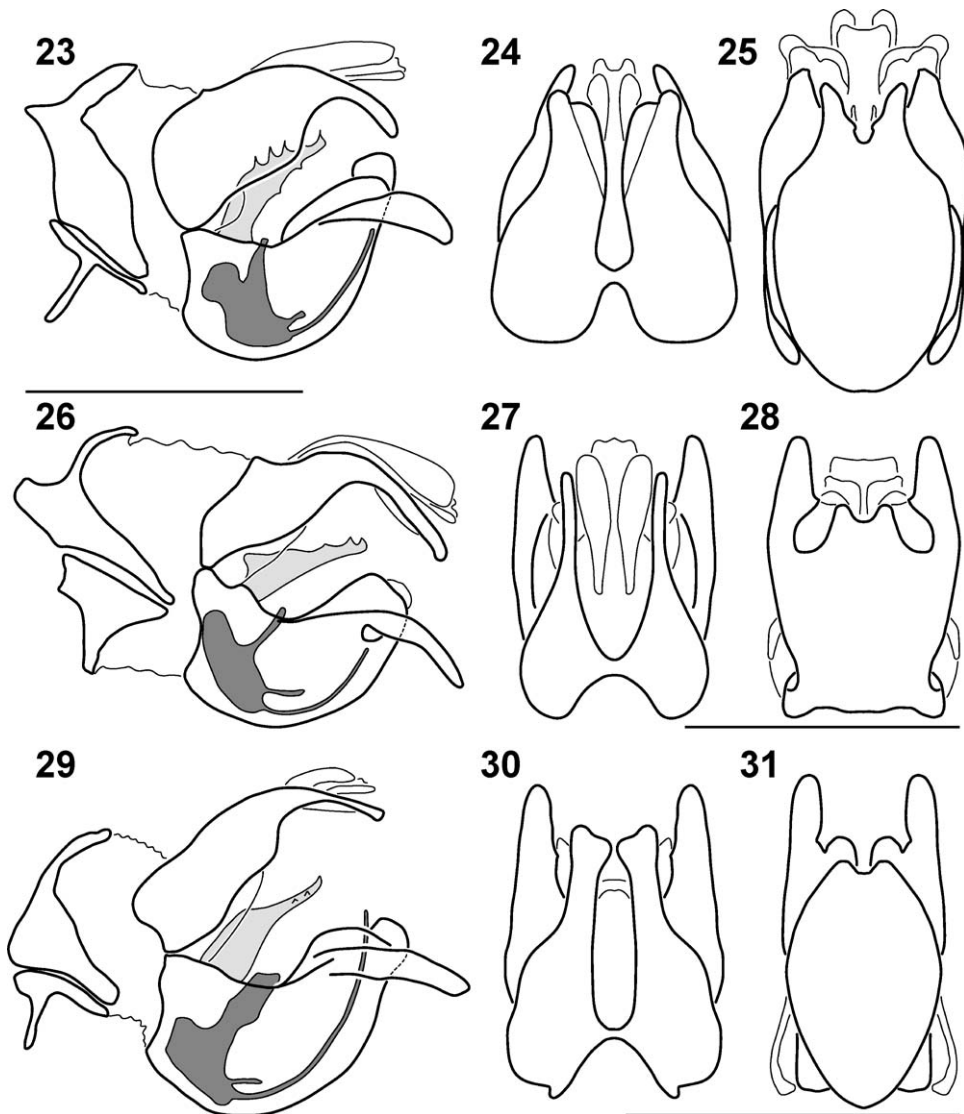
Thorax: Brown, predominantly apubescent; scutum uniformly brown, surface entirely smooth, apubescent, scutal setation comprised of long white setae with distinct rows of long dorsocentral setae and dense lateral scutal setae; *dc* setae pre- and postsuturally white, *acr* setae present, lateral scutal setae white, *npl* setae 0, *spal* setae 0, *pal* setae 0; postpronotal lobe brown, grey pubescent; proepisternum, lateral postpronotum, and postpronotal lobe long white setose; scutellum grey pubescent proximally, apubescent distally, asetose, apical scutellar setae absent; mesopostnotum, anatergite, and katatergite lightly grey pubescent, mesopostnotum asetose, anatergite asetose, katatergite long white setose; katatergite more-or-less flat; anterior anepisternum asetose, supero-posterior anepisternum long white setose; posterior anepimeron long white setose, katapimeron long white setose; metanepisternum lightly grey pubescent, asetose, metepimeron more-or-less flat, same colour as T1, lightly grey pubescent, long white setose.

Leg: Brown, setation predominantly white; *pro*, *mes*, and *met* coxa apubescent, long white setose; *met* trochanter setose medially; femur brown, *met* femur more-or-less cylindrical only slightly wider than *pro* and *mes* femur, in distal half macrosetose, 1 anteroventral and 1 posteroventral row of macrosetae, posteroventrally long white, erect setose and setae arranged in distinct row; *pro*, *mes*, and *met* tibia straight, *met* tibia cylindrical, ventral keel absent, lateroposteriorly long white, erect setose and setae arranged in distinct row; *pro* and *mes* tarsomere 1 as long as tarsomere 2, *met* tarsomere 1 as long as combined length of tarsomeres 2–3; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; empodium absent.

Wing: Length 7.9 mm; hyaline throughout, veins light brown, microtrichia absent; cells r_1 , r_4 , r_5 , m_3 , and *cup* closed; C terminates at junction with R_1 ; R_4 terminates in R_1 ; R_5 terminates in R_1 ; stump vein (R_3) at base of R_4 present, short not reaching R_2 ; R_4 and R_5 widest apart medially; *r-m* distinct, R_{4+5} and M_1 apart, connected by crossvein;

M_1 straight at $r-m$ (not curving anteriorly), M_1 (or M_1+M_2) terminates in R_1 ; CuA_1 and CuA_2 split proximally to $m-cu$ (cell m_3 narrow proximally); M_3+CuA_1 do not terminate together in C; A_1 undulating, cell a_1 wide, A_1 and wing margin further apart proximally than distally; alula well-developed; haltere light brown.

