Festschrift for Jason Gilbert Hayden Londt

Edited by

Torsten Dikow, Kirstin Williams, John Midgley

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African Invertebrates 64(2) (Special Issue)
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First published 2023
ISBN 978-619-248-110-0 (e-book)

Pensoft Publishers
12 Prof. Georgi Zlatarski Street, 1700 Sofia, Bulgaria
Fax: +359-2-870-42-82
info@pensoft.net
www.pensoft.net

Printed in Bulgaria, May 2023

Contents

African Invertebrates 64(2): 13–40 (2023)
doi: 10.3897/AfrInvertebr.64.105050
https://africaninvertebrates.pensoft.net

EDITORIAL

African Invertebrates
A journal of biodiversity research

Jason G. H. Londt: A giant of South African entomology

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Academic editor: Kirstin Williams | Received 17 April 2023 | Accepted 20 April 2023 | Published 5 May 2023

https://zoobank.org/3283F2CD-F831-421B-B85C-BFEFC1D1C750

Citation: Dikow T, Midgley J (2023) Jason G. H. Londt: A giant of South African entomology. In: Dikow T, Williams K, Midgley J (Eds) Festschrift for Jason Gilbert Hayden Londt. African Invertebrates 64(2): 13–40. https://doi.org/10.3897/AfrInvertebr.64.105050

Abstract

To celebrate the 80th birthday of Jason G.H. Londt, we present a collection of articles in his honour. This introduction includes a summary of Jason's life and career, an overview of the articles in the Festschrift, lists of his scientific and popular publications and a list of species named in his honour. Jason's contribution to Mecoptera and Asilidae research in the Afrotropics is discussed, highlighting the impressive contributions he has made to the taxonomy, biology and ecology in both groups.

Keywords

Asilidae, Bibliography, biography, Bittacidae, personalia, species descriptions

Jason G. H. Londt has made a notable impact on South African and International Entomology over a career of more than 50 years. 2023 marks Jason's 80th birthday and it is fitting to publish a Festschrift in honour of this milestone. This Festschrift recognizes the outstanding contributions that Jason has made to entomological research on flies, especially assassin or robber flies (Diptera, Asilidae), on hangingflies (Mecoptera, Bittacidae), and field collections of insects, primarily in South Africa. This issue includes nine articles celebrating Jason's career by authors from three continents and five countries.

Brief biographical sketch

Jason Gilbert Hayden Londt (Figs 1, 2) was born in Johannesburg, Transvaal [now Gauteng], South Africa on April 1st, 1943, where he attended Parkview Junior, Parkview Senior and Parktown Boys' High Schools. Jason received all of his academic training at Rhodes University in Grahamstown [now Makhanda], Cape Province [now Eastern Cape], South Africa with research on ticks (graduating with BSc 1968; BSc Honours 1969; MSc 1971; PhD 1974), where he was an excellent student (B. Wilmot pers. comm. 2023). He also developed an interest in Mecoptera and started his taxonomic research on this group while he was a student. During 1970, Jason undertook some lecturing in entomology (sharing a vacant post with B. Wilmot) in order to bring in some income and to assist with the teaching load. During 1971–1973, Jason held the position of Research Officer at the newly established Tick Research Unit, Department of Zoology and Entomology, Rhodes University, during which time he also assisted in the teaching of Entomology. In 1974, Jason was awarded the University of London 'Esmé Fairbairn Post-doctoral Fellowship', and conducted biological research on various species of British ticks including *Ixodes trianguliceps* under Prof. Don R. Arthur, head of the Department of Zoology at Kings College, London, UK, some time was also devoted to taxonomic work on Afrotropical Mecoptera at the Natural History Museum, London. During this period, he also collected insects in Germany, Switzerland, The Netherlands and the United Kingdom. Following his one-year studies in London, Jason accepted a post as a Senior Professional Officer at the Onderstepoort Veterinary Institute (1975) in Pretoria, Gauteng, South Africa, where he continued to work on the biology and ecology of southern African cattle ticks (Ixodidae), mostly of the Blue Tick (*Boophilus decoloratus*) and the Red-legged Tick (*Rhipicephalus evertsi*). In 1976, Jason took up the post of Assistant Director of the KwaZulu-Natal Museum [then the Natal Museum] in Pietermaritzburg, Natal [now KwaZulu-Natal], South Africa. This is where he commenced his research on the assassin flies (Asilidae, Fig. 3). During the 17 years when Jason was Assistant Director, he also undertook all the editorial work on the museum's scientific publications. Jason became Director of the same museum in 1994 and retired from that position on 30 April 2003. After retirement, Jason served a 6-month post-retirement contract as Acting Director while the museum council appointed his successor. Jason was an active member of the Pietermaritzburg Rotary Club from 1989 to 2018, serving as President in 2000/01. He continues to this day to visit the museum to meet with staff, study and add flies and other insects to the collection, and writes a column entitled 'Concrete Jungle' for the local newspaper, The Witness. Jason has been married to his wife Ann for 55 years and they have three children, Hilary, Cynthia and Brendan, and six grandchildren.

Brief summary of research impact

Jason has contributed a remarkable amount to entomology in South Africa and the world. During a career of 51 years, Jason published 137 scientific papers and book

Figures 1–4. 1 Jason next to a quiver tree (*Aloidendron dichotomum*, Asphodelaceae) following a successful day in the field at Tierberg Nature Reserve, Keimoes, Northern Cape, South Africa (28°43'01"S, 20°59'48"E, 2004-02-05). Asilidae species (6) collected at this site on this day: *Acasilus tigrimontis* Londt, 2005, *Afroholopogon mauros* Londt, 2005, *Afroholopogon pardosoros* Londt, 2005, *Alcimus* sp., *Lycostommyia albifacies* (Hermann, 1907), and *Trichoura pardeos* Londt & Dikow, 2016. Photo by T. Dikow 2004 (with Jason's camera) **2** Jason and Torsten Dikow at Doreen Clark Nature Reserve in Hilton, KwaZulu-Natal, South Africa (29°34'52"S, 30°17'25"E, 2019-09-15). No Asilidae was collected on this day at this site. Photo by A. Cabrero 2019 **3** assassin fly *Melouromyia natalensis* (Ricardo, 1919), one of two species in the genus *Melouromyia* Londt, 2002, photographed by Jason in his garden in Pietermaritzburg, KwaZulu-Natal, South Africa. Photo by J. Londt 2013 **4** two KwaZulu-Natal Museum dipterists, Jason Londt (Director, left) and Brian Stuckenberg (Director Emeritus, right), talking about flies. Photo by T. Dikow 2000.

chapters, 29 popular articles and six popular books (see Appendix 1, publication list, below), collected specimens in ten African, four European and one Central American country and assembled a collection of over 21,700 Asilidae and 65,000 insect specimens, almost all housed at the KwaZulu-Natal Museum. Throughout his career at the KwaZulu-Natal Museum, he had to balance his research with the administrative demands of his positions, further highlighting his research productivity. As a measure of the esteem in which his colleagues held him, 32 Diptera species in 17 families, four other insects in three orders, and two Oligochaetes have been named in his honour (Table 1). A further five species are named in his honour in this Festschrift.

Table 1. List of species named in honour of Jason Londt.

Order	Family	Species
Insects		
Diptera	Acroceridae	*Acrocera londti* Barraclough, 1984: 64
	Asilidae	*Asilella londti* Lehr, 1989: 233
		Cerdistus londti Lavigne, Suludere & Stevens, 2019: 245
		Damalis londti Scarbrough, 2005: 150
		Lasiocnemus londti Dikow, 2007: 69
		Microphontes jasonlondti Markee & Dikow, 2018: 210
		Neolophonotus londti Bosák & Hradský, 2011: 704
		Oligopogon londti Geller-Grimm & Hradský, 2003: 173
		Philodicus londti Joseph & Parui, 1991: 251
		Saropogon londti Parui, 1999: 216
	Camillidae	*Afrocamilla londti* Barraclough, 1997: 191
	Diopsidae	*Teloglabrus londti* Feijen, 1983: 127
	Dolichopodidae	*Medetera londti* Grichanov, 2000: 418
		Pseudargyrochlamys londti Grichanov, 2020: 98
		Pseudargyrochlamys jasoni (Grichanov, 2004: 110)
	Drosophilidae	*Leucophenga londti* Bächli, Vilela & McEvey, 2005: 32
	Hybotidae	*Acarterus londti* Sinclair, 1996: 224
	Muscidae	*Atherigona londti* Muller, 2015: 882
	Mycetophilidae	*Mycomya londti* Väisänen, 1994: 18
	Neriidae	*Chaetonerius londti* Barraclough, 1993: 8
	Phoridae	*Aenigmatistes londti* Disney, 1991: 361
		Woodiphora londti Disney, 2004: 97
	Platystomatidae	*Agrochira londti* (Whittington, 2003: 165)
	Sarcophagidae	*Sarcophaga* (*Liosarcophaga*) *londtiana* (Lehrer, 1996: 60)
		Sarcophaga (*Nuzzaciella*) *londti* (Lehrer, 1994: 18)
	Syrphidae	*Syritta londti* Lyneborg & Barkemeyer, 2005: 160
	Tabanidae	*Philoliche londti* Chainey, 1983: 465
	Tachinidae	*Austrosolieria londti* Cerretti & O'Hara, 2016: 288
		Winthemia londti Inclán & Cerretti, 2016
	Therevidae	*Orthactia londti* Lyneborg, 1988: 552
	Vermileonidae	*Vermipardus londti* Stuckenberg, 1995: 234
		Vermilynx jasoni Stuckenberg, 1996: 198
Hemiptera	Notonectidae	*Anisops londti* Truxal, 1990: 90
	Tingidae	*Cochlochila* (*Kibongoto*) *londti* Rodrigues, 1982: 259
Lepidoptera	Pterophoridae	*Gypsochares londti* Ustjuzhanin & Kovtunovich, 2010: 701
Orthoptera	Tridactylidae	*Xya londti* Günther, 1982: 339
Other Invertebrates		
Haplotaxida	Microchaetidae	*Proandricus jasoni* Plisko, 1992: 362
		Proandricus londti Plisko, 1993: 204
Taxa described this Festschrift		
Diptera	Asilidae	*Anypodetus londti* Dikow & Dubus, 2023: 189
	Empididae	*Wiedemannia londti* Sinclair, 2023: 142
	Syrphidae	*Amphoterus londti* Midgley, Bellingan & Jordaens, 2023: 158
	Therevidae	*Neotherevella londti* Winterton, Irwin & Mortelmans, 2023: 120
Mecoptera	Bittacidae	*Bittacus londti* Midgley, 2023: 98

Research on Bittacidae

Jason published his first scientific article, the description of *Bittacus tjederi* Londt, 1970, on the Mecoptera (Londt 1970) and, despite his career focused on the Asilidae (his publications on Asilidae outnumber publications on Mecoptera five to one), continued publishing on Mecoptera for the next 37 years, until 2007. During his career, he published 20 articles and book chapters, 13 on the taxonomy of Mecoptera and seven on their distribution, biology and ecology. His treatment of the Bittacidae in "A catalogue of Afrotropical Mecoptera" (Londt 1994a) remains the most thorough publication on the Afrotropical fauna and his key to the southern African species in "The Mecoptera of Southern Africa" (Londt 1972) is the only identification resource for the Afrotropics.

The majority of Jason's work focused on the Afrotropical Mecoptera, where he described 16 species, though he did also describe one species from the Neotropics (Londt and Byers 1974). The Afrotropical Mecoptera are represented by a single family, the Bittacidae, and three genera, one of which, the monotypic *Afrobittacus* Londt, 1994, was described by Jason. *Anomalobittacus* Kimmins, 1928 is also monotypic, leaving the majority of the Afrotropical diversity (51 species) in *Bittacus* Latreille, 1805. With two monotypic genera, articles treating the entire family are more practical for the Afrotropics and, in most cases, this was Jason's approach. Of the 53 valid species known from the Afrotropics, Jason has described 14, or 26% of the known diversity. The only authors to describe a comparable number are Longinos Navás who described 13 valid *Bittacus* species and Peter Esben-Petersen who described seven valid species. No other author has described more than three Afrotropical Mecoptera species. Of the 17 Mecoptera species described by Jason, only two have proven to be junior synonyms, both from his early work (Londt 1972) and both synonymized by Jason himself (Londt 1994a).

While most of Jason's publications were taxonomic, he also published on the fauna of specific regions, such as Malawi (Londt 1981) and Mkomazi in Tanzania (Londt and van Noort 1999), an atlas of the Mecoptera of KwaZulu-Natal (Londt 1995b) and four general articles on the distribution, biology and ecology of Mecoptera. As in his research on the Asilidae, his observations of this group have provided insights that are uncommon in many Afrotropical insect groups.

Taxonomic Asilidae research

Jason joined the Natal Museum (NMSA) in Pietermaritzburg as Assistant Director in 1976. Although he had not published on Diptera yet, the then director and preeminent dipterist Brian Stuckenberg (Kirk-Spriggs 2012, Fig. 4) asked Jason to focus his attention on Asilidae in part because a review of the southern African fauna had just been published by Harold Oldroyd from the Natural History Museum in London, UK (Oldroyd 1974, see also below).

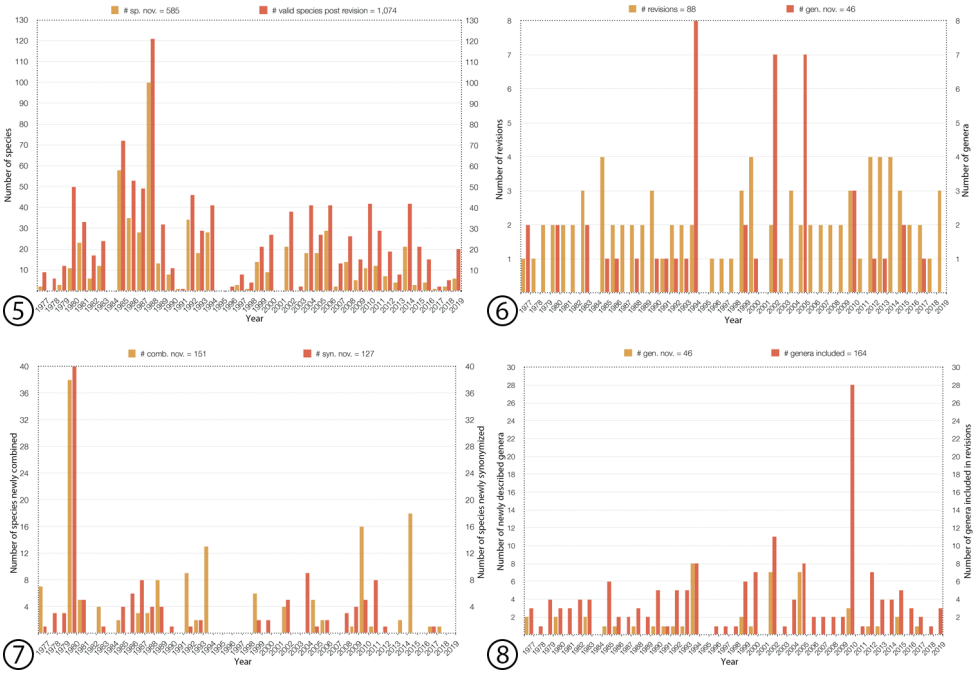
Jason published his first article on assassin flies, focusing on the genus *Choerades* Walker, 1851, in 1977 (Londt 1977). This article started his series entitled "Afrotropical Asilidae" to which he added 32 additional manuscripts with the final one appearing on the genus *Habropogon* Loew, 1847 in 2000 (Londt 2000). This remarkable series of papers was (1) exclusively published in the "Annals of the Natal Museum" (renamed to "African Invertebrates" in 2001), (2) authored solely by Jason as the single author, and (3) included, with three exceptions, only taxonomic revisionary studies. To these 33 taxonomic "Afrotropical Asilidae" publications, Jason added an amazing 55 other taxonomic revisionary studies published in a number of different entomological journals but chiefly in "African Invertebrates". His taxonomic work focused on genera distributed in southern Africa or the entire Afrotropical Region with his last publication appearing in 2019 on the genus *Astochia* Becker in Becker and Stein 1913 (Londt 2019). In a total of 88 revisions, Jason described 585 new Asilidae species (Fig. 5: 580 Afrotropical, 4 Oriental (India, Pakistan, Sri Lanka), 1 Palaearctic (Iran)), 46 new genera (Fig. 6: 45 Afrotropical, 1 Oriental), newly combined 151 species, and newly synonymized 127 species of Asilidae (Fig. 7). These revisions included more than 1,000 species (Fig. 5, most with high-quality re-descriptions).

The new species descriptions are spread among 70 genera from ten of the 12 currently recognized subfamilies recorded for the Afrotropics. The only two subfamilies known from the Afrotropical Region that Jason did not describe new species in are Leptogastrinae and Ommatiinae. Remarkably, Jason has only a single junior synonym in the Asilidae to his name to this day, which he himself established in 2015 when synonymizing *Notiolaphria africana* Londt, 1977, which was described in his first article, with *Notiolaphria coerulescens* Macquart, 1834 when it was newly combined with *Notiolaphria* Londt, 1977 (Londt 2015).

The vast majority of new taxa were described in Asilinae with 247 new species and 15 new genera followed by Stenopogoninae with 95 new species and 10 new genera.