Abdomen: Brown; setation comprised of dense white setose, surface entirely smooth; T1–7 brown; T1–2 long white setose, T3–7 shorter white setose; T1 apubescent, T2–7 posteromedially grey pubescent; S1–7 brown; S1 asetose, S2–7 sparsely white setose;



Figs 23–31. Male terminalia of *Nothomydas* spp.: (23–25) *No. aquilonius* sp. n. (AAM-000873, holotype): (23) lateral, (24) dorsal, (25) ventral; (26–28) *No. gariepinus* (AAM-003018): (26) lateral, (27) dorsal, (28) ventral; (29–31) *No. namaquensis* (♂ paratype): (29) lateral, (30) dorsal, (31) ventral. Aedeagus dark grey, supra-hypandrial sclerite light grey. Scale lines = 1 mm.

S predominantly apubescent; T2–4 parallel-sided and not constricted waist-like; bullae on T2 black, transversely elongate, surface entirely smooth, T2 surface anterior to bullae smooth.

Terminalia (Figs 23–25): Epandrium distally in dorsal view pointed with single tip posteromedially.

Female. Unknown.

Holotype: ♂ NAMIBIA: Karas: Rotkop, 26°42'00"S 15°23'00"E, 12–26.xi.1993, E. Marais, pitfall trap (AAM-000873, NMNW).

Type locality and distribution: Rotkop (26°42'00"S 15°23'00"E), Namibia (Fig. 43, GBIF resource #14003). Biodiversity hotspot: endemic to Succulent Karoo.

Nothomydas gariepinus Hesse, 1969

Figs 26–28, 37, 38, 43

Nothomydas gariepinus: Hesse 1969: 292.

ZooBank LSID: see Table 1.

Diagnosis: The species, known only from males, is distinguished from congeners by the predominantly grey pubescent scutum (Fig. 38) with apubescent anterior slopes, the entirely grey pubescent scutellum, the only dorsally setose scape and pedicel (asetose ventrally), the partially apubescent abdominal tergite 1 (proximally apubescent and distally grey pubescent) (Fig. 38), and its apparent distribution along the Orange River valley in southern Namibia and northern South Africa (Fig. 43).

Redescription:

Male.

Head: Black, in general grey pubescent; width distinctly greater than thorax, interocular distance on vertex larger than at ventral eye margin, vertex between compound eyes more-or-less horizontally straight, medially only slightly below dorsal eye margin, parafacial area less than half the width of central facial gibbosity; facial gibbosity distinct, well-developed and discernible in lateral view; mystax white, covering facial gibbosity except for narrow median dorso-ventral area; frons medially apubescent, laterally grey pubescent, vertex medially apubescent, laterally grey pubescent, postgena apubescent; setation: vertex white, frons white, *ocp* setae white, *pocl* macrosetae absent; ocellar triangle apubescent; proboscis brown, long, projecting well-beyond fronto-clypeal suture and beyond tip of postpedicel; labellum small, as wide as prementum, about quarter length of prementum, unsclerotised laterally; maxillary palpus cylindrical, brown, minute.

Antenna: Brown, scape and pedicel white setose dorsally, asetose ventrally; postpedicel cylindrical in proximal third, symmetrically bulbous in distal two-thirds, $\geq 5.0\times$ as long as combined length of scape and pedicel; apical 'seta-like' sensory element situated apically in cavity on postpedicel.

Thorax: Brown, scutum predominantly grey pubescent, pleura predominantly apubescent; scutum uniformly brown, surface entirely smooth, anterior slopes (facing occiput) apubescent, otherwise densely grey pubescent with broad sublateral stripes (interrupted by transverse suture) and narrow paramedial stripes (not reaching posterior margin) sparsely grey pubescent, scutal setation comprised of long white setae with distinct

rows of long *dc* setae and dense lateral scutal setae; *dc* setae pre- and postsuturally white, *acr* setae present, lateral scutal setae white, *npl* setae 0, *spal* setae 0, *pal* setae 0; postpronotal lobe brown, grey pubescent; proepisternum, lateral postpronotum, and postpronotal lobe long white setose; scutellum grey pubescent, asetose, apical scutellar setae absent; mesopostnotum, anatergite, and katatergite grey pubescent, mesopostnotum asetose, anatergite asetose, katatergite long white setose; katatergite more-or-less flat; anterior anepisternum asetose, supero-posterior anepisternum long white setose; posterior anepimeron long white setose, katepimeron long white setose; meta-nepisternum grey pubescent, asetose, metepimeron more-or-less flat, same colour as T1, grey pubescent, long white setose.

Leg: Light brown and brown, setation brown and white; *pro*, *mes*, and *met* coxa apubescent, *pro* and *mes* coxa short white setose, *met* coxa long white setose; *met* trochanter setose medially; femur brown, *met* femur more-or-less cylindrical only slightly wider than *pro* and *mes* femur, in distal half macrosetose, 1 anteroventral and 1 posteroventral row of macrosetae, posteroventrally long white, erect setose and setae arranged in distinct row; *pro*, *mes*, and *met* tibia straight, *met* tibia cylindrical, ventral keel absent, lateroposteriorly long white, erect setose and setae arranged in distinct row; *pro* and *mes* tarsomere 1 longer than tarsomere 2, but less than combined length of tarsomeres 2–3, *met* tarsomere 1 less than combined length of tarsomeres 2–3; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; empodium absent.

Wing: Length 6.6–7.3 mm; hyaline throughout, veins brown, microtrichia absent; cells r_1 , r_4 , r_5 , m_3 , and cu_1 closed; C terminates at junction with R_1 ; R_4 terminates in R_1 ; R_5 terminates in R_1 ; stump vein (R_3) at base of R_4 absent or only very short; R_4 and R_5 widest apart medially; $r-m$ distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 straight at $r-m$ (not curving anteriorly), M_1 (or M_1+M_2) terminates in R_1 ; CuA_1 and CuA_2 split proximally to $m-cu$ (cell m_3 narrow proximally); M_3+CuA_1 do not terminate together in C; A_1 undulating, cell a_1 wide, A_1 and wing margin further apart proximally than distally; alula well-developed; haltere light brown.

Abdomen: Brown; setation comprised of dense white and brown setose, surface entirely smooth; T1–7 brown; T1 and anterior half of T2 long white setose, remaining T2 and T3–7 brown setose; T1 grey pubescent posteromedially, T2 predominantly grey pubescent (except anterolaterally), remaining T narrowly grey pubescent medially and wider grey pubescent posteriorly; S1–7 brown; S1 asetose, S2–7 sparsely brown setose; S predominantly apubescent; T2–4 parallel-sided and not constricted waist-like; bullae on T2 black, transversely elongate, surface entirely smooth, T2 surface anterior to bullae smooth.

Terminalia (Figs 26–28): Epandrium distally in dorsal view pointed with single tip posteromedially.

Female. Unknown.

Material examined: NAMIBIA: *Karas*: 1♂ Rosh Pinah, 16 km S, 28°04'00"S 16°51'00"E, visiting yellow flowers *Tripteris* (Asteraceae), 13.x.2000, F. & S. Gess (AAM-003018, AMGS). SOUTH AFRICA: *Northern Cape*: 1♂ Vioolsdrif, 28°46'10"S 17°37'37"E, 4–6.x.1966, SAM Museum Staff (Holotype, SAMC).

Type locality and distribution: Vioolsdrif (28°45'22"S 17°37'13"E), Namibia, South Africa (Fig. 43, GBIF resource #14003). Biodiversity hotspot: occurring inside and outside of Succulent Karoo.

Nothomydas namaquensis Hesse, 1972

Figs 22, 29–31, 39, 40, 43

Nothomydas namaquensis: Hesse 1972: 152.

ZooBank LSID: see Table 1.

Diagnosis: The species is distinguished from congeners by the predominantly grey pubescent scutum with apubescent anterior slopes, the entirely grey pubescent scutellum, the dorsally and ventrally white setose scape and pedicel, the structure of the postpedicel, which is cylindrical in the proximal quarter and bulbous in the distal three quarters, and its apparent distribution in coastal habitats in the north-western Northern Cape Province of South Africa (Fig. 43).

Redescription:

Male.

Head: Brown, in general densely grey pubescent; width distinctly greater than thorax, interocular distance on vertex larger than at ventral eye margin, vertex between compound eyes more-or-less horizontally straight, medially only slightly below dorsal eye margin, parafacial area about as wide as half the width of central facial gibbosity; facial gibbosity distinct, well-developed and discernible in lateral view; mystax white, covering entire facial gibbosity; frons medially apubescent, laterally grey pubescent, vertex medially apubescent, laterally grey pubescent, postgena apubescent; setation: vertex white, frons white, *ocp* setae white, *pocl* macrosetae absent; ocellar triangle apubescent; proboscis brown, long, projecting well-beyond fronto-clypeal suture and beyond tip of postpedicel; labellum small, as wide as prementum, about quarter length of prementum, unsclerotised laterally; maxillary palpus cylindrical, brown, minute.

Antenna: Brown, scape and pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal quarter, symmetrically bulbous in distal three-quarters, $\geq 6.0\times$ as long as combined length of scape and pedicel; apical 'seta-like' sensory element situated apically in cavity on postpedicel.

Thorax: Brown, scutum predominantly grey pubescent, pleura predominantly apubescent; scutum uniformly brown, surface entirely smooth, anterior slopes (facing occiput) apubescent, otherwise grey pubescent with broad sublateral stripes (not reaching anterior margin) and narrower paramedian stripes (not reaching posterior margin) brown pubescent, scutal setation comprised of long white setae with distinct rows of long dorsocentral setae and dense lateral scutal setae; *dc* setae pre- and postsuturally white, *acr* setae present, lateral scutal setae white, *npl* setae 0, *spal* setae 0, *pal* setae 0; postpronotal lobe light brown, grey pubescent; proepisternum, lateral postpronotum, and postpronotal lobe long white setose; scutellum grey pubescent, asetose, apical scutellar setae absent; mesopostnotum, anatergite, and katatergite grey pubescent, mesopostnotum asetose, anatergite asetose, katatergite long white setose; katatergite more-or-less flat; anterior anepisternum asetose, supero-posterior anepisternum long white setose; posterior anepimeron long white setose, katepimeron long white setose; metanepisternum grey pubescent, asetose, metepimeron more-or-less flat, same colour as T1, grey pubescent, long white setose.

Leg: Brown, setation white on *pro* and *mes* legs and white and brown on *met* leg; *pro*, *mes*, and *met* coxa apubescent, *pro* and *mes* coxa short white setose, *met* coxa long white setose; *met* trochanter setose medially; femur brown, *met* femur more-or-

less cylindrical only slightly wider than *pro* and *mes* femur, in distal half macrosetose, 1 anteroventral and 1 posteroventral row of macrosetae, posteroventrally long white, erect setose and setae arranged in distinct row; *pro*, *mes*, and *met* tibia straight, *met* tibia cylindrical, ventral keel absent, lateroposteriorly long white, erect setose and setae arranged in distinct row; *pro* and *mes* tarsomere 1 longer than tarsomere 2, but less than combined length of tarsomeres 2–3, *met* tarsomere 1 less than combined length of tarsomeres 2–3; pulvillus well-developed on *pro* and *mes* legs, smaller on *met* legs; empodium absent.

Wing: Length 5.5–6.1 mm; hyaline throughout, veins brown, microtrichia absent; cells r_1 , r_4 , r_5 , m_3 , and cup closed (r_5 sometimes open); C terminates at junction with M_1 (or M_1+M_2) or terminates at junction with R_1 ; R_4 terminates in R_1 ; R_5 terminates in R_1 ; stump vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; $r-m$ distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 straight at $r-m$ (not curving anteriorly), M_1 (or M_1+M_2) terminates in C or R_1 ; CuA_1 and CuA_2 split proximally to $m-cu$ (cell m_3 narrow proximally); M_3+CuA_1 do not terminate together in C; A_1 undulating, cell a_1 wide, A_1 and wing margin further apart proximally than distally; alula well-developed; haltere light brown.

Abdomen: Brown; setation comprised of dense white and brown setose, surface entirely smooth; T1–7 brown; T1 and anterior half of T2 long white setose, remaining T2 and T3–7 brown setose; T1 apubescent, T1–7 anterior 0.25 and laterally apubescent, remaining T grey pubescent; S1–7 brown; S1 asetose, S2–3 white and brown setose; S mainly apubescent; T2–4 parallel-sided and not constricted waist-like; bullae on T2 black, transversely elongate, surface entirely smooth, T2 surface anterior to bullae smooth.

Terminalia (Figs 29–31): Epandrium distally in dorsal view pointed with bifid tip posteromedially.

Female.