The highest number of new species in a single manuscript was published in 1988 in the *Neolophonotus comatus* group with 98 new species (Londt 1988, Fig. 5). The highest number of new genera was published in 1994 with seven new genera of small Stenopogoninae (Londt 1994b, now mostly placed in Brachyrhopalinae, Fig. 6) plus the genus *Afroholopogon* (Londt 1994b) closely followed by the two comprehensive studies on the Asilinae with seven new genera in Londt (2002b) and six in Londt (2005) (Fig. 6). In one of his earlier articles, Jason cleaned up the complex taxonomic history of the genus *Pegesimallus* Loew, 1858 (with junior synonyms *Cenopogon* Wulp, 1898, *Lagodias* Loew, 1858, and *Neolaparus* Williston, 1889) in which he described 10 new species, two new genera, synonymized 39 previously described species, and newly combined 37 species with *Pegesimallus* (Londt 1980, Fig. 7).

Jason usually included single genera in his manuscripts, but when he reviewed the fauna of a particular region he included several genera. The largest of these was his review of the fauna of The Gambia, based on 298 Gambian Asilidae collected by William F. Snow between 1974–1977 and deposited at Oxford University Museum of Natural History, where a total of 28 genera were dealt with in a single publication (Fig. 8) (Londt 2012).

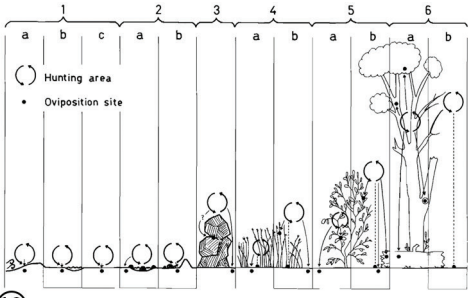


Figures 5–8. Graphical summary of 88 taxonomic revisionary studies published by Jason Londt on Asilidae between 1977–2019 **5** number of new species described and valid species recognized **6** number of revisions and number of new genera **7** number of new generic combinations and number of new junior synonyms **8** number of new genera and number of genera included in each revision (note: total number of 164 encompasses genera included in multiple revisions).

Jason published his taxonomic Asilidae research primarily as the sole author (78 taxonomic revisionary studies) with ten articles co-authored by four colleagues (six with T. Dikow, two with R. Copeland, and one each with R. Vieira and L. Tsacas).

Faunistic and biological Asilidae research

While Jason's taxonomic reviews and keys represent the core of his Asilidae research, he also used his expeditions to note biological data while collecting specimens in the field (Fig. 9). Jason published twelve articles that are not strictly taxonomic in nature and that contributed immensely to understanding the biology, ecology and diversity of (Afrotropical) Asilidae. His publication "Afrotropical Asilidae (Diptera) 26. Ethological observations, and a possible ecological classification based on habitats" (Londt 1994c) provided a summary of his extensive experience when observing and collecting assassin flies in the field. The unique perching and oviposition behaviours of many species are here compared and contrasted within six ecological categories and three oviposition strategies (Fig. 10). Prey specialization is also discussed based on predator-prey pairs in



Figures 9–10. 9 Jason reviewing the catch in the shade at Cumberland Nature Reserve, KwaZulu-Natal, South Africa (29°30'25"S, 30°30'23"E, 2004-01-13). Asilidae species (11) collected at this site on this day: *Afroestricus chiastoneurus* (Speiser, 1910), *Euscelidia brunnea* (Loew, 1858), *Laxenecera albicincta* (Loew, 1852), *Leptogaster carotenoides* (Tomasovic, 1999), *Ommatius senex* (Bromley, 1936), *Pegesimallus aulicus* (Wiedemann, 1828), *Philodicus tenuipes* (Loew, 1857), *Promachus amastrus* (Walker, 1849), *Rhipidocephala* sp., *Scylaticus costalis* (Wiedemann, 1819), and *Stichopogon punctum* (Loew, 1851). Photo by T. Dikow 2004 **10** ecological categories of Afrotropical Asilidae from Londt 1994: fig. 2. Numbers – primary divisions; letters – subdivisions; circling arrows – hunting area; dots – possible oviposition sites.

the collection, a subject on which Jason would publish further papers. The (Afrotropical) assassin fly prey is further analyzed in two articles entitled, "Predation of Asilidae by Asilidae" (Londt 1995a) and "An analysis of 2000 prey records" (Londt 2006). One can imagine that the 'cannibalistic' behaviour of preying on your own 'kind' is not that prevalent, but the analysis of 100+ field-caught assassin fly predator-prey pairs provides a first set of data points. Jason showed that true cannibalism does not occur in Afrotropical Asilidae, with most predator/prey relationships being between genera (Londt 1995a). In general, assassin flies are not that specific about their prey choice, but some Afrotropical genera are and Jason summarized the available prey data in the two mentioned publications and on honeybees (Londt 1993) and butterflies (Londt 1999). On the reverse, Jason was also involved in research on predator avoidance such as through hypertrophied hindwings in Nemopteridae (spoonwings, Neuroptera) that are postulated to reduce attack success by assassin flies (Picker et al. 1992). The female oviposition strategies, egg and early instar larval morphology, and other biological data were analyzed for *Millenarius dichaetus* (Hull, 1967) (Asilinae)(Londt and Harris 1987) and *Damalis femoralis* Ricardo, 1925 (Trigonomiminae)(Londt 1991) along with scanning electron micrographs and illustrations of the eggs and larvae.

Jason also published three interesting faunistic studies. The first was based on material in the NMSA collected by Dr J. Brauns in and around Willowmore, Eastern Cape, South Africa between 1902–1929. It established that the habitats in the southernmost extent of the Nama Karoo harbour an incredible species diversity of assassin flies with 62 species in 27 genera recorded (Londt 1998). These numbers need to be increased to 63 species in 28 genera based on a unique specimen in the United States

National Museum (USNM) of the genus *Ammodaimon* Londt, 1985 collected by J. Brauns at Willowmore in 1903. Jason showed an early understanding of the potential of databases in this work and had GBIF existed at the time, it is likely that he would have included the USNM data and those of others museums. This study provides a measure of species richness for the semi-arid Nama Karoo and no comparable data are currently available for arid or semi-arid environments anywhere else in the world. The other two faunistic articles are much stronger in the scientific technique applied and closer to home as they focus on the fauna of Queen Elizabeth Park (Londt 2002a) in Pietermaritzburg and the Jacana Eco Estate (Londt 2020) in Hilton, which is just north of the same city. Both are year-long studies of grassland-inhabiting assassin fly species collected through standardized sweeping and walking the same paths to visually locate flies. At Queen Elizabeth Park, 20 species from 15 genera (including *Millenarius* Londt, 2005, which was collected for the first time during this study and later described) representing eight subfamilies were recorded. At Jacana Eco Estate, 18 species from 13 genera representing six subfamilies were recorded. These studies provide insight into the species richness of assassin flies in grasslands within South Africa and no other comparable studies for this habitat type exist.

The "Manual of Afrotropical Diptera" project, spearheaded by Ashley Kirk-Spriggs and Bradley Sinclair (Kirk-Spriggs and Sinclair 2017), came at a time when many of the Afrotropical Asilidae genera had already been reviewed and who would be better suited to summarize our knowledge than Jason himself? The chapter on Asilidae (Londt and Dikow 2017) includes 148 genera accounting for 1,684 species, which makes it the most diverse Diptera family in the Afrotropics. Today, this species count has risen slightly to 1,704 valid species and many more will be discovered and need to be described in the future. This book chapter provides also, for the first time, a single identification key to all known genera and will be a valuable resource for the study of assassin flies for years to come.

Fieldwork in search of Asilidae

Almost half of new species described by Jason are based on his own collecting throughout South Africa (the NMSA has 279 Asilidae holotypes collected and described by Jason). The fauna of this vast country is particularly well-known because Jason exhaustively covered every corner of it to collect specimens since starting work at the NMSA in 1976 (Fig. 11, see also below). Asilidae specimens collected by Jason since 1966 are in the NMSA collection (though some from his student years were deposited at the Albany Museum, Makhanda) and he is adding new ones to this day. It is obviously difficult to compare entomologists collecting throughout their careers, but we believe that there are very few, if any, other South African entomologists who have covered the entire country as densely as Jason has (Fig. 11). Amazingly, the entire NMSA Diptera collection has been databased and holds a staggering 42,000+ specimens of Asilidae in its drawers of which 21,700+ are assassin flies collected by

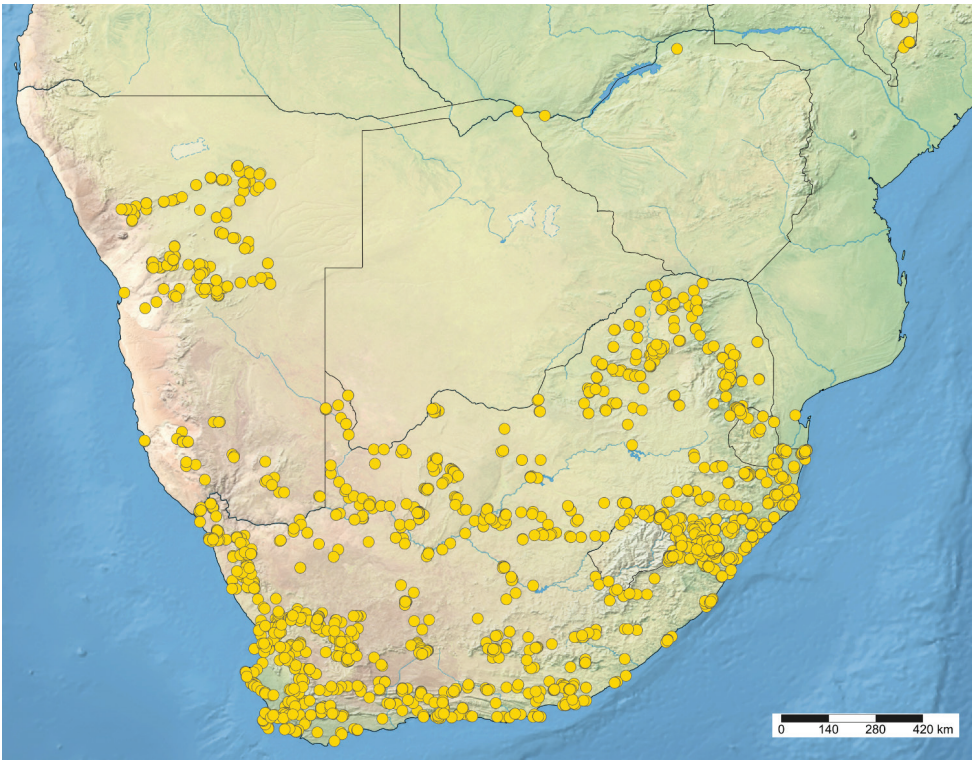


Figure 11. Map of southern Africa with collecting localities at which Jason Londt collected Asilidae (and other flies/insects). Based on published records and NMSA collection database. Map created in SimpleMappr (Shorthouse 2010).

Jason and of which 18,700+ are from within South Africa alone. Figs 12–17 show Jason in a number of habitats throughout South Africa in search of assassin flies. Jason collected almost every single genus of assassin flies known from South Africa. In some instances, such as *Bana* Londt, 1991, he collected the genus in Namibia but did not collect the only known species from South Africa, *Bana madiba* Londt, 2013. In other instances, such as *Zelamyia* Londt, 2005 or a few Ommatiinae genera, Jason has not been at the right time at the right place to encounter these genera in the field.

Jason also collected Asilidae, Diptera in general, and other insects on extended field trips in Malawi (1980, 1987; 850+ Asilidae specimens), Namibia (1983, 1984; 1,250+ Asilidae specimens), Côte d'Ivoire (1989; 240+ Asilidae specimens), Swaziland [now Eswatini] (1991; 125+ Asilidae specimens), Kenya (1992; 315+ Asilidae specimens) and Costa Rica (2010; 110+ Asilidae specimens in USNM). These expeditions added immensely valuable material to the NMSA collection from other Afrotropical countries (Fig. 18). A single specimen of *Rhabdogaster* was also collected at Victoria Falls, Zambia, on a vacation in 2008.

Figures 12–17. 12 Jason catching flies at Cumberland Nature Reserve, KwaZulu-Natal, South Africa (29°30'25"S, 30°30'23"E, 2004-01-13). For a list of captured species, see Fig. 9 captions. Photo by T. Dikow 2004 **13** Jason sweeping vegetation at Mhlopeni Nature Reserve, KwaZulu-Natal, South Africa (29°01'13"S, 30°25'01"E, 2004-02-13). Asilidae species (15) collected at this site on this day: *Afroestricus chiastoneurus* (Speiser, 1910), *Astochia armata* (Becker, 1909), *Connomyia leonina* (Engel, 1932), *Connomyia varipennis* (Ricardo, 1925), *Gonioscelis zulu* Londt, 2004, *Heligmonevra* sp., *Hoplistomerus nobilis* (Loew, 1858), *Lasiocnemus lugens* (Loew, 1858), *Laxenecera albicincta* (Loew, 1852), *Melouromyia natalensis* (Ricardo, 1919), *Ommatius flavipes* (Loew, 1858), *Ommatius senex* (Bromley, 1936), *Pegesimallus aulicus* (Wiedemann, 1828), *Rhipidocephala* sp., and *Stichopogon punctum* (Loew, 1851). Photo by T. Dikow 2004 **14** Jason sweeping grass at Doorndraai Dam Nature Reserve, Limpopo, South Africa (24°17'41"S, 28°46'41"E, 2005-02-16). Asilidae species (8) collected at this site on this day: *Ancylorhynchus fulvicollis* (Bigot, 1879), *Emphysomera pallidapex* (Bigot, 1891), *Euscelidia procula* Walker, 1849, *Lasiocnemus lugens* (Loew, 1858), *Laxenecera albicincta* (Loew, 1852), *Ommatius* sp., *Pegesimallus* sp., and *Philodicus fraterculus* (Walker, 1855). Photo by T. Dikow 2005 **15** Jason admires a giraffe while collecting at Messina Nature Reserve, Limpopo, South Africa (22°24'54"S, 30°05'12"E, 2005-02-14–15). Asilidae species (9) collected at this site on this day: *Alcimus* sp., *Anypodetus arachnoides* Oldroyd, 1974, *Hoplistomerus nobilis* Loew, 1858, *Philodicus dubius* Ricardo, 1921, *Philodicus tenuipes* (Loew, 1857), *Pegesimallus laticornis* (Loew, 1858), *Stichopogon punctum* (Loew, 1851), *Trichardis apicalis* (Oldroyd, 1974), and *Trichardis testacea* (Macquart, 1838). Photo by T. Dikow 2005 **16** Jason and his field vehicle, a Toyota Hilux, at red Kalahari sand dunes near Keimoes, Northern Cape, South Africa (28°44'55S, 20°46'11"E, 2004-02-04). Asilidae species (3) collected at this site on this day: *Laphystotes ariel* Londt, 2004, *Macroetra* sp., and *Sporadothrix gracilis* Hermann, 1907. Photo by T. Dikow 2004 **17** Jason at Tugela River mouth on the Indian Ocean coast, KwaZulu-Natal, South Africa (29°13'21"S, 31°30'22"E, 2019-09-19). No Asilidae was collected on this day at this site. Photo by T. Dikow 2019.

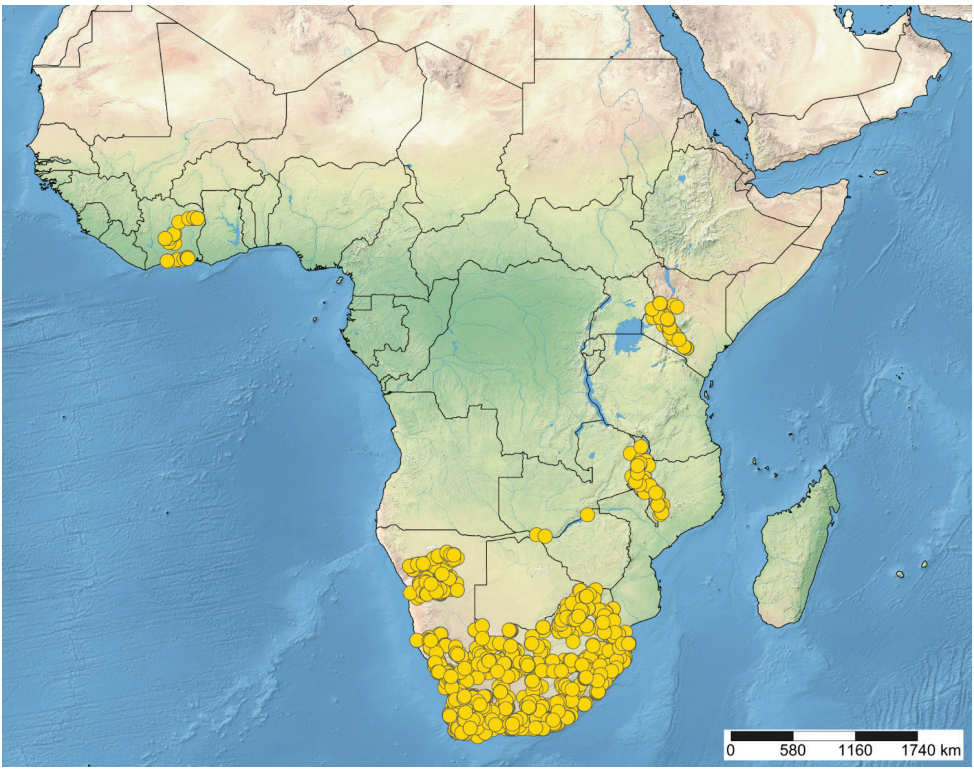


Figure 18. Map of the Afrotropical Region with localities where Jason Londt collected Asilidae (and other flies/insects). Based on published records and NMSA collection database. Map created in SimpleMappr (Shorthouse 2010).

The southern African Asilidae fauna

The fauna of assassin or robber flies of southern Africa is arguably one of the best-known of any region on the planet. That is in large part because of Jason's dedicated field-work and research on this fauna since 1977. This area with diverse habitats such as Mediterranean fynbos and macchia, Namib and Kalahari deserts, Mopane woodlands, subtropical coastal forests, high altitude mountain plateaus, savanna, and Succulent and Nama Karoo covers the countries Botswana, Eswatini, Lesotho, Mozambique (south of the Zambesi river), Namibia, South Africa, and Zimbabwe.

The southern African Asilidae fauna has received attention from European dipterists for over 240 years (Fig. 20). Johan Christian Fabricius described the first species, *Teratopomyia cyanea* (Fabricius, 1781), from 'Cap. bon. sp.' (*Promontorium bonae spei* = Cape of Good Hope) in South Africa (Fabricius 1781). Jason reviewed this species in 2009 (Londt 2009) and commented on its unique morphology and metallic blue-black colouration, which is unknown from any other Afrotropical Asilidae species. Christian R.W. Wiedemann (between 1819–1830), Justin P.M. Macquart (between 1834–1855), and Francis Walker (between 1849–1857) added 25, 32, and 26 still valid species, respectively (Fig. 20). The first comprehensive review of the fauna was published by F. Hermann Loew who in

This Award recognizes the most knowledgeable Afrotropical Asilidae taxonomist —present and past—

Jason G.H. Londt

for his contributions to the study of assassin flies with a species named in his honour—

Microphontes jasonlondti

Microphontes jasonlondti Markee & Dikow, 2018
Holotype male – South Africa: Northern Cape: Renoster River, 18 km N Sutherland, 1290 m, 7 November 1998, Karoo macchia, J.G.H. Londt & B. Londt – NMSA-DIP-4768

Taxonomy and phylogeny of Asilidae – honouring 40 years of Afrotropical research by Jason Londt

9th International Congress of Dipterology, Windhoek, Namibia

27 November 2018

Figure 19. Commemorative award celebrating the career of Jason Londt presented at ICD9 in Windhoek, Namibia in 2018.

1860 published the *Die Dipteren-Fauna Südafrika's* (pages 56–170) recognizing 96 species (Loew 1860). Loew described a total of 64 still valid species between 1851–1863 from southern Africa (Fig. 20). In the 20th century, Gertrude Ricardo (between 1900–1925) described 50, Erich O. Engel (between 1925–1932) described 26, Stanley W. Bromley (between 1930–1952) added 25, Frank M. Hull (between 1958–1967) added 20, and

Harold Oldroyd (between 1966–1974) added 52 still valid species (Fig. 20). By the time of the publication of "An Introduction to the Robber Flies (Diptera: Asilidae) of Southern Africa" (Oldroyd 1974), the total number of valid species in Southern Africa stood at 480 after ~175 years of attention of which 208 were treated in detail by Oldroyd. Jason alone described 490 (481 sole, 9 co-authored) new species of Asilidae from southern Africa in less than a third of this time, which demonstrates the immense contribution he has made to dipterology and entomology in southern Africa (Fig. 20). Other contemporary authors who added species are Torsten Dikow with 27 species (between 2000–present, 5 co-authored with Jason), Aubrey Scarbrough with 9 (between 1996–2005) and Guy Tomasovic with 6 (between 1999–2013). Today, some 952 Asilidae species are recognised from southern Africa and thanks to Jason's exceptional collecting efforts and detailed revisionary taxonomic publications these species can be easily identified.

Southern Africa is also very diverse in terms of genera of Asilidae. In total, 102 genera have been recorded to date of the 148 genera known from the Afrotropical Region. Of these, 45 genera are endemic to southern Africa and 18 are monotypic. Jason described 37 genera from southern Africa during his career of which 28 are endemic and 13 are monotypic. The numbers of endemic and monotypic genera might suggest that the actual species diversity has not been fully described. To some biologists it might seem that Jason was a splitter 'overdescribing' the southern African fauna. However, Jason conducted such comprehensive field-work in biologically diverse habitats (see above) that yielded beautifully pinned specimens with high-quality associated locality and habitat data that it is no surprise that new species have been discovered. Furthermore, Jason included useful identification keys in each of his taxonomic publications making the species recognition and identification for entomologists possible for generations to come. On the other hand, Jason did not tackle and publish on some diverse, world-wide genera such as *Microstylum* Macquart, 1838 (79 Afrotropical and 39 southern African species) or *Promachus* Loew, 1848 (97 Afrotropical and 21 southern African species) in which, no doubt, many more species will be discovered and need to be described in the future. The southern African Asilidae fauna is exceptionally diverse and new species will be discovered by studying already available specimens at the KwaZulu-Natal Museum or by new fieldwork.

Summary of Asilidae research

Jason presented his research on Asilidae at several meetings of the "Entomological Society of Southern Africa" as evidenced by published abstracts (e.g., Londt 1987, 2001). Jason also participated in the "International Congresses of Dipterology" in Guelph, Canada (1994, ICD3), Oxford, UK (1998, ICD4), San José, Costa Rica (2010, ICD7), and Windhoek, Namibia (2018, ICD9) to share his research with the international dipterological community (e.g. Londt 2010b, 2010a). Jason was elected an Honorary Member of the "International Congresses of Dipterology" at the Windhoek meeting in 2018. He is the 2nd African dipterist to receive these honours following his close colleague Brian Stuckenberg, who was elected an Honorary Member of the

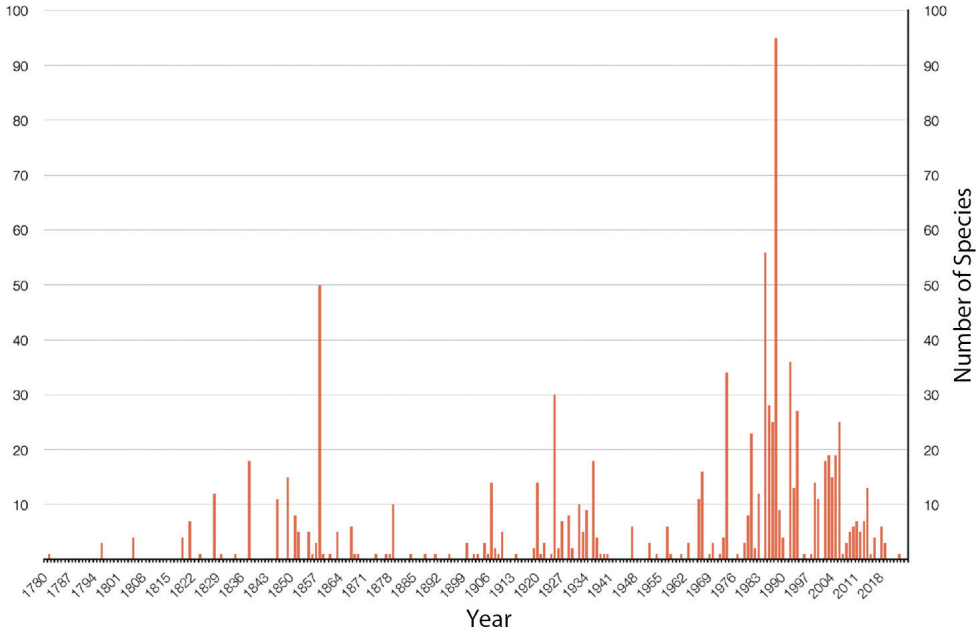


Figure 20. Summary of the accumulation of described southern African Asilidae species over time, from the first description in 1781 to the present day.

Congresses in 1994 (Kirk-Spriggs 2012). Also at ICD9, a symposium was organized by the senior author entitled, "Taxonomy and phylogeny of Asilidae – honouring 40 years of Afrotropical research by Jason Londt" to celebrate his career. Jason received a commemorative award with a newly described species, *Microphontes jasonlondti* Markee & Dikow, 2018, at the symposium (Fig. 19).

Jason's outstanding ability to collect and mount assassin flies, flies in general, and other insects will impact the discovery of new southern African species for many years. One way to visualize his impact in adding specimens to the collection at the KwaZulu-Natal Museum and his study of specimens from many other natural history museums is through his Bionomia record at https://bionomia.net/0000-0001-8308-3718. This summary, based on the recordedBy (collector) and identifiedBy (identifier) fields of specimen data submitted by natural history museums around the world to the Global Biodiversity Information Facility (GBIF, www.gbif.org), illustrates how many specimens Jason has handled both while pinning freshly killed flies and studying them to put an identification label on them. The number of records aggregated (currently 9,860 records for collected by and 1,486 records for identified by) will only increase as more and more specimen data are captured in entomological collections around the world and attributed by Bionomia scribes. In addition, a project is underway by Plazi (plazi.org) and the senior author to liberate in a machine-readable format all of Jason's taxonomic revisionary studies. An example is the revision of *Smeryngolaphria* Hermann, 1912 (Londt 1989), which is available in open access at Plazi TreatmentBank (https://tb.plazi.org/GgServer/summary/FFD2FF9D1015FFF28C64FF9ACE650454) with the taxonomic treatments

individually captured and at Zenodo (https://doi.org/10.5281/zenodo.1472869) with treatments and figures citable with individual DOIs.

Jason has contributed immensely over a career of 43 years of publishing on Asilidae to the understanding of species diversity and ecological roles of assassin flies in sub-Saharan Africa. Describing 580 species of Afrotropical Asilidae alone is an amazing feat and far outnumbers other dipterists studying the Afrotropical fauna such as Harold Oldroyd (144 valid Afrotropical Asilidae species, described between 1939–1974), Gertrude Ricardo (80, 1900–1925), Hermann Loew (77, 1851–1873), or Stanley W. Bromley (69, 1927–1952) to name but a few. Likewise, in terms of capturing the generic diversity, Jason described 45 new Afrotropical genera (1977–2015), all of which are still valid, eclipsing Hermann Loew (26 valid genera, 1847–1873), Friedrich Hermann (13, 1906–1926), Harold Oldroyd (7, excluding replacement names, 1959–1974) and Frank M. Hull (7, 1958–1962).

In a way, the summary chapter on assassin flies in the *Manual of Afrotropical Diptera* (Londt and Dikow 2017) with a key to all Afrotropical genera, its many photographs of flies in nature and from the collection, and up-to-date summaries of their diversity can be regarded as a tribute to Jason's exceptional knowledge of these charismatic flies.

Festschrift summary

Following this introduction, this Festschrift includes three articles on Jason's impact on entomology. Firstly, a catalogue of the types Jason deposited or designated at the Natural History Museum, London was compiled by Erica McAlister and Peter Wing. Kirstin Williams, Jacobus Steenkamp and Louwrens Snyman summarize Jason's general collection at the KwaZulu-Natal Museum and Martin Villet gives an overview of the KwaZulu-Natal Museum Cicadidae collection. Five papers describing new species in Jason's honour, one hangingfly and four true flies, follow this. John Midgley and Terence Bellingan describe a new *Bittacus* (Mecoptera, Bittacidae) a genus in which more than quarter of the Afrotropical species were described by Jason. Shaun Winterton, Michael Irwin and Jonas Mortelmans describe a new *Neotherevella* (Diptera, Therevidae), Bradley Sinclair describes a new *Wiedemannia* (Diptera, Empididae), John Midgley, Terence Bellingan and Kurt Jordaens describe a new *Amphoterus* (Diptera, Syrphidae) and finally, Torsten Dikow and Meliah Dubus describe a new *Anypodetus* (Diptera, Asilidae) (Table 1).

Acknowledgements

We thank all authors who have contributed to this Festschrift. Ann Londt is thanked for confirming biographical information. Brian Wilmot is thanked for discussions on Jason's university days.

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Appendix 1. Publications by Jason Londt, in chronological order

Research articles and book chapters

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African Invertebrates 64(2): 41–77 (2023)
doi: 10.3897/AfrInvertebr.64.103087
https://africaninvertebrates.pensoft.net

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Type material of Asilidae (Diptera) described by Jason Londt in the Natural History Museum, London

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Academic editor: John Midgley | Received 6 March 2023 | Accepted 18 April 2023 | Published 5 May 2023

https://zoobank.org/4F2939C1-CB80-4A80-BC00-FEC997B2A099

Citation: McAlister E, Wing P (2023) Type material of Asilidae (Diptera) described by Jason Londt in the Natural History Museum, London. In: Dikow T, Williams K, Midgley J (Eds) Festschrift for Jason Gilbert Hayden Londt. African Invertebrates 64(2): 41–77. https://doi.org/10.3897/AfrInvertebr.64.103087

Abstract

The primary and secondary types as well as some non-type material donated by Jason Londt (and various collaborators) to the Natural History Museum, London (NHMUK) have been examined and databased which comprises 35 holotypes, 293 paratypes, and 18 non-types (added for completeness), a total of 328 type specimens from 103 species (6% of the total Afro-tropical fauna). All specimen labels were imaged, both frontal and reverse sides, alongside the specimen. Notes were made of any dissections or damage to the specimens. Additional notes were made of any differences between the labels from the species descriptions and the actual specimens.

Keywords

Asilidae, Jason Londt, London, Natural History Museum, Primary types, Secondary types, UK

Introduction

Asilidae are one of the larger families of Diptera with over 7,500 (Pape et al. 2011) species described to date. The Afrotropical fauna is particularly rich with 1700 species and 148 genera, representing 22% and 27% respectively of the world fauna (Dikow 2021). Since 1977 Jason Londt has described 583 species and 46 genera of Asilidae from the Afrotropics to date, a staggering 29% of species and 30% of the genera from this region. Although the majority of Londt' s specimens in the Natural History Mu-

seum, London (NHM) are described from South Africa, he also describes new species from elsewhere in Africa as well as from Asia (Fig. 1).

Londt began designating NHM specimens as types since 1977, with the most recent in 2021 (Londt 1977, 1980, 1981a, b, 1982, 1985a, b, c, 1986a, b, 1989, 1992, 1993, 1994, 1997, 2004, 2005, 2006a, b, 2007, 2008, 2009, 2010, 2011, 2014 and 2019; Londt and Tsacas 1987; Londt and Dikow 2018) and during this period he has also donated both type and non-type material to maintain the comprehensiveness of the collection. All Londt type material has now been imaged and databased, thus providing free and open access to the data through the NHM Data Portal (https://data.nhm.ac.uk). Specimens donated to the NHM by Londt have mostly been recorded in accession registers from which the data have now been migrated to the museum's collections database and therefore can be more easily located. The Diptera Collection at the NHM has the Londt type material (primary, secondary or both) for 328 specimens from 103 of these taxa as well as non-type material for at least 11 more (not all non-type material was examined and databased). There are 35 holotypes (HT) and 293 paratypes (PT). A final complete check of the Diptera collection was conducted to ensure that no specimens were missed and had not been entered into the system. Thirteen type specimens that had been deposited in the collection but had either sat under a manuscript name that had been subsequently published or had not been entered onto the collections management, now were fully incorporated.

Barcoding and overview (specimen and labels) imaging were undertaken from the methodology of Blagoderov et al. (2017), with Canon EOS 5DSr cameras and either Tamron 90 mm or Canon 100 mm lenses being used with Canon EOS Utility for all dorsal habitus images that show specimen labels (Fig. 2). Two images following this method allowed all labels, bar the added unique identifier (UID), encoded with human and machine readable (DataMatrix barcode), to be turned over to show whether any data was present on the reverse.

Separate dorsal habitus, lateral habitus and anterior head images were taken via Canon EOS 5DSr with either Canon 100 mm or Canon MP-E 65 mm (1–5× macro lens),

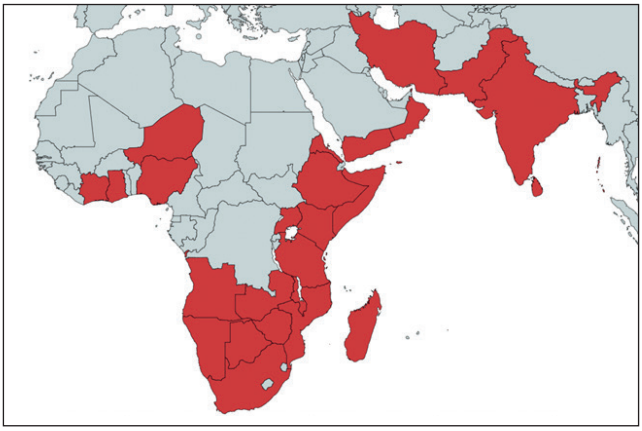

Figure 1. Countries from which J. Londt described new species based on NHMUK material.