Head: Mystax white, covering facial gibbosity except for narrow median dorso-ventral area. *Antenna*: Brown; scape and pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal quarter, symmetrically bulbous in distal three-quarters, $\geq 6.0\times$ as long as combined length of scape and pedicel; apical ‘seta-like’ sensory element situated apically in cavity on postpedicel. *Leg*: Setation predominantly white; in distal half macrosetose, 1 anteroventral row of macrosetae. *Wing*: Length 6.1 mm; veins light brown; C terminates at junction with R_1 ; M_1 (or M_1+M_2) terminates in R_1 . *Abdomen*: Scattered white setose, T1 and anterior quarter of T2 long white setose, remaining tergites short white setose, setae directed anteriorly on T3–7; S1 asetose, S2–7 sparsely white setose. *Genitalia* (Fig. 22): 5–6 acanthophorite spines per plate.

Material examined: SOUTH AFRICA: *Northern Cape*: 1♀ 5♂ Port Nolloth, 29°15'17"S 16°52'18"E, x.1964, SAM Museum Staff (holotype & paratypes, SAMC).

Type locality and distribution: Port Nolloth (29°15'17"S 16°52'18"E), South Africa (Fig. 43, GBIF resource #14003). Biodiversity hotspot: endemic to Succulent Karoo.

***Nothomydas picketti* sp. n.**

Figs 32–34, 41, 42, 43

ZooBank LSID: see Table 1.

Etymology: The species is named after and dedicated to the memory of Vespidae systematist and taxonomist and good friend Kurt Milton Pickett who left us much too early (Crowley 2011).

Diagnosis: The males of this species are distinguished from congeneric males by the apubescent scutum, the predominantly apubescent abdominal tergites 1–5 while tergites 6–7 are entirely grey pubescent (Fig. 41), and the entirely apubescent scutellum. The females can be distinguished by the entirely grey pubescent vertex and the predominantly grey pubescent abdominal tergites 2–4 (only anterolaterally apubescent) while tergites 6–7 are apubescent (Fig. 42).

Description:

Male.

Head: Black, in general densely grey pubescent; width distinctly greater than thorax, interocular distance on vertex larger than at ventral eye margin, vertex between compound eyes more-or-less horizontally straight, medially only slightly below dorsal eye margin, parafacial area about as wide as half the width of central facial gibbosity; facial gibbosity distinct, well-developed and discernible in lateral view; mystax white, covering entire facial gibbosity; frons medially apubescent, laterally grey pubescent, vertex apubescent, postgena apubescent; setation: vertex white or yellow, frons white, *ocp* setae white or yellow, *pocl* macrosetae absent; ocellar triangle apubescent; proboscis brown, long, projecting well-beyond fronto-clypeal suture and beyond tip of postpedicel; labellum small, as wide as prementum, about quarter length of prementum, unsclerotised laterally; maxillary palpus cylindrical, brown, minute.

Antenna: Brown, scape and pedicel white setose dorsally, asetose ventrally; postpedicel cylindrical in proximal third, symmetrically bulbous in distal two-thirds, $\geq 4.0\times$ as long as combined length of scape and pedicel; apical 'seta-like' sensory element situated apically in cavity on postpedicel.

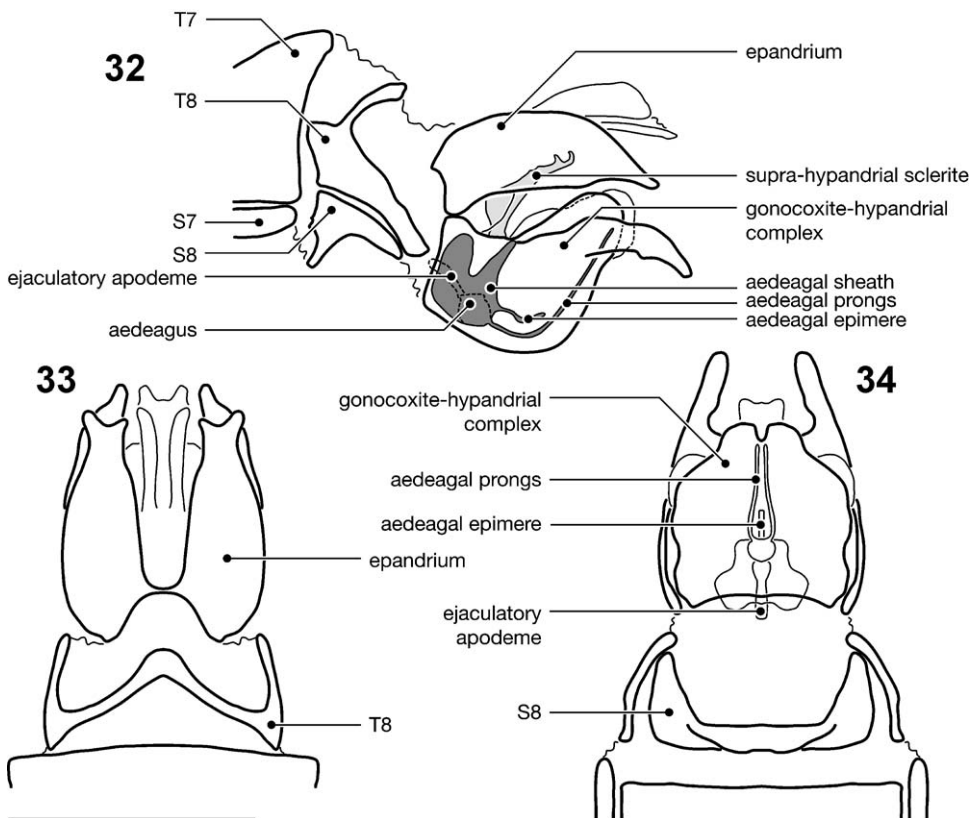
Thorax: Brown, predominantly apubescent; scutum uniformly brown, surface entirely smooth, apubescent, scutal setation comprised of long white setae with distinct rows of long dorsocentral setae and dense lateral scutal setae; *dc* setae pre- and post-suturally white, *acr* setae present, lateral scutal setae white, *npl* setae 0, *spal* setae 0, *pal* setae 0; postpronotal lobe brown, grey pubescent; proepisternum, lateral postpronotum, and postpronotal lobe long white setose; scutellum apubescent, asetose, apical scutellar setae absent; mesopostnotum, anatergite, and katatergite apubescent, mesopostnotum asetose, anatergite asetose, katatergite long white setose; katatergite more-or-less flat; anterior anepisternum asetose, supero-posterior anepisternum long white setose; posterior anepimeron long white setose, katapimeron long white setose; metanepisternum lightly grey pubescent, asetose, metepimeron more-or-less flat, same colour as T1, lightly grey pubescent, long white setose.