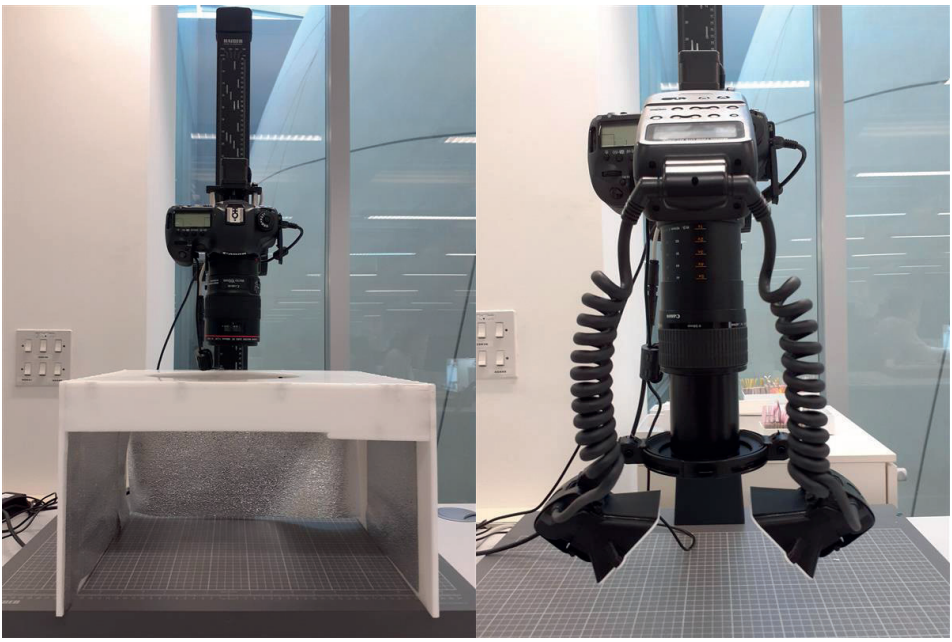

Figure 2. Imaging setup used for (left) overview and (right) stacked specimen photography.

also equipped with Canon MT-24EX twin head flash, and attached to a Cognisys StackShot Macro set up on a Kaiser RS1 copy stand to allow for stacked photography. Images were captured in Helicon Remote (ver.3.9.12) and processed in Helicon Focus (ver.8.1.1; Method c: "pyramid", smoothing = 4) to provide uncompressed TIFF images. Scale bars were applied via Image J (ver. 1.53 q). Specimen records and associated images are available on the NHM data portal (https://data.nhm.ac.uk/).

Institutional Abbreviations and historic names of Museums in the publication are as follows:

NHM	Natural History Museum, London, UK;
NHMUK	Natural History Museum, London, UK (applied to specimen numbers);
BMNH, BMNHE & BMNH(E)	Natural History Museum, London, UK (applied to accession numbers);
SAM	Iziko South African Museum, South Africa;
NMSA	KwaZulu-Natal Museum, South Africa;
Rhodesia Museum	Natural History Museum of Zimbabwe.

Specimen information

Label information taken from the specimens, and any discrepancies with the published information is highlighted. Lines broken in the text at the same label are indicated

by "/"; separate labels with the same specimen are indicated by ","; information on the back of the labels are indicated by "~". All labels given. Information in quotation marks was added in the publication.

Stenopogoninae

Ancylorhynchus doryphorus Londt, 2011: 486. HT **Tanzania** 'Tanganyika/Mahali/Aug-Sept. 1959/2nd. Oxford U. Exped./B.M.1960-279.', 'HOLOTYPE/*Ancylorhynchus/doryphorus* sp.n./Det JGHLondt', 'BMNH(E) #950423' – ♂ NHMUK014034817 (Fig. 3). Male terminalia in vial. In his description Londt also provides additional collection data: "Mountains, 06°12'S:29°50'E".

Ancylorhynchus feijeni Londt 2011, 488. 1 PT ♂ **South Africa** 'Transvaal:/Pretoria. 28.iii.1914./Miss J. Brinker./1914-277.', 'PARATYPE/*Ancylorhynchus/feijeni* sp.n./Det JGHLondt', 'BMNH(E) #950383' – ♂ NHMUK014034818. In his description Londt also provides the latitude and longitude: "25°44'S:28°11'E".

Ancylorhynchus greatheadi Londt, 2011: 498. HT & 10 PT **Eritrea** HT 'Eritrea:/Salamona/30.iv.1961/ D.J. Greathead', 'HOLOTYPE/*Ancylorhynchus/greatgeadi* sp.n./Det JGHLondt', 'BMNH(E) #950395' – ♂ NHMUK014034819 (Fig. 4); 2PT 'Eritrea:/Salamona/30.iv.1961/D.J. Greathead', 'PARATYPE/*Ancylorhynchus/greatgeadi* sp.n./Det JGHLondt', 'BMNH(E) #950386' or 'BMNH(E) #950387'– ♂ NHMUK014034820 (Male terminalia in vial) & ♀ NHMUK014034821; 2 PT 'Eritrea:/Salamona/9–10.iv.1961/D.J. Greathead', 'PARATYPE/*Ancylorhynchus/greatgeadi* sp.n./Det JGHLondt', 'BMNH(E) #950388' or 'BMNH(E) #950394' – ♀ NHMUK014034822 & ♀ NHMUK014034823, respectively; 1 PT 'Eritrea:/Salamona/29.iv.1961/D.J. Greathead', 'PARATYPE/*Ancylorhynchus/greatgeadi* sp.n./Det JGHLondt', 'BMNH(E) #950392' – ♀ NHMUK014034825, in his description Londt also provides the latitude and longitude for Salamona: "15°39'N:39°01'E"; 1 PT 'Eritrea/nr/Gogni /17.ix.1960/D.J. Greathead', 'PARATYPE/*Ancylorhynchus/greatgeadi* sp.n./Det JGHLondt', 'BMNH(E) #950391' – ♀ NHMUK014034824 – abdomen in vial; 2 PT 'Eritrea:/Waddi/Damas/14.iii.1956/D.J. Greathead', 'PARATYPE/*Ancylorhynchus/greatgeadi* sp.n./Det JGHLondt', 'BMNH(E) #950385' or 'BMNH(E) #950393' – ♂ NHMUK014034826 & ♂ NHMUK014034829, respectively; 2 PT 'Eritrea:/Barentu/Dist./18.ix.1960/D.J. Greathead', 'PARATYPE/*Ancylorhynchus/greatgeadi* sp.n./Det JGHLondt', 'BMNH(E) #950389' or 'BMNH(E) #950390' – ♂ NHMUK014034827 & ♂ NHMUK014034828, respectively. Londt also provides location information for the Barentu specimens: "15°07'N:37°36'E".

Ancylorhynchus similis Londt, 2011: 518. HT **Ghana** 'Gold Coast/Accra./22.vi.1941./K.M. Guichard/B.M. 1945–39', 'HOLOTYPE/*Ancylorhynchus/similis* sp.n./Det JGHLondt', 'BMNH(E) #950396' – ♂ NHMUK014034830. Dissected male terminalia preserved in vial. In his description Londt also provides the latitude and longitude: "05°33N:00°13'W".

Ancylorhynchus simpsoni Londt, 2011: 520. HT **Nigeria** 'Pres by/Imp. Bur. Ent./Brit Mus./1923–58', 'Zungeru /N. Nigeria/1.xi.1910/J.J. Simpson', '*Ancylorhynchus* /

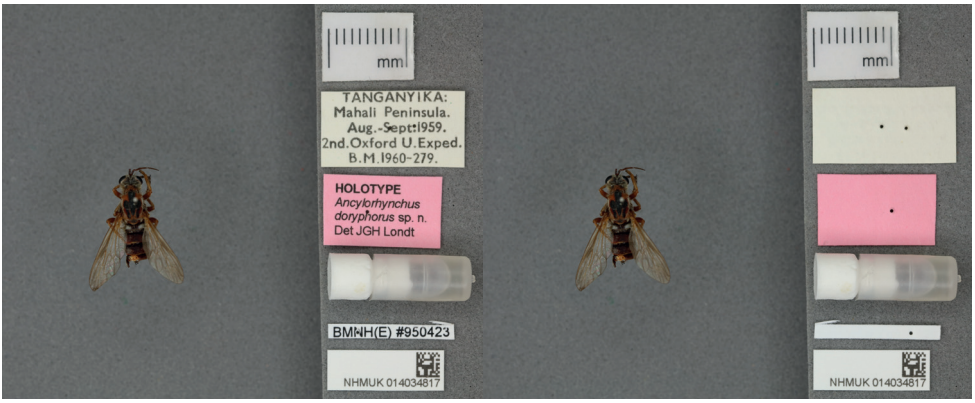

Figure 3. Whole specimens and labels for *Ancylorhynchus doryphorus* holotype NHMUK014034817.

Figure 4. Whole lateral image of *Ancylorhynchus greatheadi* holotype NHMUK014034819.

nomada Wies./ ♂ ', 'This agrees with/the description of/Dasyp – nomada Wd/det. H.Oldroyd 196', 'HOLOTYPE/*Ancylorhynchus/simpsoni* sp.n./Det JGHLondt', 'BMNH(E) #950397' – ♂ NHMUK014034831. Male terminalia in vial.

Ancylorhynchus snowi Londt, 2011: 521. 2 non-types **Niger** 'Niger/Niamey 200m/11.x.1976/K. Guichard/BM 1976-583', '*Ancylorhynchus/?snowi* Londt/Det JGHLondt/Sp.n. – 2010', 'BMNH(E) #950378' or 'BMNH(E) #950379' – ♀ NHMUK014034832 & ♀ NHMUK014034833, respectively. In his description Londt added the latitude and longitude - to replace in Londt (2011) extra location

information is given extra location information is given: "14°00'N:01°43'E". Although these specimens were mentioned in this paper, they were not included in the type series, and are added here for completeness.

Ancylorhynchus sokokensis Londt, 2011: 522. HT & 1 PT **Kenya** 'Sokoke For K/8 May 76 IB', 'HOLOTYPE/*Ancylorhynchus/similis* sp.n./Det JGHLondt', 'BMNH(E) #950425' – ♂ NHMUK014034835 (Male terminalia in vial); same as HT except 'PARATYPE/*Ancylorhynchus/similis* sp.n./Det JGHLondt', 'BMNH(E) #950424' – ♀ NHMUK014034834. In his description Londt provides additional locality data: "Forest, 03°29'S:39°50'E".

Corymyia melas Londt, 1994: 80. 1 PT **South Africa** 'Sth Africa: Cape Prov/12 km W Soutfontein./3017DA 4.ix.1981/J. Londt, L. Schoeman/and B. Stuckenberg./ Succulent Karoo', '**PARATYPE**/Corymyia ♂/melas sp.n./J. G. H. Londt', 'BM 1994E/39' – ♂ NHMUK014034891. Specimen donated by Londt to the NHM.

Connomyia annae Londt, 1993: 109. 2 PT **malawi** 'Malawi SE1435Ac/35 km N of Mangochi/10 km N Club Makokola/10–11.iii.1987 Sandy/grassveld J & A Londt', '**PARATYPE**/Connomyia/annae sp.n./J. G. H. Londt' – ♀ NHMUK014034883 & ♂ NHMUK014034884 (Fig. 5). Specimens donated by Londt to the NHM.

Connomyia argyropodos Londt, 1993: 110. 1 PT **Namibia** 'NAMIBIA 21.iii.1984/15 km NE Grootfontein/ J Scribante Skietbaan/Rd8/2 19 28'S:18 15'E/Stuckenberg & Londt/Grassy road verges', '**PARATYPE**/Connomyia/argypopodus sp.n./J. G. H. Londt' – ♂ NHMUK014034885. Label information and order differs slightly to publication. Name spelt incorrectly on paratype label. Specimen donated by Londt to the NHM.

Connomyia briani Londt, 1993: 115. 1 PT **Namibia** 'Namibia 19.iii.1984/Omuramba Omatako Riv./Near Osire. Road 57/21 05'S:17 15'E/Londt & Stuckenberg/Grassy road verge', '**PARATYPE**/Connomyia/briani sp.n./J. G. H. Londt' – ♀ NHMUK014034886. Specimen donated by Londt to the NHM.

Connomyia callima Londt, 1993: 116. 2 PT **Namibia** 'NAMIBIA 18.iv.1983/5 km S Windhoek, 2217CA/JL & Stuckenberg/Mixed thornveld', '**PARATYPE**/Connomyia/callima sp.n./J. G. H. Londt' – ♂ NHMUK014034887 & ♀ NHMUK014034888. Order on label different to publication. Specimens donated by Londt to the NHM.

Connomyia oropegia Londt, 1993: 123. 2 PT **South Africa** 'S Africa: OFS #6/36 km E Bultfontein/28 23'S:26 29'E 1350m/Date: 11 .iii.1991/Whittington & Londt/ nr. Vet River Branch', '**PARATYPE**/Connomyia/oropegia sp.n./J. G. H. Londt' – ♂ NHMUK014034889 & ♀ NHMUK014034890 (Fig. 6). Specimens donated by Londt to the NHM.

Danomyia forchhammeri Londt, 1993: 138. 2 PT **Botswana** 'Botswana SE2226BD/ Farmers Brigade 5km/SE of Serowe Hillside/N slope P.Forchhammer/malaise trap 2/vi 86', '**PARATYPE**/Danomyia/forchhammeri sp.n./J. G. H. Londt' – ♀ NHMUK014034892 (Fig. 7) & ♂ NHMUK014034893. From different malaise trap sample to that of the holotype.

Figure 5. Whole lateral image of *Connomyia annae* paratype NHMUK014034884.

Figure 6. Whole lateral image of *Connomyia oropegia* paratype NHMUK014034890.

Figure 7. Whole lateral image of *Danomyia forchhammeri* paratype NHMUK014034892.

Danomyia habra Londt, 1993: 140. 2 PT **South Africa** 'S Africa: Cape #35/23 km N of Middelpos/31°44'S:20°14'E 1170m/Date: 29.xi.1990/Whittington & Londt/ at Kookfontein River', '**PARATYPE**S/Danomyia/habra sp.n./J. G. H. Londt' – ♂ NHMUK014034894 & ♀ NHMUK014034895. Label order differs, and altitude omitted from publication. These two specimens are pinned together. Specimens donated by Londt to the NHM.

Danomyia pachyphallus Londt, 1993: 142. 2 PT **Botswana** 'Botswana SE2226BD/ Serowe. Farmers/Brigade. Malaise/trap Forchhammer./viii.89', '**PARATYPE**/ Danomyia/pachyphallus sp.n./J. G. H. Londt' – ♂ NHMUK014034896 (Fig. 8) & ♀ NHMUK014034897.

Danomyia sathos Londt, 1993: 143. 2 PT **Botswana** 'Botswana SE2226BD/Farmers Brigade/ca. 6 km SE of Serowe/P. Forchhammer 1300m/A. tortilis woodland/Malaise trap 3./11.ix.84/Forestry Nursery', '**PARATYPE**/Danomyia/sathos sp.n./J. G. H. Londt – ♀ NHMUK014034898 & ♂ NHMUK014034899. Extra information on the label not stated in publication.

Danomyia tanaos Londt, 1993: 145. 2 PT **Botswana** 'Botswana/ Serowe/MT 6.x.87', '**PARATYPE**/Danomyia/tanaos sp.n./J. G. H. Londt' – ♂ NHMUK014034900 & ♀ NHMUK014034901.

Gonioscelis amnoni Londt, 2004: 32. 2PT **Tanzania** 1 PT 'Tanganyika:/Rukwa Valley./28.v.1948/Z. Waloff', 'Pres. BY/ Anti-Locust/Res. Centre./B.M.1948-457', '**PARATYPE**/*Gonioscelis/amnoni*/Det. JGH Londt' – ♂ NHMUK014034927;

Figure 8. Whole lateral image of *Danomyia pachyphallus* paratype NHMUK014034896.

1 PT 'Tanganyika:/Old Shinyanga. /28.v.53/E. Burtt/Block 11', 'COM.INST. ENT./COLL. NO. 13444', '**PARATYPE**/*Gonioscelis/amnoni*/Det. JGH Londt' – ♂ NHMUK014034928. In his description Londt also provides the latitude and longitude: "08°00'S 32°00'E".

Gonioscelis batyleon Londt, 2004: 33. HT & 1 PT **Kenya** HT ' Meneghetti/2-1943/ Nairobi', 'Pres. by/Coryndon Mus./B.M. 1961-696' '**HOLOTYPE**/*Gonioscelis/ batyleon*/Det. JGH Londt' – ♂ NHMUK014034925 (Fig. 9) (with dissected male terminalia preserved in vial); 1 PT same as HT except '**PARATYPE**/*Gonioscelis/ batyleon*/Det. JGH Londt' – ♂ NHMUK014034926. In his description Londt also provides the latitude and longitude: "01°17'S 36°49'E".

Gonioscelis bykanistes Londt, 2004: 34. 23 PT **South Africa** 9 PT 'S.W. Africa (W36)/Otjikoko Slid Fm.,/33 mls. ENE./Omaruru/10–13.ii.1972', 'Southern/ African Exp./B.M. 1972-1', '**PARATYPE**/*Gonioscelis/bykanistes*/Det. JGH Londt' – ♂ NHMUK014034920, ♂ NHMUK014034921, ♀ NHMUK014034915, ♀ NHMUK014034916, ♀ NHMUK014034917, ♀ NHMUK014034918, ♀ NHMUK014034922, ♀ NHMUK014034923 & ♀ NHMUK014034924. In his description Londt also provides the latitude and longitude: "21°26'S 15°56'E"; 1 PT 'S.W. Africa (W30)/Ameib Farm/19 mis. NW. Karibib/31.i.–2.ii. 1972', 'Southern/African Exp./B.M. 1972-1', '**PARATYPE**/*Gonioscelis/bykanistes*/Det. JGH Londt' – ♀ NHMUK014034919. In his description Londt also provides the latitude and longitude: "21°56'S 15°50'E"; **Namibia** 5 PT 'S.W. Africa (W34)/Regenstein,

Figure 9. Lateral view of *Gonioscelis batyleon* holotype – NHMUK014034925.

15 mls.,/SSW. Windhoek,/8.ii. 1972', 'Southern/African Exp./B.M. 1972-1', '**PARATYPE**/*Gonioscelis/bykanistes*/Det. JGH Londt' – ♂ NHMUK014034910, ♂ NHMUK014034911, ♀ NHMUK014034909, ♀ NHMUK014034912 & ♀ NHMUK014034913. In his description Londt provides the latitude and longitude: "22°35'S 17°05'E"; 8 PT 'S.W. Africa (W34)/Regenstein, 15 mls.,/SSW. Windhoek,/7.ii. 1972', 'Southern/African Exp./B.M. 1972-1', '**PARATYPE**/*Gonioscelis/bykanistes*/Det. JGH Londt' – ♂ NHMUK014034902, ♂ NHMUK014034905, ♂ NHMUK014034906, ♂ NHMUK014034907 & ♂ NHMUK014034908, ♀ NHMUK014034903, ♀ NHMUK014034904 & ♀ NHMUK014034914. Specimens NHMUK014034902 & NHMUK014034903 are pinned together on the same mount.

Gonioscelis hadrocantha Londt, 2004: 48. HT & 2 PT **Angola** 'Angola (A42)/Roçadas /30.iii.1972', 'Southern/African Exp./B.M. 1972-1', '**HOLOTYPE**/*Gonioscelis/hadrocantha*/Det. JGH Londt' – ♂ NHMUK014034929; 2 PT same as HT except "**PARATYPE**/*Gonioscelis/hadrocantha*/Det. JGH Londt' – ♂ NHMUK014034930 (with dissected male terminalia preserved in vial) & ♀ NHMUK014034931.

Gonioscelis whittingtoni Londt, 2004: 98. 2 PT **Malawi** 1'Pres. by/Imp. Bur. Ent./ Brit. Mus./1925-122', 'Nyasaland,/Lingadzi,/nr. Domira Bay./1700 ft. 28.1.1915/ Dr. W.A. Lamborn', 'PARATYPE/*Gonioscelis/whittingtoni*/Det. JGH Londt' – ♂ NHMUK014034936; 'Pres. by/Imp. Bur. Ent./ Brit. Mus. /1925-122', 'Nyasaland,/Lingadzi,/ nr. Domira Bay./1700 ft. 30.1.1915/Dr. W.A. Lamborn', 'PARATYPE/*Gonioscelis/whittingtoni*/Det. JGH Londt' – ♂ NHMUK014034937.

All of the following material is identified and labelled as Paratypes in the NHM by Londt but in the manuscript they are not designated thus. The authors have included them in this publication for completeness; **Eritrea** 1 'Eritrea:/Jebel/Geddem/16.xii.1955 /D.J. Greathead', 'PARATYPE/*Gonioscelis/whittingtoni*/Det. JGH Londt' – ♀ NHMUK014034932; 1 Eritrea:/Mareb/Bridge /12.x.1960/D.J. Greathead', 'PARATYPE/*Gonioscelis/whittingtoni*/Det. JGH Londt' – ♀ NHMUK014034933; 1 'Eritrea:/Hamasien/31.x.1958/D.J. Greathead', 'PARATYPE/*Gonioscelis/whittingtoni*/Det. JGH Londt' – ♂ NHMUK014034934; 1 Eritrea:/Ailet/(taken with prey) /7.i.1956/D.J. Greathead', 'PARATYPE/*Gonioscelis/whittingtoni*/Det. JGH Londt' – ♂ NHMUK014034935; **Ghana** 1 'Gold Coast/Tamala /24.xi.51/B210-51/J. Bowden', 'PARATYPE/*Gonioscelis/whittingtoni*/Det. JGH Londt' – ♂ NHMUK014034938; **Zambia** 1 'Northern Rhodesia/Broken Hill /1.1.12./F.V. Bruce Miller./1913-199', 3', 'PARATYPE/*Gonioscelis/whittingtoni*/Det. JGH Londt' – ♂ NHMUK014034939; **Zimbabwe** 1 'S. Rhodesia:/Bindura./i.1929./H.S. Leeson./ B.M. 1929-466', 'Bindura/S Rhodesia/HS Leeson 1:1929', 'PARATYPE/*Gonioscelis/whittingtoni*/Det. JGH Londt' – ♂ NHMUK014034940; **Unknown**: 2 'Zambesia', 'Bought/A. Ford', 'C.J. Wainwright/Collection./B.M. 1948-488', 'PARATYPE/*Gonioscelis/whittingtoni*/Det. JGH Londt' – ♂ NHMUK014034941 & ♂ NHMUK014034942.

Oligopogon argolagon Londt, 2014: 280. 4 PT **South Africa** 2 PT 'Delagoa Bay./8.11.1935', 'S Africa:/R.E. Turner/B.M. 1935-73', 'BMNHE)/#1030002' or 'BMNH(E)/#1030003', 'PARATYPE/ *Oligopogon/argolagon* sp.n/J.G.H. Londt' – ♂ NHMUK014035045 & ♂ NHMUK014035048, respectively; 1 PT 'Aliwal North/Cape Province/Dec. 1922', 'S. Africa/R.E. Turner/Brit. Mus./1923-45', 'BMNH E)/#1029998', 'PARATYPE/ *Oligopogon/argolagon* sp.n/J.G.H. Londt' – ♂ NHMUK014035046; 1 PT 'South Africa/C.P. Kenton-on-sea/2.i.1972/D.J. Greathead', 'BMNH(E)/# 1029989', 'PARATYPE/*Oligopogon/argolagon* sp.n/J.G.H. Londt' – ♂ NHMUK014035047. In his description Londt also provides latitude and longitude for Aliwal North and Kenton-on-Sea: "30°42'S 26°42'E, 33°42'S 26°41'E" respectively and adds that Delagoa Bay refers to Algoa Bay in Port Elizabeth (Gqeberha): "33°58'S 25°35'E".

Oligopogon hemistego Londt, 2014: 289. HT & 17 PT **Angola** HT 'Angola (A17)/15mls. N. Sa/de Bandeira,/c. 6500 ft./3.iii.1972', 'Southern/African Exp./B.M.1972-1', 'HOLOTYPE/*Oligopogon/hemistego* sp.n/J.G.H. Londt' 'BMNH(E/) 1237778' – ♂ NHMUK014035049; 17 PT same as HT except 'PARATYPE/*Oligopogon/hemistego* sp.n/J.G.H. Londt' and 'BMNH(E)/1237779' – ♂ NHMUK014035050; 'BMNH(E)/1237780' – ♂ NHMUK014035051; 'BMNH(E)/1237781' – ♂ NHMUK014035052; 'BMNH(E)/1237783' – ♂ NHMUK014035053 (abdomen in vial); 'BMNH(E)/1237784' – ♂ NHMUK014035054; 'BMNH(E)/1237790' – ♂ NHMUK014035055; 'BMNH(E)/1237782' – ♀ NHMUK014035056; 'BMNH(E)/1237785' – ♀ NHMUK014035057; 'BMNH(E)/1237786' – ♀ NHMUK014035058; 'BMNH(E)/1237787' – ♀ NHMUK014035059; 'BMNH(E)/1237788' – ♀ NHMUK014035060; 'BMNH(E)/1237789' – ♀ NHMUK014035061; 'BMNH(E)/1237791' – ♀ NHMUK014035062;

'BMNH(E)/1237792' – ♀ NHMUK014035063; 'BMNH(E)/1237793' – ♀ NHMUK014035064; 'BMNH(E)/1237794' – ♀ NHMUK014035065; 'BMNH(E)/1237795' – ♀ NHMUK014035066, respectively.

Oligopogon napaios Londt, 2014: 296. 1 PT **South Africa** 'SOUTH AFRICA 232BD/Transvaal 2–4km S of/Bandelierkop 27.I.78/JGH. Londt Bushveld', 'PARATYPE/ *Oligopogon/napaios* sp.n/J.G.H. Londt', 'NMSA – DIP 74895', 'BMNH(E)/#1030074', 'BMNH(E) 2014 -68/JGH Londt 2014 – ♀ NHMUK014034811.

Oligopogon platypteron Londt, 2014: 303. 2 PT **Kenya** 1 PT 'KENYA Rt. A109/50 km SE Nairobi/30.iv.1991/A. Freidberg/& Fini Kaplan', 'BMNH(E) 2014 -68/JGH Londt 2014', 'PARATYPE/ *Oligopogon/platypteron* sp.n/J.G.H. Londt', 'BMNH(E)/#1030067' – ♂ NHMUK014034812; 1 PT same as the male except 'BMNH(E)/#1030077' – ♀ NHMUK014034813.

Oligopogon torsteni Londt, 2014: 308. 1 PT **South Africa** 'SOUTH AFRICA 2429AC/ Transvaal 10 km SE/Potgietersrus on rd/to Zebediela 24–7.i./1978 J.G.H. Londt/ Bushveld', 'Oligopogon/? penicillatus Loew/Det. J.G.H. Londt', 'PARATYPE/ *Oligopogon/torsteni* sp.n/J.G.H. Londt' 'BMNH(E) 2014-68/JGH Londt 2014', 'BMNH(E)/#1030075' – ♀ NHMUK014034814.

Oligopogon trichopteron Londt, 2014: 309. 1 PT **South Africa** 'SOUTH AFRICA/ TVL PROVINCE./PRETORIA/15.xi.1959/D.J. Greathead.', 'Oligopogon/ penicillatus Loew/det J.E. Chainey 1983', 'BMNH(E)/#1029993', '***PARATYPE***/ *Oligopogon/trichopteron* sp.n/J.G.H. Londt' – ♀ NHMUK014035044. In his description Londt also provides latitude and longitude: "25°44'S 28°11'E".

Oligopogon zulu Londt, 2014: 311. 2 PT **South Africa** 1 PT 'South Africa, Natal Prov/Zululand; 20 mi. S. Ndumu/Game Res. Camp (2732Aa)/Nov. 29, 1971; ME&BJ Irwin/dry scrub forest; 320 ft', 'NMSA – Dip. 06464', 'PARATYPE/ *Oligopogon/zulu* sp.n/J.G.H. Londt' 'BMNH(E)/#1030069', 'BMNH(E) 2014-68' – ♂ NHMUK014034815; 1 PT 'South Africa, Natal Prov/Zululand; 20 mi. S. Ndumu/Game Res. Camp (2732Aa)/Nov. 29, 1971; ME&BJ Irwin/ dry scrub forest; 320 ft', 'PARATYPE/ *Oligopogon/zulu* sp.n/J.G.H. Londt', 'BMNH(E)/#1030072', 'BMNH(E) 2014-68' – ♀ NHMUK014034816. Ndumu is now called Ndumo.

Ontomyia ricardoi (Londt, 1985a: 69) – originally *Oratostylum ricardoi*. 4 PT **Namibia** 1 PT 'PARA-/TYPE', 'NAMIBIA 28.iii.1984/43km NW Usakos. Road/1930. Spitzkop area./21 59'S: 15 21'E/Stuckenberg & Londt/Acacias, rocky area.', 'PARATYPE ♂/Oratostylum/ricardoi sp.n/J.G.H. LONDT' – ♂ NHMUK014034947; 1 PT same except 'PARATYPE ♀/Oratostylum/ricardoi sp.n/J.G.H. LONDT' – ♀ NHMUK014034946; 2 PT 'NAMIBIA 28.iii.1984/40km NW Usakos. Road/1930. Spitzkop area. /21 51'S 15 22'E/Londt & Stuckenberg/Riparian woodland.', 'PARATYPE ♀/Oratostylum/ricardoi sp.n/J.G.H. LONDT', 'Ontomyia/ricardoi (Londt, 1985)/det. T.Dikow 2000', 'BMNH(E)/2002-82' – ♀ NHMUK014034948; 1 PT same except 'PARATYPE ♂/Oratostylum/ricardoi sp.n/J.G.H. LONDT' – ♂ NHMUK014034949 (Fig. 10). In his description

Figure 10. Whole lateral image of *Ontomyia ricardoi* paratype NHMUK014034949.

Londt states that all NHM paratypes are recorded at 40km rather than both 40 km and 43 km. Specimens donated by Londt to the NHM.

Scylaticus bromleyi Londt, 1992: 109. 7 PT **South Africa** 4 PT 'Aliwal North/ Cape Province, Dec.1922', 'S. Africa/R. E. Turner/Brit.Mus. /1923-45', '**PARATYPE/**Scylaticus/bromleyi sp.n./J.G.H. Londt' – ♂ NHMUK014034841, ♂ NHMUK014034842, ♂ NHMUK014034844 & ♀ NHMUK014034839; 3 PT 'Aliwal North/Cape Province/ 4350ft /1–13.i.1923', 'S. Africa/R. E. Turner/ Brit.Mus. /1923-70', '**PARATYPE/**Scylaticus/bromleyi sp.n./J.G.H. Londt' – ♂ NHMUK014034843, ♀ NHMUK014034838 & ♀ NHMUK014034840. In his description Londt wrongly says that all paratypes in the NHM were collected in December 1922, and also provides the latitude and longitude for Aliwal North: "30 42'S:26°42'E".

Scylaticus camptus Londt, 1992: 116. 1 PT **South Africa** 'STH AFRICA: Transvaal/6 km N of Vivo 2229CC/23–24.ii.1980 Londt/& Schoeman Bushveld/ veget. & old lands', '**PARATYPE/**Scylaticus/camptus sp.n./J.G.H. Londt' – ♂ NHMUK014034845. Specimen donated by Londt to the NHM.

Scylaticus cuthbertsoni Londt, 1992: 126. HT **Zimbabwe** 'Sawmills/S. Rhodesia/22-2-1925/Rhod. Museum', 'Pres. By/Imp.Bur.Ent./Brit.Mus./1928-347', 'Scylaticus /zonatus Lw/Dr.E.O.Engel det.', '**HOLOTYPE/**Scylaticus/cuthbertsoni/ sp.n./J.G.H. Londt' – ♂ NHMUK014034846. Male terminalia in vial. In his description Londt also provides latitude and longitude: "19°35'S:28°02'E".

Scylaticus danus Londt, 1992: 127. 1 PT **South Africa** STH AFRICA: Cape Prov/10 km W of Williston/15.xi.1986 3120BD/Londt & Quickelberge/1060m Sand Acacias', '**PARATYPE/**Scylaticus/danus sp.n./J.G.H. Londt' – ♀ NHMUK014034847. Specimen donated by Londt to the NHM.

Scylaticus entrichus Londt, 1992: 131 (Fig. 11). 2 PT **South Africa** 'S AFRICA: Cape #26/18 km N of Sutherland/32°16'S:20°41'E 1350 m/Date: 26.xi.1990/Londt & Whittington/Renosterrivier area', '**PARATYPE/**Scylaticus/entrichus sp.n./J.G.H. Londt' – ♂ NHMUK014034849 & ♀ NHMUK014034848 (Fig. 11), respectively. Specimen donated by Londt to the NHM.

Scylaticus gongrocercus Londt, 1992: 1331. HT & 3 PT **South Africa HT** 'Cape Province:/Worcester./3–4.x.1928.', 'S.Africa./R.E.Turner./Brit. Mus./1928-491.', 'HOLOTYPE/Scylaticus/gongrocercus/sp.n./J.G.H. Londt' -♂ NHMUK014034850; 'Cape Province:/Worcester./3–4.x.1928.', 'S.Africa./R.E.Turner./Brit. Mus./1928-491.', 'PARATYPE/Scylaticus/gongrocercus/sp.n./J.G.H. Londt' – ♀ NHMUK014034853; 2 PT **Namibia** 'Aus./Dec. 1929.', S.W.Africa./R.E.Turner./Brit. Mus./1930-113.', 'PARATYPE/Scylaticus/gongrocercus/sp.n./J.G.H. Londt' – ♀ NHMUK014034851 & ♀ NHMUK014034852. In his description Londt also provides latitude and longitude for Worcester and the Namibian locality: "33°39'S:19°26'E and 26°40'S:16°16'E respectively".

Scylaticus iota Londt, 1992: 139. 1 PT **South Africa** 'STH AFRICA: Cape Prov /46km SE of Middelpos/18.xi.1986, 3220AB/Londt & Quickelberge/12S0m, Scrub nr river', 'PARATYPE/Scylaticus/iota sp.n./J.G.H. Londt' – ♀ NHMUK014034854. Specimen donated by Londt to the NHM.

Scylaticus irwini Londt, 1992: 141. 3 PT **South Africa** 1 PT 'STH AFRICA Cape Prov/25km N. Kamieskroon/2917DD 5.ix.1983/Stuckenberg & Londt/Rocky Hillside veget.', 'PARATYPE/Scylaticus/irwini sp.n./J.G.H. Londt' – ♂ NHMUK014034857. Specimen donated by Londt to the NHM; 2 PT **Namibia** "Aus./Dec. 1929.', S.W.Africa./R.E.Turner./Brit. Mus./1930-113.', 'PARATYPE/Scylaticus/irwini sp.n./J.G.H. Londt' – ♀ NHMUK014034855 & ♀ NHMUK014034856. In his description Londt also provides latitude and longitude for the female paratypes: "26°40'S:16°16'E".

Scylaticus loewi Londt, 1992: 145. 2 PT **South Africa** 'S AFRICA: Cape #26/18 km N of Sutherland/32°16'S:20°41'E 1350m/Date: 26.xi.1990/Londt & Whittington/Renosterrivier area', 'PARATYPE/Scylaticus/irwini sp.n./J.G.H. Londt' – ♂ NHMUK014034858 & ♀ NHMUK014034859. Specimens donated by Londt to the NHM.