Leg: Brown, setation predominantly white; *pro*, *mes*, and *met* coxa apubescent, long white setose; *met* trochanter setose medially; femur brown, *met* femur more-or-less cylindrical only slightly wider than *pro* and *mes* femur, in distal half macrosetose, 1 anteroventral and 1 posteroventral row of macrosetae, posteroventrally long white, erect setose and setae arranged in distinct row; *pro*, *mes*, and *met* tibia straight, *met* tibia cylindrical, ventral keel absent, lateroposteriorly long white, erect setose and setae arranged in distinct row; *pro* and *mes* tarsomere 1 longer than tarsomere 2, but less

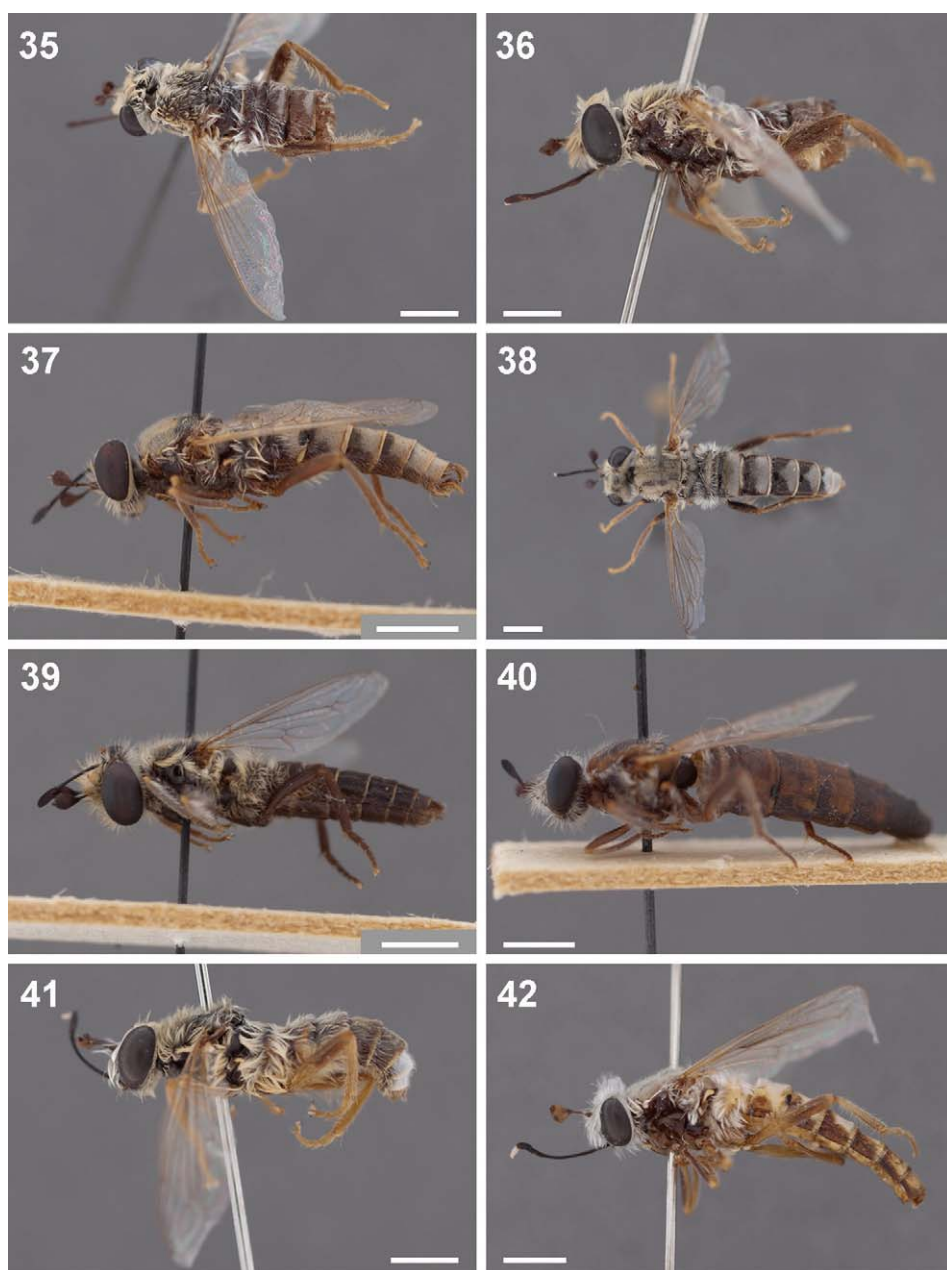
than combined length of tarsomeres 2–3, *met* tarsomere 1 less than combined length of tarsomeres 2–3; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; empodium absent.

Wing: Length 7.0–7.4 mm; hyaline throughout, veins brown, microtrichia absent; cells r_1 , r_4 , r_5 , m_3 , and *cup* closed; C terminates at junction with R_1 ; R_4 terminates in R_1 ; R_5 terminates in R_1 ; stump vein (R_3) at base of R_4 present, short not reaching R_2 ; R_4 and R_5 widest apart medially; $r-m$ distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 straight at $r-m$ (not curving anteriorly), M_1 (or M_1+M_2) terminates in R_1 ; CuA_1 and CuA_2 split proximally to $m-cu$ (cell m_3 narrow proximally); M_3+CuA_1 do not terminate together in C; A_1 undulating, cell a_1 wide, A_1 and wing margin further apart proximally than distally; alula well-developed; haltere light brown.

Abdomen: Brown; setation comprised of dense white setose, surface entirely smooth; T1–7 brown; T1–2 long white setose, T3–7 shorter white setose; T1–5 apubescent, T6–7 entirely grey pubescent; S1–7 brown; S1 asetose, S2–7 sparsely white setose; S predominantly apubescent; T2–4 parallel-sided and not constricted waist-like; bullae on T2 black, transversely elongate, surface entirely smooth, T2 surface anterior to bullae smooth.



Figs 32–34. Male terminalia of *Nothomydas picketti* sp. n. (AAM-000877) with features labelled: (32) lateral, (33) dorsal, (34) ventral. Aedeagus dark grey, supra-hypandrial sclerite light grey. Scale line = 1 mm.