Scylaticus namibiensis Londt, 1992: 153. 2 PT **South Africa** 'S AFRICA: N Cape #15/14 km S of Hotazel/27 19S:22 54E 1050m/Date: 14.iii.1991/Londt & Whittington/Ga-Mogara River bed', 'PARATYPE/Scylaticus/namibiebsis sp.n./J.G.H. Londt' – ♂ NHMUK014034860 & ♀ NHMUK014034861. Specimens donated by Londt to the NHM.

Scylaticus pardalotus Londt, 1992: 155. 5 PT **South Africa 3 PT** 'Cape Province/Somerset East/Nov. 25–30 1930.', 'S.W.Africa/R.E.Turner/Brit.

Figure 11. Whole lateral image of *Scylaticus entrichus* paratype NHMUK014034848.

Mus/1931-12', 'PARATYPE/Scylaticus/pardalotus sp.n./J.G.H. Londt' – ♂ NHMUK014034862, ♂ NHMUK014034864, ♂ NHMUK014034865; same as before except '**PARATYPE**/Scylaticus/namibiebsis sp.n./J.G.H. Londt' – ♂ NHMUK014034866 & ♀ NHMUK014034863.

Scylaticus phaeus Londt, 1992: 157. HT & 1 PT **South Africa** HT 'Cape Province:/Matjiesfontein./14–27.xi.1928', 'S. Africa/R. E. Turner/Brit. Mus./1928-542', '**HOLOTYPE**/Scylaticus/phaeus sp.n./J.G.H. Londt' – ♂ NHMUK014034867. Holotype with dissected male terminalia preserved in vial; 1 PT same as HT except 'Scylaticus ♀/near? Marginatus Engel/H. Oldroyld 1940', '**PARATYPE**/Scylaticus/phaeus sp.n./J.G.H. Londt' – ♀ NHMUK014034868.

Scylaticus tigrinus Londt, 1992: 164. HT **South Africa** 'Cape Province/Matjiesfontein/1–18.xii.1928', 'S. Africa/R. E. Turner/Brit. Mus./1929-15', '**HOLOTYPE**/Scylaticus/phaeus sp.n./J.G.H. Londt' – ♂ NHMUK014034869. Male terminalia in vial.

Brachyrhopalinae

Afroholopogon aspros Londt, 2005: 211. 2 PT **South Africa** 'STH AFRICA: KZ-Natal/Umgeni Valley Nat. Res./ 29°28'43"S 30°15'39"E/28.iv.2005 JGH Londt/696m Black Eagle Trail/Swept *Aristida* grassland', 'PARATYPE/*Afroholopogon*/*aspros*/J. G. H. Londt', 'BMNH(E)/2006-112' – ♂ NHMUK014034956 & ♀ NHMUK014034957. Specimens donated by Londt to the NHM.

Afroholopogon dasys Londt, 2005: 216. HT & 2 PT **Oman** HT 'DHOFAR 670 m./Qara Hills/North slopes/22.9.1977/K.Guichard', 'BMNH/London', '**HOLOTYPE**/*Afroholopogon*/*dasys*/J. G. H. Londt' – ♂ NHMUK014035086; 1 PT **Eritrea** 'Eritrea:/W. Ancober/near Keren/8.x.1957/D.J. Greathead', 'BMNH/london', 'PARATYPE/*Afroholopogon*/*dasys*/J. G. H. Londt' – ♀ NHMUK014035087; 1 PT **Yemen** 'Abdelkuri I:/ North Shore/S.K;/7.v.1967/K. Guichard', 'Brit.Mus./1967-455', 'PARATYPE/*Afroholopogon*/*dasys*/J. G. H. Londt' – ♂ NHMUK014035088. Male terminalia in vial. In his description Londt provides latitudes and longitudes for the Oman: "approx. 1700N 5345E", Yemen: "'Abd al Kuri 1219N 5222E" and Eritrea: "1547N 3828E" localities.

Afroholopogon mauros Londt, 2005: 218. 2 PT **Botswana** 1 PT 'BOTSWANA/ SEROWE/M.T.6.xii.87', 'PARATYPE/*Afroholopogon*/*mauros*/J. G. H. Londt' – ♂ NHMUK014035082; 1 PT 'BOTSWANA/SEROWE/M.T.6.xi.87', 'PARATYPE/*Afroholopogon*/*mauros*/J. G. H. Londt' – ♂ NHMUK014035083. Londt does not state that this paratype was deposited in the NHM. In his description Londt also provides the latitude and longitude: "2223S 2643E".

Afroholopogon melas Londt, 2005: 221. 1 PT **South Africa** "STH AFRICA: Cape Prov/Franschhoek Pass/3319CC 21.xi.1986/Londt & Quickelberge/Grass & macchia on/summit of pass 800 m', 'PARATYPE/*Afroholopogon*/*melas*/J. G. H. Londt', 'BMNH(E)/2006-112 – ♀ NHMUK014035080. In his description Londt also provides the latitude and longitude: "3354S 1909E".

Ischiolobos mesotopos Londt, 2005: 234. 1 PT **South Africa** 'South Africa KZN/ Cumberland Nat. Res./29°30.832'S 30°30.306'E/Light trap 654 m/Date: 2–3. xii.2004/Coll: M. Mostovski', 'PARATYPE/*Ischiolobos*/*mesotopos*/J. G. H. Londt', 'BMNH(E)/2006-112' – ♀ NHMUK014035081.

Agrostomyia dimorpha Londt, 1994: 78. 2 PT **South Africa** 'Sth Africa Cape Prov/30 km E. Groblershoop/2822CD 19.iii.1982/J. Londt & L. Schoeman/ Roadside vegetation', '**PARATYPE**/Agrostomyia ♂/dimorpha sp.n./J. G. H. Londt', 'BM1994 E/39' – ♂ NHMUK014034879 (Fig. 12); same as before except '**PARATYPE**/Agrostomyia ♀/dimorpha sp.n./J. G. H. Londt' – ♀ NHMUK014034880. Specimens donated by Londt to the NHM.

Irwinomyia argentea Londt, 1994: 83. 1 PT **Namibia** 'SOUTH WEST AFRICA 2115Ba/ Omaruru Dist. 50 km, N.W./ Omaruru, 1200 m. 5-11-1974/ ME Irwin, flood plain/with large Acacia tree', '**PARATYPE** ♂/Irwinomyia/argentea sp.n./J. G. H. Londt', 'BM1994E/.39' – ♂ NHMUK014034943 (Fig. 13).

Macroetra damara Londt, 1994: 84. 2 PT **Namibia** 1 PT 'PARA_TYPE', 'S.W.Protect./ Otjituo'-'R.W.Tucker/Jan. 1920', 'Recd. From/S. Africa/Museum.', '**PARATYPE**/ Macroetra/damara sp.n./J. G. H. Londt' – ♀ NHMUK014034944; 1 PT 'NAMIBIA 26.iii.1984/54 km S Khorixas. Road/76. 20 43' S: 14 49'E/ Londt & Stuckenberg/Roadside grass and/flowers, sandy area', '**PARATYPE**/Macroetra ♂/ damara sp.n./J. G. H. Londt' 'BM1994E/39' – ♂ NHMUK014034945. Specimen donated by Londt to the NHM.

Figure 12. Whole lateral image of *Agrostomyia dimorpha* paratype NHMUK014034879.

Figure 13. Whole lateral image of *Irwinomyia argentea* paratype NHMUK014034943.

Pedomyia epidema Londt, 1994: 89. 2 PT **South Africa** 1 PT 'STH AFRICA: Cape Prov/ Biedou Valley 300 m/32°06'00"S:19°19'00"E J Londt B Stuckenberg & P Croeser 6.ix.1989/ Rocky gentle N slope/Scrub & wild flowers', '**PARATYPE**/Pedomyia ♂/epidema sp.n./J. G. H. Londt', 'BM1994E/39' – ♂ NHMUK014034951 (Fig. 14); 1 PT same as before except '**PARATYPE**/Pedomyia/epidema sp.n./J. G. H. Londt' – ♀ NHMUK014034952. Specimens donated by Londt to the NHM.

Pedomyia melanothrix Londt, 1994: 89. 2 PT **South Africa** 1 PT "STH AFRICA: Cape Prov/Richtersveld 7 km S/Lekkersing 2.ix.1989/29°03'00"S: 17°06'00"E/J Londt B Stuckenberg /& P Croeser Dry river/flat rocky area 300m', '**PARATYPE** ♂/Pedomyia/ melanothrix sp.n./J. G. H. Londt', 'BM1994E/39' – ♂ NHMUK014034953; 1 PT "STH AFRICA: Cape Prov/Richtersveld 6 km W/of Kuboes 1.ix.1989/28°27'00"S: 16°58'30"E/B Stuckenberg J Londt/& P Croeser 200m Sandy/area with succulents', '**PARATYPE**/Pedomyia/melanothrix sp.n./J. G. H. Londt' 'BM1994E/39' – ♀ NHMUK014034954. The label data for the female paratype is different to that in the description. Specimens donated by Londt to the NHM.

Pedomyia xanthocera Londt, 1994: 89. 1 PT **South Africa** 'STH AFRICA Cape Prov/20 km NE of Springbok/2918CA 7.ix.1983 /Londt & Stuckenberg/Rocky hillside & dry/watercourse veget.', '**PARATYPE**/Pedomyia/xanthocera sp.n./J. G. H. Londt' 'BM1994E/39' – ♂ NHMUK014034955. Specimen donated by Londt to the NHM.

Habropogon capensis Londt, 1981b: 72. 2 PT **South Africa** 'SOUTH AFRICA, CAPE PROV/11mi.NNE.Hondeklipbaai /Sept.8. 1972, 3017 Ab /ME&BJ Irwin, 200 ft alt-/reddish sand, shrubs', 'Hapropogon/sp.nov/det. H.Oldroyd 19/note mid tarsi' (only for ♂ specimen), 'PARATYPE/Habropogon/capensis/Londt 1980', 'BMNH(E)/2002-82' – ♂ NHMUK014034836 & ♀ NHMUK014034837. The '3017 Ab' differs from HT label which is written as 3019AD.

Rhabdogaster etheira Londt, 2006b: 255. 3 PT **Namibia** 'S.W.AFRICA (W48)/ Kombat/1–6.iv.1972', '**PARATYPE**/*Rhabdogaster/etheira sp.n.*/Det JGH Londt', 'Southern/African Exp./B.M.1972-1' – ♀ NHMUK014034958, ♀ NHMUK014034959 & ♀ NHMUK014034960.

Rhabdogaster lindneri Londt, 2006b: 263. 3 PT **Uganda** 1 PT 'Uganda /Entebbe/1954/ G.S. Corbet', 'G0404', '**PARATYPE**/*Rhabdogaster/lindneria sp.n.*/Det JGH Londt' – ♀ NHMUK014034961; **Kenya** 1 PT 'Dr van Someren/NAIROBI/March 1928', KENYA COLONY', 'IMP.INST./ENTOM', 'SWBromley/Collection/1955', 'BMNH/London', 'lindneri', '**PARATYPE**/*Rhabdogaster/lindneria sp.n.*/Det JGH Londt' – ♂ NHMUK014034962; 1 PT ' EMALI RANGE/ Sultan Hamud/ 4900–5900ft. 3–40', 'Pres. By/Coryndon Mus./B.M.1961-696', '**PARATYPE**/ *Rhabdogaster/lindneria sp.n.*/Det JGH Londt' – ♀ NHMUK014034963.

Rhabdogaster nyx Londt, 2006b: 270. 1 PT **South Africa** 'Gt. Wint-hoek /Tulbagh/3.800 ft.' ~ 'April 1916/ R.M.L.', 'BMNH/London', 'Rhabdogaster/sp./det. J.E. Chainey, 198', '**PARATYPE**/*Rhabdogaster/nyx sp.n.*/Det JGH Londt' – ♀ NHMUK014034964.

Rhabdogaster pedion Londt, 2006b: 275. 2 PT **South Africa** "S. Africa: Natal #2/Royal Natal National/ Park. 25.iv.1984 1900m/at Witsieshoek /R. Miller & P. Stabbins', '**PARATYPE**/*Rhabdogaster/pedion sp.n.*/Det JGH Londt', 'BMNH(E)/2006-112 – ♂ NHMUK014034965 & ♀ NHMUK014034965.

Figure 14. Whole lateral image of *Pedomyia epidema* paratype NHMUK014034951.

Rhabdogaster poa Londt, 2006b: 277. 11 PT **South Africa** 2 PT 'South Africa 2229DC/Transvaal 10 km NW of/Waterpoort26.i.1978/JGH. Londt open grass', '**PARATYPE**/*Rhabdogaster/poa sp.n.*/Det JGH Londt', 'BMNH(E)/2006-112' – ♂ NHMUK014034976 & ♀ NHMUK014034977 (Fig. 15). Specimens donated by Londt to the NHM; 9 PT "Skukuza/Kruger N.P./leg. ZumPT II.56', 'BMNH/London', '**PARATYPE**/*Rhabdogaster/poa sp.n.*/Det JGH Londt' – ♂ NHMUK014034967, ♂ NHMUK014034968, ♂ NHMUK014034969, ♂ NHMUK014034970, ♂ NHMUK014034971, ♀ NHMUK014034972, ♀ NHMUK014034973, ♀ NHMUK014034974 & ♀ NHMUK014034975.

Rhabdogaster zopheros Londt, 2006b: 290. HT & 6 PT **Angola** HT & 2 PT 'ANGOLA (A40)/Tundavala,/8–10 mls. NW./Sa da Bandeira/27–29.iii.1972', 'Southern / African Exp./B.M. 1972-1.', '**HOLOTYPE**/*Rhabdogaster/zopheros sp.n.*/Det JGH Londt', – ♂ NHMUK014034978; 2 PT as HT except '**PARATYPE**/*Rhabdogaster/zopheros sp.n.*/Det JGH Londt' – ♂ NHMUK014034979 & ♀ NHMUK014034982 respectively; 3 PT 'ANGOLA (A6)/Tundavala,/9 mls. NW. Sa/da Bandeira /23. ii.1972', 'Southern /African Exp./B.M. 1972-1.', '**PARATYPE**/*Rhabdogaster/zopheros sp.n.*/Det JGH Londt' – ♂ NHMUK014034983, ♀ NHMUK014034980 & ♀ NHMUK014034984; 1 PT 'ANGOLA (A18)/Tundavala,/9 mls. NW. Sa/da Bandeira /5.iii.1972', 'Southern /African Exp./B.M. 1972-1.', '**PARATYPE**/*Rhabdogaster/zopheros sp.n.*/Det JGH Londt' – ♀ NHMUK014034981. In his description Londt states that all the type series have the same data which he writes as "Angola (A6)/Tundavala,/9 mls. NW. Sa/da Bandeira/23.ii.1972", "Southern/ Arican Exp. /B.M. 1972-1.".

Figure 15. Whole lateral image of *Rhabdogaster poa* paratype NHMUK014034977.

Asilinae

Astochia silva Londt, 2019: 226. 1 PT **Kenya** 'Brit. E. Afr./ S.E. Slopes/of Kenya/6,000–7,000 ft./Feb. 3–12, 1911./S.A. Neave'-'A1', 'E preying/on F', 'Pres. by/ Imp. Bur. Ent./1921–9.', 'Astochia sp./det J.G.H. Londt, 1981', 'PARATYPE/Astochia silva/J.G.H.Londt' – ♀ NHMUK010629012. In his description Londt also writes also states "Prey pinned alongside 'Brit. E. Afr./S.E, Slopes/of Kenya/6,000–7,000 ft./ Feb. 3–12, 1911./S.A. Neave', 'F prey/of E: "Coleoptera: Staphylinidae"', 'Pres. by/ Imp. Bur. Ent./1921–9." Prey no longer associated with specimen.

Congomochtherus elferinki Londt & Tsacas, 1987: 32. 2 PT **South Africa** 1 PT 'PARA/ TYPE', 'Sth Africa Transvaal/Johannesburg. 2628Aa/Highlands N./R.Elferink 7 III 1982', 'PARATYPE ♀/Congomochtherus/elferinki sp.n./J.Londt & L.Tsacas' – ♀ NHMUK014034755; 1 PT same apart from 'PARATYPE ♂/Congomochtherus/elferinki sp.n./J.Londt & L.Tsacas' – ♂ NHMUK014034756. Exact data on ♂ is HIGHLANDS NORTH not Highlands N. In his description Londt provides further location data: "c. 26°09'S 28°05'E c. 1675 m".

Congomochtherus inachus Londt & Tsacas, 1987: 34. 2 PT **South Africa** 1 PT 'PARA/TYPE', 'SO.AFRICA:CAPE PROV./Cradock, Fish River/3225BA Londt & Miller/28.X.1978 river bank', 'PARATYPE ♀/Congomochtherus/ inachus sp.n./Londt & Tsacas' – ♀ NHMUK014034757; 1 PT same apart from 'PARATYPE ♂/Congomochtherus/inachus sp.n./Londt & Tsacas'- ♂ NHMUK014034758. In his description Londt provides further locality data: "c. 32°10'S 25°37'E, c 875m".