Figs 35–42. Images of *Nothomydas* spp.: (35, 36) *No. aquilonius* sp. n. ♂ (holotype, AAM-000873, note: ♂ terminalia previously removed): (35) dorsal (Morphbank: #702395), (36) lateral (#703557); (37, 38) *No. gariepinus*: (37) ♂ lateral (holotype, #704336), (38) ♂ dorsal (AAM-003018, #704340); (39, 40) *No. namaquensis*, lateral: (39) ♂ paratype (#704346), (40) ♀ paratype (#704349); (41, 42) *No. picketti* sp. n., lateral: (41) ♂ holotype (AAM-000878, #704354); (42) ♀ paratype (AAM-000876, #704357). Scale lines = 2 mm.

Terminalia (Figs 32–34): Epandrium distally in dorsal view pointed with bifid tip posteromedially.

Female.

Head: Vertex entirely grey pubescent; setation: vertex white, *ocp* setae white. *Antenna:* Brown; scape and pedicel white setose dorsally, aetose ventrally; postpedicel cylindrical in proximal third, symmetrically bulbous in distal two-thirds, $\geq 5.0\times$ as long as combined length of scape and pedicel; apical 'seta-like' sensory element situated apically in cavity on postpedicel. *Thorax:* Scutum predominantly grey pubescent, pleura predominantly apubescent; anterior slopes (facing occiput) apubescent, otherwise densely grey pubescent with broad sublateral stripes (not reaching anterior margin) and narrower paramedian stripes (not reaching posterior margin) sparsely grey pubescent (or even apubescent); scutellum grey pubescent proximally, apubescent distally, aetose; mesopostnotum, anatergite, and katatergite grey pubescent. *Leg:* *pro*, *mes*, and *met* coxa apubescent, *pro* and *mes* coxa short white setose, *met* coxa long white setose; *pro* and *mes* tarsomere 1 as long as tarsomere 2. *Wing:* Length 8.0–8.9 mm; veins light brown. *Abdomen:* Scattered white setose; T1 and anterior half of T2 long white setose, remaining T2 and T3 short white setose; T1 apubescent, T2–4 predominantly grey pubescent, anterolaterally apubescent, T5 grey pubescent medially, T6–7 apubescent. *Genitalia:* 6 acanthophorite spines per plate.

Holotype: ♂ NAMIBIA: Karas: Skerpioenkop, 27°46'00"S 16°29'58"E, 20–22.ix.1997, A. Kirk-Spriggs & E. Marais, yellow trays (AAM-000878, NMNW).

Paratypes: 4♀ 1♂ same data as holotype (AAM-000874–AAM-000877, AAM-000879, NMNW).

Type locality and distribution: Skerpioenkop (27°46'00"S 16°29'58"E), Namibia (Fig. 43, GBIF resource #14003). Biodiversity hotspot: endemic to Succulent Karoo.

Remarks: *N. picketti* sp. n. is the most sexually dimorph species within this genus as can be seen from the rather long description of the female and that the male and female are separated in the identification key.

Key to *Namibimydas* and *Nothomydas* species

(This key can also be accessed online at IdentifyLife.org and
http://www.mydidae.tdvia.de/online_keys)

- 1 Alula well-developed, but medially not touching scutellum (when wings folded over abdomen); proboscis always long, extending beyond tip of postpedicel (Figs 41, 42); postocular macrosetae absent (occipital and postocular setae present); frons medially apubescent; small flies, wing length 5.5–8.9 mm; ♀ with short, anterior directed setae on T4–8 (Figs 40, 42) (*Nothomydas*).....5
- Alula well-developed and large, medially slightly overlapping with scutellum (when wings folded over abdomen); proboscis generally long, but not extending beyond tip of postpedicel (except in *Namibimydas gaerdesi*) (Fig. 20); postocular macrosetae present (sometimes difficult to discern among dense occipital and postocular setae); entire frons pubescent; large flies, wing length 11.2–17.7 mm; ♀ without short, anterior directed setae on T4–5 (these setae present on T7–8 though) (Figs 18, 20) (*Namibimydas*).....2

- 2 Metathoracic femora without antero- or posteroventral rows of macrosetae; parafacial area more than half the width of central facial gibbosity (at same level); distributed in coastal south-western South Africa (Fig. 43) **Namibimydas prinsi**
- Metathoracic femora with well-developed antero- and posteroventral rows of macrosetae; parafacial area about half or less than half the width of central facial gibbosity (at same level); distributed in coastal and inland Namibia (Fig. 43) 3
- 3 Proboscis short, not extending beyond fronto-clypeal suture; labellum about half of length of prementum; anatergite long white setose; abdominal setation short and sparse in ♂ and ♀ (Figs 17, 18); distributed at eastern edge of Namib Desert sand dunes (Fig. 43) **Namibimydas psamminos** sp. n.
- Proboscis long, extending well-beyond fronto-clypeal suture (Figs 13, 20); labellum about quarter of length of prementum; anatergite asetose (absence of anatergal setae sometimes difficult to discern, view obfuscated by long white setae on katatergite and T1); abdominal setation long and dense in ♂ and ♀ (Figs 13, 19, 20); distributed in coastal Namib Desert (Fig. 43) 4
- 4 Proboscis long, extending beyond tip of postpedicel (Fig. 13); mystax white to yellowish (Fig. 13); wing veins yellow; postgena apubescent; known only from between Swakopmund and Sandwich Bay (Fig. 43) **Namibimydas gaerdesi**
- Proboscis long, extending beyond fronto-clypeal suture, but not reaching tip of postpedicel (Fig. 20); mystax entirely white (Fig. 20); wing veins light brown; postgena lightly grey pubescent; known only from around Lüderitz (Fig. 43) **Namibimydas stuckenbergi** sp. n.
- 5 Scutum entirely apubescent (Fig. 35) 8
- Scutum predominantly grey pubescent, only anterior slopes (facing occiput) and sometimes sublateral and paramedian stripes apubescent (Fig. 38) 6
- 6 Vertex entirely grey pubescent; scutellum grey pubescent proximally, but apubescent distally ♀ of **Nothomydas picketti** sp. n.
- Vertex medially apubescent, laterally grey pubescent; scutellum entirely grey pubescent 7
- 7 Postpedicel cylindrical in proximal third and symmetrically bulbous in distal two-thirds; scape and pedicel only white setose dorsally and asetose ventrally; T1 proximally apubescent and distally grey pubescent; parafacial area less than half the width of central facial gibbosity (at same level) **Nothomydas gariepinus**
- Postpedicel cylindrical in proximal quarter and symmetrically bulbous in distal three quarters; scape and pedicel white setose dorsally and ventrally; T1 entirely apubescent; parafacial area about as wide as half the width of central facial gibbosity (at same level) **Nothomydas namaquensis**
- 8 T1–5 entirely apubescent, T6–7 entirely grey pubescent (Fig. 41); scutellum entirely apubescent; metathoracic tarsomere 1 less than combined length of tarsomeres 2–3 ♂ of **Nothomydas picketti** sp. n.
- T1 apubescent, T2–7 posteromedially grey pubescent otherwise apubescent (Fig. 35); scutellum grey pubescent proximally and apubescent distally; metathoracic tarsomere 1 as long as combined length of tarsomeres 2–3 **Nothomydas aquilonius** sp. n.