Congomochtherus oldroydi Londt & Tsacas, 1987: 36. HT & 3 PT **Kenya** HT 'HOLO/TYPE', 'Brit. E. Africa/Narossura River/Nov 1912/W.P.Lowe/1913-73', 'HOLOTYPE ♂/Congomochtherus/oldroydi/J.Londt + L.Tsacas' – ♂ NHMUK014034759. Male terminalia in vial; 1PT 'PARA/TYPE', 'Brit. E. Africa/Narossura River/Nov 1912/W.P.Lowe/1913-73', 'PARATYPE ♂/Congomochtherus/oldroydi sp.n./J.Londt + L.Tsacas' – ♂ NHMUK014034760. Male terminalia in vial. In the description Londt provides further location for both this PT and the HT: "1°32'S: 35°52'E" and altitude: "1860m"; 1 PT 'PARA/TYPE', 'Brit. E. Afr./Between/Guaso-Nyeri/ & Narosura/Masai Reserve/27.ii.1914/ Capt.A.O.Luckman', 'Pres. By./Imp. Bur. Ent./1921-9', 'PARATYPE', '*Congomochtherus/oldroydi n.sp./J.G.H. Londt &/ L.Tsacas det. 1985*) – ♂ NHMUK014034766, Male terminalia in vial; 1 PT same as NHMUK014034766 except 'Congomochthe-/rus oldroydi n.sp./J.G.H. Londt &/ L.Tsacas det. 1985) – ♀ NHMUK014034767. In his description Londt provides additional locality data: "c. 1°18'S 36°14'E, c1400m"; In his description Londt gives further location information for Masai Reserve specimen that was stated to be deposited in the NHM but is no longer here: "Masai Mara c. 1°29'S 35°08'E, c. 1560 m", Ngasemarok: "?". A. D. Luckman, 6000'; Although marked as PT in the NHM collection five further specimens were not included in the original description but have been added here for completeness; 3 'PARA/TYPE', 'Brit. E. Africa/Narossura River/Nov 1912/W.P.Lowe/1913-73', 'PARATYPE', '*Congomochtherus/oldroydi n.sp./J.G.H. Londt &/ L.Tsacas det. 1985*) – ♀ NHMUK014034762, ♂ NHMUK014034763 & ♂ NHMUK014034764.; 1 'PARA/TYPE', 'Brit. E. Africa/Narossura River/Nov 1912/W.P.Lowe/1913-73', 'PARATYPE', '*Congomochthe-/rus oldroydi n.sp./J.G.H. Londt &/ L.Tsacas det. 1985*) – ♂ NHMUK014034765.; 1 'PARA/TYPE', 'Brit. E. Africa/Narossura River/Nov 1912/W.P.Lowe/1913-73', 'PARATYPE', '*Congomochtherus/penicillatus Spieser/det. H.Oldroyd 1966*', '*Congomochthe-/rus oldroydi n.sp./J.G.H. Londt &/ L.Tsacas det. 1985*) – ♂ NHMUK014034761.

Congomochtherus potamius Londt & Tsacas, 1987: 39. 2 PT **South Africa** 1 PT 'PARA/TYPE',' South Africa: Cape./Rhodes area 3027DD/Londt & Stuckenberg/9–10.i.1979 banks of/river & Hill near town', 'PARATYPE ♀/ *Congomoctherus/potamius sp.n./J.* Londt & L.Tsacas' – ♀ NHMUK014034769; 1 PT same except 'PARATYPE ♂/ *Congomoctherus/potamius sp.n./J.* Londt & L.Tsacas' – ♂ NHMUK014034768. On NHMUK014034768 Africa was actually misspelt "Afirca" and both of the original determination labels have the genus incorrectly spelt. Londt (2014) provides additional locality data: "c. 30°47'38"S 27°57'38"E, c. 1815 m". Specimens donated by Londt to the NHM.

Dasophrys engeli Londt, 1981a: 655. 2 PT **South Africa** 1 PT 'PARA/TYPE', 'Mossel Bay/Cape Province./April, 1921', 'S.Africa/R.E.Turner/Brit. Mus./1921-210', 'PARATYPE ♂/Dasophrys/engeli sp.n./J.G.H. Londt' – ♂ NHMUK014034743, dissected male terminalia mounted on a pinned plastic strip; 1 PT 'Para/type', 'AFRICA:/Pt. Elizabeth.//1937–1938./Pres.A. H. Newton./B.M.1950-227.', 'Pt. Elizabeth/21.ii.37', 'PARATYPE ♀/Dasophrys/engeli sp.n./J.G.H. Londt' – ♀ NHMUK014034744.

Gibbasilus arenaceus Londt, 1986a: 2. 1 PT **South Africa** 'PARA/TYPE',' Brandkop Area/Calvinia District/South-West Cape/14 October 1964/B&P Stuckenberg', 'PARATYPE ♂/Gibbasilus/arenaceus sp.n./J.G.H. Londt' – ♂ NHMUK014034751. One wing mounted separately on card. In his description Londt provides further location data: "3219AA" (this location is an area in the north-west quadrant of 32S 19E).

Neolophonotus chaineyi Londt, 1986b: 532. HT **Uganda** 'Holo/type', 'UGANDA/10 miles South/of Kaabora/14.viii.1958/J. Bowden', 'HOLOTYPE ♂/*Neolophonotus/chaineyi* sp.n./J.G.H Londt' – ♂ NHMUK014034753. In his description Londt also provides the latitude and longitude: "Kabora—now Abola 1°45'N:33° 19'E". Male terminalia dissected on a pinned plastic strip.

Neolophonotus iranensis (Londt, 1985a: 74) – originally *Hippomachus iranensis.* HT & 1 PT **Iran** HT 'Holo/type', 'IRAN Belutschistan/Sudost Jranshar/Bampurufer/13.iii.1954 leg./Richter u. Schäuffele', 'Pres: Staatliches/Museum f. Naturkunde/Stuttgart./B.M.1957-609', 'HOLOTYPE ♂/ Hippomachus/ iranensis sp.n./J.G.H.LONDT' – ♂ NHMUK014034741. Dissected male terminalia mounted on a pinned plastic strip; 1 PT 'PARA/TYPE"IRAN Belutschistan/Jranshar 800 m./Rand Rig Ispalch/13.iii.1954/Richter u.Schäuffele leg.', 'Pres: Staatliches/Museum f. Naturkunde/Stuttgart./B.M.1957-609', 'Neolophonotus/(Lophopeltis) ♀/pegasus Loew/ det. H.Oldroyd. 1957', 'PARATYPE ♀/ Hippomachus/ iranensis sp.n./J.G.H.LONDT' – ♀ NHMUK014034742 (Fig. 16).

Neolophonotus variabilis Londt 1986b, 589 1 non-type **South Africa** 'Pres. By/Imp. Inst. Ent./Brit Mus./1931—56', Robinson Pass/Mossel Bay/ Dr. Brauns./Cape Colony/25. ix.1922' – ♂ NHMUK014034754. In his description Londt did not list this as a type but data is the same as the paratypes in SAM and added here for completeness.

Laphriinae

Hoplistomerus pegos Londt, 2007: 182. 1 HT & 5PT **Somalia** HT 'Bohotle/Somaliland./1903/Vety-Major AF Appleton/1907-89.', '**HOLOTYPE**/*Hoplistomerus/pegos* sp.n./Det JGH Londt' – ♂ NHMUK015191085; 3 PT as HT except '**PARATYPE**/*Hoplistomerus/pegos* sp.n./Det JGH Londt' – ♂ NHMUK015191088, ♂ NHMUK015191090 (Male terminalia in vial) & ♀NHMUK015191089; 2 PT 'SOMALILAND:/Ado (Vadere)/24.xi.1953/Desert Locust Survey.'-'BM1982-513/Taken in/Cop (x)', '**PARATYPE**/*Hoplistomerus/pegos* sp.n./Det JGH Londt'- ♂ NHMUK015191086 & ♀ NHMUK015191087. In his description Londt gives further location information is given: "08°15'N:46°20'E" &: "Ada, 09°55'N:43°47'E", respectively.

Laphyctis eremia Londt & Dikow, 2018: 83. 10 PT **Angola** 1 PT 'Angola (A11)/Bruco. 26.ii -/2.iii.1972', 'Southern/African Exp./B.M. 1972-1', 'PARATYPE/Laphyctis/eremia sp.n./Londt & Dikow' – ♂ NHMUK010624214. In their description Londt & Dikow give further location information: "c. 15°07'00"S, 13°11'00"E

Figure 16. Whole lateral image of *Neolophonotus iranensis* paratype NHMUK014034742.

738m"; **Namibia** 1 PT 'Okahandja/2–18.iii.1928.', 'S. W. Africa./R. E. Turner./ Brit. Mus./1928 – 178', 'PARATYPE/Laphyctis/eremia sp.n./Londt & Dikow' – ♂ NHMUK010624227. In their description Londt & Dikow give further location information: "c. 21°58'19"S, 16°54'23"E 1354m"; 1 PT 'S. W. Africa (29)/Kahn River, 5 mls./N. Usakos/30–31.i.1972', 'Southern/African Exp./ B.M. 1972-1', 'PARATYPE/Laphyctis/eremia sp.n./Londt & Dikow' – ♀ NHMUK010624217; 1 PT 'S. W. Africa (28)/Goanikontes, 21 mls./E. Swakopmund/30.i.1972', 'Southern/African Exp./B.M. 1972-1', 'PARATYPE/Laphyctis/eremia sp.n./ Londt & Dikow' – ♂ NHMUK010624207. In their description Londt & Dikow give further location information: "c. 22°40'06"S, 14°49'04"E 157m"; 3 PT 'S. W. Africa (22);/Kuiseb Canyon./ 23 18'S, 15 45'E/22– 23.i.1972', 'Southern/African Exp./B.M. 1972-1', 'PARATYPE/Laphyctis/eremia sp.n./Londt & Dikow' – ♂ NHMUK010624206, ♂ NHMUK010624213 & ♀ NHMUK010624215. In their description Londt & Dikow give further location information: "c. 23°17'59"S, 15°45'32"E 770m"; 1 PT 'S. W. Africa (23)/Homeb, 10 mls./ESE. Gobabeb/23–25.i.1972', 'Southern/African Exp./B.M. 1972–1', 'PARATYPE/Laphyctis/eremia sp.n./Londt & Dikow' – ♂ NHMUK010624220. In their description Londt & Dikow give further location information: "c. 23°38'12"S, 15°10'55"E 445m"; 1 PT 'S. W. Africa (23)/Homeb, 10 mls./ESE. Gobabeb/23–25.i.1972', 'Southern/ African Exp./ B.M. 1972- 1', 'Laphystia/gigantella Loew/det. H. Oldroyd 1973', 'PARATYPE/Laphyctis/eremia sp.n./Londt & Dikow' – ♀ NHMUK010624219; 1 PT 'S. W. Africa (29)/Kahn River, 5 mls./N. Usakos /30–31.i.1972', 'Southern

/African Exp./B.M. 1972- 1', 'Laphystia/gigantella Loew/det. H. Oldroyd 1973', 'PARATYPE/Laphyctis/eremia sp.n./Londt & Dikow' – ♂ NHMUK010624208. I In their description Londt & Dikow give further location information: "c. 21°56'10"S, 15°41'29"E 1043m".

Loewinella deemingi Londt, 1982: 232. HT & 1 PT **Nigeria** HT 'Holo-type', 'N. Nigeria/Zaria/Samaru/26.vi.1972/J. C. Deeming', 'HOLOTYPE ♂/Loewinella/deemingi sp.n./Londt.J. 1981' – ♂ NHMUK014034808. Male terminalia dissected on a pinned plastic stripe; 1 PT 'Para-/type', 'N. Nigeria/Zaria/Samaru,/2. vii.1972/J. C. Deeming', 'PARATYPE ♀ /Loewinella/deemingi sp.n./Londt.J. 1981' – ♀ NHMUK014034809.

Loewinella lehri Londt, 1982: 236. HT **Pakistan** 'Holo-type', 'N.W. India/Quetta/May 1902/C. G. Nurse/B.M.1934-8', 'Quetta/5.02', 'HOLOTYPE ♂/Loewinella/lehri sp.n./LONDT.J.G.H.' – ♂ NHMUK014034810. Dissected male terminalia mounted on a pinned plastic strip. The label information is a different order to that in the publication.

Nannolaphria niger Londt, 1977: 48. 2 PT **South Africa** 1 PT 'Para-/type', 'SOUTH AFRICA: Natal/ Pietermaritzburg/1930Cb 7.XII.1977/J.G.H. Londt/Town Bush FOREST EDGE', 'PARATYPE ♂/NANNOLAPHRIA/NIGER – LONDT/ DEC – 1976' – ♂ NHMUK014034806; 1 PT as NHMUK014034806 except 'PARATYPE ♀/NANNOLAPHRIA/NIGER – LONDT/ DEC. 1976'- ♀ NHMUK014034805. In his description Londt does not include the location code (probably based on latitude and longitude).

Nusa eos Londt, 2006a: 116. HT & 6 PT **Ethiopia** HT & 2 PT 'van Someren/Garissa Bura/Tana Riv: 11 48', 'Com. Inst Ent./Coll. No. 11185', 'SW Bromley/Collection/1955', 'BMNH/London', '**HOLOTYPE**/*Nusa eos*/Det. JGH Londt/September 2005'– ♂ NHMUK014035089; 2 PT same as before HT except '**PARATYPE**/*Nusa eos*/Det. JGH Londt/September 2005' – ♂ NHMUK014035091 (Male terminalia in vial) & ♀ NHMUK014035092. In his description Londt gives further location information: "0028S 3938E" &: "? xi 1948"; 1 PT '537/18.12.51', 'E.Africa:/Nairobi,/Zone H, HZS 3181,/L.C. Edwards./B.M. 1952- 403.', 'PARATYPE/*Nusa eos*/Det. JGH Londt/September 2005' – ♀ NHMUK014035093. In his description Londt gives further location information: "0117S 3649E"; **Sudan**: 1 PT 'Ent. Coll./C28258', 'COM. INST. ENT./COLL. NO. 11747', 'Sudan Govt.: "sideways"/Arema/J.W. COWLAND/19.x.28', 'BMNH/London', '**PARATYPE**/*Nusa eos*/Det. JGH Londt/September 2005' – ♀ NHMUK014035095. In his description Londt gives further location information: "? Arema, Ethiopia– 1214N 3657E"; **Tanzania**: 1 PT 'Tanganyika Terr:/Old Shinyanga/6.i.1936/E. Burtt./B.M. 1938-433', 'A'-'2/1219', '**PARATYPE**/*Nusa eos*/Det. JGH Londt/September 2005' – ♂ NHMUK014035094. In his description Londt gives further location information: "0333S 3324E" but the 'A' label was not included (unsure of relevance); **Kenya**: 1 PT 'Kenya: Archer's Post/Uaso Nyiro river/2300' 6-xii-1969/M.E. Irwin &/E.S. Ross', 'Nusa/spp/det.EMFisher 76', '**PARATYPE**/*Nusa eos*/Det. JGH Londt/September 2005' – ♂ NHMUK014035090. Dissected male terminalia preserved in vial. In his description Londt provides the latitude and longitude: "0039N 3641E"

and this specimen was not listed in NHMUK and there is a further label 'Collection of the/CALIFORNIA ACADEMY/OF SCIENCES, San/ Francisco, Calif.'

Trichardis abdelkuri Londt, 2008: 175. HT & 3 PT **Yemen** HT 'ABDELKURI I:/ /Jebel Saleh/500–1500 ft/7.v.1967/K. Guichard', 'Brit. Mus. / 1967-455', '*Trichardis*/*nigrescens*/(Ricardo, 1903)/Det. JGH Londt', '**HOLOTYPE**/*Trichardis*/*abdelkuri*/Det JGH Londt' – ♂ NHMUK015191091. In his description Londt gives further location information: "12°05'N:52°20'E". Male terminalia in vial; 3 PT 'ABDELKURI I:/ /Jebel Saleh/500–1500 ft/7.v.1967/K. Guichard', 'Brit. Mus. / 1967-455', '**PARATYPE**/*Trichardis*/*abdelkuri*/Det JGH Londt' – ♂ NHMUK015191092, ♀ NHMUK015191093 (one leg on card) & ♀ NHMUK015191094.

Trichardis eburacta Londt, 2008: 181. 1 PT **Nigeria** 'N. NIGERIA/Zaria,/ Samaru./18.vi.1968', 'J. C. Deeming/m.v. trap.', 'PARATYPE/Trichardis/eburacta/Det. J.G.H. Londt' – ♀ NHMUK014034801. In his description Londt also provides the latitude and longitude: "11°10'N:07°37'E".

Trichardis mellina Londt, 2008: 192. 1 PT **Eritrea** 'ABYSSINIA/NOV 1911/R. J. STORDY', 'Pres by/Imp. Bur.Ent./Brit.Mus./1923–58.', 'Trichardis/erythrogaster.Herm/Typus' (manuscript name by Hermann), 'PARATYPE/Trichardis/mellina/Det. J.G.H. Londt' – ♂ NHMUK014034802.

Trigonomiminae

Damalis achilles Londt, 1989: 65. 1 PT **South Africa** 'H.C.BURNUP'/Tongaat, '08-9', '63' (There are 4 holes in the label which may be obscuring a mark between these two numbers), 'S.Africa/Pres. By Natal Mus./Pietermaritzburg./ B.M.1927-59.', 'PARATYPE/DAMALIS/ACHILLES/J.G.H. LONDT' – ♀ NHMUK014034993. In his description the latitude and longitude of the locality is provided: "29°35'S:31°08'E" and a probable collection date (which is almost certainly correct) "? 1908–1909".