TABLE 1

List of ZooBank LSIDs for the author and generic- and species-group names.

author/taxon	ZooBank LSID
T. Dikow	http://zoobank.org/?lsid=urn:lsid:zoobank.org:author:F8869067-4618-4CCE-960C-E8A107F162FB
<i>Halterorchis</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:28F87624-36C2-4589-9359-1408E40D389D
<i>Halterorchis inermis</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:E14557F3-7416-44FA-9FA9-959EC7A742D4
<i>Halterorchis karooensis</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:6FC8E91C-FD6E-4482-A296-990D9D11D84B
<i>Namibimydas</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:98725DD6-1BA7-4314-AACA-E42524792A6E
<i>Namibimydas gaerdesi</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:26A9177F-BD5B-46AD-BE01-B559511D6A3E
<i>Namibimydas prinsi</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:A14F9991-4874-4153-8574-B8A3CE434A76
<i>Namibimydas psamminos</i> sp. n.	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:E26A52B5-1CB0-44D5-98EE-3C50D2E374AF
<i>Namibimydas stuckenbergi</i> sp. n.	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:998E177D-D495-4973-A8EF-702EC589D3F2
<i>Nothomydas</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:7B3FEBA3-31F8-4253-BD3F-9CC61E443D30
<i>Nothomydas aquilonius</i> sp. n.	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:FC366CC8-B779-4F0A-8451-A35E601B8872
<i>Nothomydas gariepinus</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:6EC90827-141C-461C-98E4-6A1439C70136
<i>Nothomydas namaquensis</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:4AFF18BB-4AB4-4CF8-8496-AFE48AB44AFD
<i>Nothomydas picketti</i> sp. n.	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:B7BAB03A-2A86-4230-9D5F-F0C3BD8E9A7D
<i>Mimadelphus</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:3E631D09-C254-49B1-9D55-A2C03BA50E1E
<i>Mimadelphus vellosus</i>	http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:F57446CE-E61A-4141-9664-5B6F3018EA62

DISCUSSION

Supra-hypandrial sclerite in males

Species of *Namibimydas* (except *N. gaerdesi*, see below) and *Nothomydas* are unique in that the male terminalia possess an additional sclerite not found in other Syllegomydinae or even Mydidae. The supra-hypandrial sclerite (Figs 4, 7, 10, 23, 26, 29, 32) is a sclerite positioned dorsal to the proximal hypandrium and ventral to the subepandrial sclerite and is generally visible without dissection of the male terminalia in *Nothomydas*, but hidden by the epandrium in *Namibimydas* (sometimes visible in a posterior view). Hesse mentioned several unique features of the male terminalia for both *Namibimydas* and *Nothomydas*, but because he did not clear the hypopygia, he mistook the supra-hypandrial sclerite as the aedeagal epimere of *Namibimydas prinsi* (Hesse 1974: 29, fig. 1 labelled “Ep”) and as the aedeagus of *Nothomydas gariepinus* (Hesse 1969: 293, fig. 18B upper right). Note that after clearing the hypopygia in

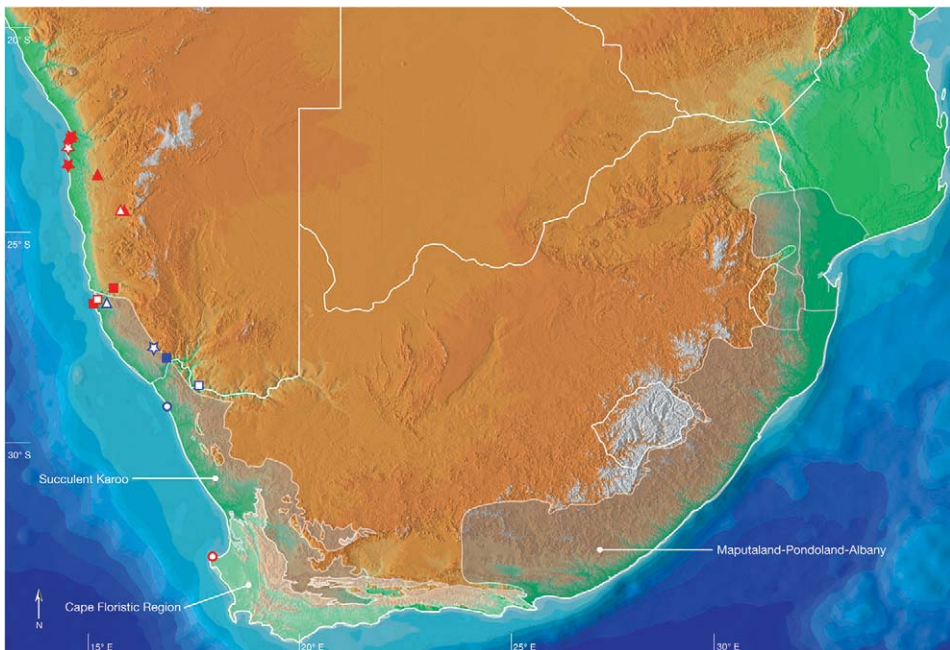
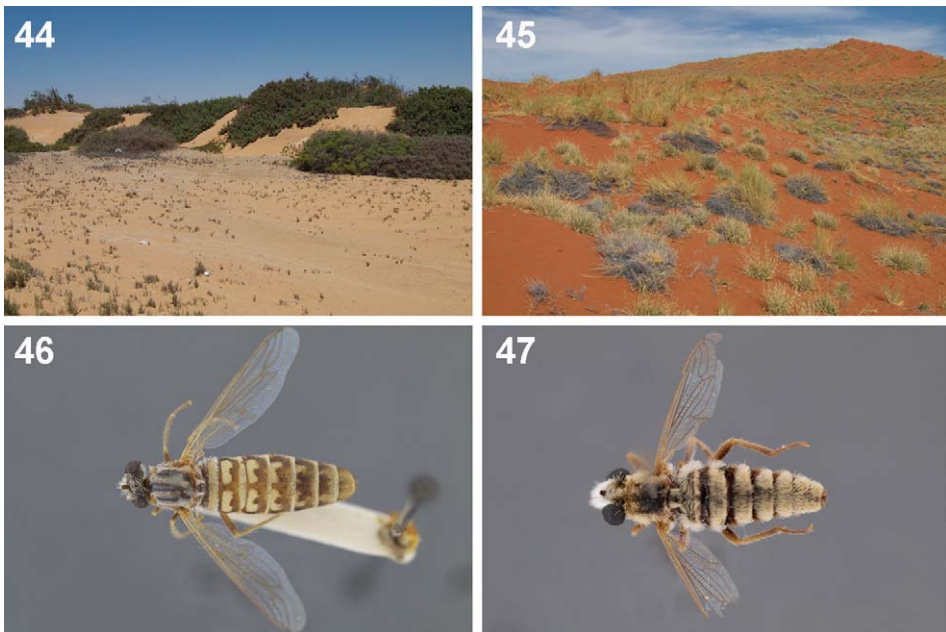


Fig. 43. Map of southern Africa with elevational relief and biodiversity hotspots showing distribution of *Namibimydas gaerdesi* (red stars), *Na. prinsi* (red circle), *Na. psamminos* sp. n. (red triangles), *Na. stuckenbergi* sp. n. (red squares), and *Nothomydas aquilonius* sp. n. (blue triangle), *No. gariepinus* (blue squares), *No. namaquensis* (blue circle), and *No. picketti* sp. n. (blue star). Type localities with open symbols. All records available through GBIF (<http://data.gbif.org/datasets/resource/14003/>).

KOH it becomes apparent that the aedeagi in both genera are well-hidden within the gonocoxite-hypandrial complex and that the two prongs are thin and elongate (Figs 4, 29). The supra-hypandrial sclerite is always bilobed apically and serrated and toothed in species-specific ways.

The absence of an apparent supra-hypandrial sclerite in *Namibimydas gaerdesi* is quite surprising. It is possible that this sclerite has been fused with the dorso-lateral margin of the gonocoxite-hypandrial complex and therefore forms a “roof” closing this entire structure dorsally (Fig. 1).

The supra-hypandrial sclerite should not be confused with the subepandrial sclerite, which is situated immediately dorsal to it, is always weakly sclerotised and plate-like without any bifurcated tip, which continues distally into the hypoproct. There are other structures morphologically similar to the supra-hypandrial sclerite in the Oriental genus *Cacatuopyga* Papavero & Wilcox, 1974 (*Cacatuopyginae*) and the New World *Mydinae*. Papavero & Wilcox (1974: 14) mention a “grooved crest-like process” dorsally on the aedeagus of a *Cacatuopyga* species and illustrated it in their figure 8. D’Andretta (1951: 45, e.g., fig. 158) illustrated the aedeagus and subepandrial sclerite of *Gauromydas mystaceus* (Wiedemann, 1830) showing a process-like structure attached to the dorso-proximal aedeagal sheath, which is also visible in other *Mydinae* species illustrated by D’Andretta. The structures illustrated in these *Cacatuopyginae* and *Mydinae* might be visible when examining the uncleared male terminalia in lateral view and since



Figs 44–47. Habitat images of *Namibimydas* species and holotype images of *Halterorchis* and *Mimadelphus*: (44) Sandy River bed and vegetated dunes (Swakopmund, S side Swakop River mouth, 22°41'33"S 14°31'37"E), where *Namibimydas gaerdesi* was observed; (45) Partly vegetated Elim Dune (Namib-Skeleton Coast National Park, near Sesriem, 24°27'28"S 15°46'37"E), where *Namibimydas psamminos* sp. n. was observed; (46) ♀ holotype of *Halterorchis karooensis* Hesse, 1969 in dorsal view (SAMC, Morphbank: #791283); (47) ♂ holotype of *Mimadelphus vellosus* Hesse, 1972 in dorsal view (SMNS, #791289).

they are directed dorsoposteriorly and approximate the subepandrial sclerite could be confused with the supra-hypandrial sclerite. However, these process-like structures are always attached to the aedeagus and neither to the hypandrium nor the gonocoxite. The supra-hypandrial sclerite as here defined for *Namibimydas* and *Nothomydas* is attached dorsolaterally to the fused gonocoxite-hypandrial complex.

Seasonal incidence

All four species of *Namibimydas* have primarily been collected during January–February, during the Southern Hemisphere summer, while *Na. psamminos* sp. n. has also been collected in April (late summer) and *Na. stuckenbergi* sp. n. also in November (early summer). Species of *Nothomydas* have been collected from September–November, spring and early summer, with *No. picketti* sp. n. only occurring in September, *No. garipepinus* and *No. namaquensis* only in October, and *No. aquilonius* sp. n. only in November.

Biodiversity hotspots

The biodiversity hotspots *sensu* *Conservation International* (Myers *et al.* 2000) are areas of high plant endemism in which the habitat has been destroyed to a considerable extent and which are under threat of more destruction. Evaluating the presence/absence of Diptera species in these priority areas earmarked for conservation can de-

termine whether these species will also be preserved when funding is made available for their protection (e.g., Dikow *et al.* 2009). Of the eight species dealt with in this contribution, four are endemic to one particular biodiversity hotspot. *Namibimydas prinsi* is endemic to the Cape Floristic Region and *Nothomydas aquilonius* sp. n., *No. namaquensis*, and *No. picketti* sp. n. are endemic to the Succulent Karoo hotspot. Both *Namibimydas stuckenbergi* sp. n. and *Nothomydas gariepini* occur inside the Succulent Karoo hotspot, but also outside of it in adjacent habitats. *Namibimydas gaerdesi* and *Namibimydas psamminos* sp. n., distributed in west-central Namibia, do not occur in any biodiversity hotspot *sensu Conservation International*.

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