Damalis angola Londt, 1989: 67. HT & 8 PT **Angola** HT 'ANGOLA (A11)/Bruco, 26.ii.- /2.iii.1972', 'Southern/African Exp./B.M.1972-1', 'HOLOTYPE/Damalis/angola/Det J.G.H. Londt' – ♂ NHMUK014034994; 7 PT as HT except 'PARATYPE/Damalis/angola/Det J. G. H. Londt', ♂ NHMUK014034995, ♂ NHMUK014034996, ♂ NHMUK014034997 (dissected male terminalia mounted on a pinned plastic strip), ♀ NHMUK014034999, ♀ NHMUK014035000, ♀ NHMUK014035001 & ♀ NHMUK014035002; 1 PT 'Angola~73/66', 'PARATYPE/Damalis/angola/Det J. G .H. Londt' – ♂ NHMUK014034998. [This latter specimen is part of a donation to the NHM made in 1873 of specimens collected in Angola donated by the Portuguese explorer Joachim John Monteiro, though in the museum's register the collector's name is given as Mr C.W. Monteiro]

Damalis chelomakolon Londt, 1989: 72. 2 PT **Zimbabwe** 'Pres. By/Imp. Bur. Ent./Brit. Mus./1928-347', '311', 'Lophurodamalis/longipennis/Lw/Det.E.O.Engel det.', 'Vumba Mts., 5700' ft./ S. Rhodesia./2–15 February, 1924./Rhodesia Museum.', 'PARATYPE/ Damalis/chelomakolon/Det J. G .H. Londt' – ♂NHMUK014035003 &

♀ NHMUK014035004. The ♀ PT does not have the label '311' and in Londt (1989) label data is missing for both as well as the original identification.

Damalis doryphorus Londt, 1989: 83. 2 PT **South Africa** 'SOUTH AFRICA: Natal/ Pongolo Bush Nat. Res/27°19'20"S:30029'35"E/Montane Podocarpus. For/ Grass nr forest 1580m/J. G. H. Londt 20.iv.1988', 'PARATYPE/Damalis/doryphorus/ Det J. G .H. Londt' – ♂ NHMUK014035006 (Fig. 17) & ♀ NHMUK014035005. In his description Londt has written the data in a different order. Specimens donated by Londt to the NHM.

Damalis drilus Londt, 1989: 86. HT & 12 PT **Uganda**: HT '80' level on/ steel tower', 'UGANDA: 7 mls from Entebbe/Zika Forest./iii.-iv.1961./P. S. Corbet./1961-341.', 'HOLOTYPE/Damalis/drilus/Det J.G.H. Londt' – ♂ NHMUK014035067; 3 PT as HT except 'PARATYPE/Damalis/ drilus/J. G. H. Londt' – ♂ NHMUK014035073, ♀ NHMUK014035074 & ♀ NHMUK014035075. In his description Londt also provides the latitude and longitude: "0004'N:32~8'E"; 5 PT same but '120' level on/steel tower/on margin of/ lakeside swamp' – ♂ NHMUK014035068 (with dissected male terminalia mounted on a pinned plastic strip), ♂ NHMUK014035079, ♀ NHMUK014035070, ♀ NHMUK014035071, ♀ NHMUK014035072; 1 PT same but '60' level on/ steel tower' – ♀ NHMUK014035076; 2 PT same but '100' level on/steel tower' – ♀ NHMUK014035077 & ♀ NHMUK014035078; 1 PT same but no level number provided – ♀ NHMUK014035069. 10 further non-type specimens from the same locations are also housed in the collection (NHMUK014035007, NHMUK014035008, NHMUK014035009, NHMUK014035010, NHMUK014035011, NHMUK014035012, NHMUK014035013, NHMUK014035014, NHMUK014035015 & NHMUK014035016).

Damalis monochaetes Londt, 1989: 107. 1 non-type **South Africa** 'Karkloof, ii.1897, Marshall./1903-17.', 'Karkloof/Natal 2.97', 'Damalis/monochaetes/Londt. / Det: J. G. H. Londt' – ♂ NHMUK014035019; 2 non-type 'Bulwer/Natal/:W. Haygarth'~'1914', 'Pres. By/Cape Museum/per.G.Ricardo/20.iii.1923', 'Damalis/monochaetes/Londt. /Det: J. G. H. Londt' – ♀ NHMUK014035018 & ♀ NHMUK014035020. These were not included as types by Londt but listed as part of the material examined and have been added here for completeness. For NHMUK014035020 most of the abdomen is missing apart from a small part which is attached to the plastic sheet that the specimen is pinned to.

Damalis neavei Londt, 1989: 109. HT & 19 PT **Malawi** HT 'Holo-/type', 'C>CI/ Mlanje/Nyasaland/31.i.1913/S. A. Neave', 'CI<C/ Mlanje/Nyasaland/3l.i.1913/S. A. Neave', 'Pres. By/Imp.Bur.Ent./1921-12', 'Centrotus/ sp. Not in B.M.', 'HOLOTYPE/Damalis/neavei/Det J.G.H. Londt' 'BMNH(E) #662515' – ♂ NHMUK014035023. Londt designates this specimen as the holotype in his description and the prey item is identified: "Prey: Hemiptera, Membracidae 'Centrotus sp. Det. W. E. China'" although the HT was originally and incorrectly added to specimen NHMUK014035021 – the labels have now been swapped; 1 PT 'K1<K/Mlanje/13.I.1913/S. A. Neave', 'K<K1/Mlanje/13.I.1913/S. A. Neave ', 'Pres. By/Imp.Bur.Ent./1921-12', 'Laspeyresia/sp. ?/ teste HS', 'PARATYPE/Dama-

Figure 17. Whole lateral image of *Damalis doryphorus* paratype NHMUK014035006.

lis/neavei/J. G. H. Londt', 'BMNH(E) # 662510' – ♂ NHMUK014035021. In his description Londt also provides the latitude and longitude: "15°57'S: 35°36'E"; 2 PT 'Brit.Mus./1911-177', 'Nyasaland:/Ft. Mangoche/to Chikala Boma/4000 ft 20–25.iii.1910./S. A. Neave', 'PARATYPE/Damalis/neavei/ J. G. H. Londt' – ♂ NHMUK014035034 & ♀ NHMUK014035022. In his description Londt also provides the latitude and longitude: "14°27'S: 35°29'E"; 2 PT 'Nyasaland/Blantyre/1914/Dr J.B. Davey', 'Pres. By/Imp.Bur.Ent./1921-236', 'PARATYPE/Damalis/neavei/ J. G. H. Londt' – ♂ NHMUK014035033 & ♀ NHMUK014035024. In his description Londt also provides the latitude and longitude: "15°47'S: 35°00'E"; 1 PT 'F>F1/S.W. of/Lake Chilwa/1O.i.1914/S. A. Neave.', 'F1<F/S.W. of/Lake Chilwa/1O.i.1914/S. A. Neave.', 'Pres. By/Imp.Bur.Ent./1921-12', 'Myrmecaria ♂/eumenoides Gergh.', 'Damalis/venusta Bert./det. J.E.Chainey, 1983', 'PARATYPE/Damalis/neavei/ J. G. H. Londt', 'BMNH(E) #662517' – ♀ NHMUK014035025. Attached prey item was named in original description: "Prey: Hymenoptera, Formicidae, 'Myrmecaria eumenoides Gergh. ♂'"; 1 PT '01 × 0/MT.Mlanje/Nyasaland/14.xii.1912/S. A. Neave', 'Pres. By/Imp.Bur.Ent./1921-12' – ♀ NHMUK014035026. Detached abdomen contained in vial; 1 PT 'A>A1/27.iii.1913/S. A. N.', 'A1<A/27.iii.1913/S. A. N.', 'Pres. By/Imp.Bur.Ent./1921-12', 'Centrotus/sp. Not in/B.M./det. In B.M./W.E.China.', 'Delphacis/?/Dicranotropis', 'PARATYPE/Damalis/neavei/ J. G. H. Londt', '?Dicrano-/tropis/det. In B.M./W.E.China.', 'BMNH€ # 662518' – ♂ NHMUK014035027. In his description Londt presumes the collec-

tion locality to be in Malawi: "the collector's initials are those of Sheffield Airey Neave who was collecting in Malawi at this time" as well as information about the attached prey item: "Prey: Hemiptera, ? Fam. '? Decranotropes Det. W. E. China'": "this probably refers to the delphacid genus Dicranotropis, though the Afrotropical species are no longer thought to belong to this genus"; 1 PT 'NYASALAND:/ Mlanje/2000'./26.xii.1944./R. C. Wood./B.M.1948-309.', '26.xii.44/ ♀/Mlanje 2000'/Nyasaland/R.C.Wood', 'PARATYPE/Damalis/neavei/ J. G. H. Londt' – ♀ NHMUK014035028; 1 PT 'E2 X E3/Rua V/Nyasaland/3.iii.1913/S. A. Neave.', 'Pres. By/Imp.Bur.Ent./1921-12', 'PARATYPE/Damalis/neavei/ J. G. H. Londt' – ♂ NHMUK014035029. In his description Londt provides the full locality name with latitude and longitude: "Rua Basin -15°54'S:35°30'E". The dissected terminalia have been mounted on celluloid; 1 PT 'A>A1/S.W. of/ L. Chilwa/Nyasaland/12.i.1914/S. A. Neave.', 'A1<A/S.W. of/ L. Chilwa/Nyasaland/12.i.1914/S. A. Neave.', 'Pres. By/ Imp.Bur.Ent./1921-12', "Crematogaster/(Decamera)[undecipherable"/sp? ♀/H. St.J.Donisthorpe./det. 28.v.1931', 'PARATYPE/Damalis/neavei/ J. G. H. Londt', 'BMNH(E) # 662513' – ♀ NHMUK014035030. In his description Londt provides identification of the prey item: "Hymenoptera, Formicidae, 'Crematogaster sp. ♀'"; 1 PT 'B>B1/S.W. of/ L. Chilwa/Nyasaland/12.i.1914/S. A. Neave.', 'B1<B/S.W. of/ L. Chilwa/Nyasaland/12.i.1914/S. A. Neave.', 'Pres. By/Imp.Bur.Ent./1921-12', 'Galeruca sp', 'PARATYPE/Damalis/neavei/ J. G. H. Londt', 'BMNH(E) # 662516' – ♀ NHMUK014035037. In his description Londt provides identification of the prey item: "Prey: Coleoptera, Chrysomelidae, 'Galeruca sp.'"; 1 PT 'NYASALAND./Mt.Mlanje./ l.i.1913./ S. A. Neave.', 'Pres. By/Imp.Bur.Ent./1923-58', 'PARATYPE/Damalis/neavei/ J. G. H. Londt' – ♀ NHMUK014035031. Wing mounted separately on slide; 1 PT 'Damalis/venustus/Bertol', 'Pres.by/Imp.Bur. Ent./Brit.Mus./1924-209, ', 'Nyasaland./Mlanje, Sep1913 Feb 1914/ J. B. Davey.', 'PARATYPE/Damalis/neavei/ J. G. H. Londt' – ♂ NHMUK014035032; 1 PT 'Pres.by/Imp.Bur.Ent./Brit.Mus./1923-58', 'NYASALAND./Marimba 15.i.1910, J. B. Davey', 'Damalis/venusta Bertolini', 'Damalis/venustus/21', 'PARATYPE/ Damalis/neavei/ J. G. H. Londt' – ♀ NHMUK014035035. In the description Londt gives further locality data: "? Maremba 14°14'S: 34°49'E"; 1 PT 'D>D1/ Mlanje,Nyasaland,/11.ii.1914,/S. A. Neave.', 'D1<D/Mlanje,Nyasaland,/11. ii.1914,/S. A. Neave.', 'Pres. By/Imp.Bur.Ent./1921-12', 'Polycorynus/sp./Det. 1932/G.E.Bryant', 'PARATYPE/Damalis/neavei/ J. G. H. Londt', 'BNHM(E) # 662514' – ♀ NHMUK014035036. In his description Londt provides identification of the prey item: "Prey: Coleoptera, ? Fam. 'Polycorynus sp. Det. G.E. Bryant'": "a fungus weevil, belongs to family Anthribidae"; 1 PT 'A>A1/S.W. of L. Chilwa/ Nyasaland/9.i.1914/S. A. Neave.', 'A1<A/S.W. of L. Chilwa/Nyasaland/9.i.1914/S. A. Neave.', 'Pres. by/Imp. Bur. Ent./1921-12.','Melitonoma/punctipennis Jae.', 'PARATYPE/Damalis/neavei/ J. G. H. Londt', 'BMNH(E) #662511' – ♂ NHMUK014035038. In his description Londt provides identification of the prey item: "Coleoptera: Chrysomelidae" and location: "15°30'S:35°30'E"; 1 PT 'C>C1/S.W. of L. Chilwa/Nyasaland/9.i.1914/S. A. Neave.', 'C1<C/S.W. of L. Chilwa/Nyasaland/9.i.1914/S. A. Neave.', 'Pres. by/Imp. Bur. Ent./1921-12.',

'Myrmecaria', 'PARATYPE/Damalis/neavei/ J. G. H. Londt', 'BMNH(E) #662512' – ♂ NHMUK014035039. In his description Londt provides identification of the prey item: "Hymenoptera: Formicidae" and location: "15°30'S:35°30'E"; **Zambia**: 1 PT 'N.Rhodesia./Lusenfura/N.W.R./3.10/Silverlock ColI./1912-20'~'35', 'PARATYPE/Damalis/neavei/ J. G. H. Londt' – ♀ NHMUK014035040. In his description Londt states that the terminalia is now missing and gives the locality name as "? Lusemfwa", also providing its latitude and longitude: "14°35'S: 29°07'E".

Damalis sphekodes Londt, 1989: 128. HT **Tanzania** 'TANGANYIKA:/Amani,/iii.1959./J. D. Phipps.B.M.1962-453.', 'HOLOTYPE/Damalis/sphekodes/Det. J.G.H. Londt' – ♂ NHMUK014035043. Terminalia dissected on a pinned plastic strip and in Londt provides latitude and longitude in his description: "5°09'S:38°36'E".

Damalis turneri Londt, 1989: 129. HT & 1 PT **South Africa** HT 'E. Cape Prov/Katberg/19–26.ii.1933', 'S. Africa./R.E.Turner./Brit.Mus./1933-175', 'HOLOTYPE/Damalis/turneri/Det. J.G.H. Londt' – ♂ NHMUK014035042; 1 PT same as HT except 'PARATYPE/Damalis/turneri/J. G. H. Londt' – ♀ NHMUK014035041. In his description Londt provides further location information: "3226BC" (the authors presume this is 32S 26E).

Dasypogoninae

Pegesimallus srilankensis Londt, 1980: 323. HT & 2 PT **Sri Lanka** HT 'Holo/type', Type'~'N/limbus/Oldr.', 'Ceylon/Dambula/15.iv.1891/Lt. Col. Yerbury/1892-192'~'21o', 'Neolaparus ♂/limbus Oldr/H.Oldroyd det.1937.', 'HOLOTYPE/Pegesimallus/srilankensis ♂/J.G.H. Londt' – ♂ NHMUK014034780. The BM accession number is not mentioned in the published description. Dissected male terminalia mounted on a pinned plastic strip; 1 PT 'Para-/type', 'Para-/type'~'N/limbus/Oldr', Ceylon/Tricomali./12.X.90./Lt.Col.Yerbury./1892-192.' ~'235', 'Neolaparus ♂/limbus Oldr/H.Oldroyd det.1937.' 'PARATYPE ♂/ Pegesimallus/srilankensis/J.G.H. Londt' – ♂ NHMUK014034781; 1 PT 'Para-/type', Ceylon/Tricomali./Hot Wells./27.IX.91./Lt.Col.Yerbury./1892-192.' ~'210', 'PARATYPE ♀/ Pegesimallus/srilankensis/J.G.H. Londt' – ♀ NHMUK014034782. Londt corrects the spelling of Dambula to Dambulla and Tricomali to Trincomalee in his description.

Pegesimallus yerburyi Londt, 1980: 333. HT & 7 PT **Sri Lanka** HT 'Holo-/type', 'Type'~'N/brussetti/Oldr.', 'Ceylon./Nilaveli/19.VII.91./Lt.Col.Yerbury./1892-192'~'210', 'HOLOTYPE/ Pegesimallus/yerburyi ♂/J.G.H. LONDT.' – ♂ NHMUK014034783. Dissected terminalia mounted on a pinned plastic strip. Londt notes that the label 'Trilaveli was "poorly written and may be incorrect" and we believe this to be Nilaveli, a small coastal town in the Trincomalee District; 1 PT 'Para-/type', 'Ceylon./Periakulam/5.iv.91./Lt.Col.Yerbury/1892-192', 'PARATYPE ♀/ Pegesimallus/yerburyi ♂/J.G.H. LONDT' – ♀ NHMUK014034784; 1 PT 'Para-/type', 'Type'~'N/brussetti/Oldr', 'Ceylon./ Alivtoya/22.iv.91./Lt.Col.Yerbury/1892-192'~'210' (date different to that given in publication), 'PARATYPE ♀/ Pegesimallus/yerburyi ♂/J.G.H. LONDT.' – ♀ NHMUK014034785; 1 PT

'Para-/type', 'Ceylon./ Kuchavelli /27.3.91./Lt.Col.Yerbury/1892-192'~' 310'(date written differently in publication), 'PARATYPE ♀/ Pegesimallus/yerburyi ♂/J.G.H. LONDT' – ♀ NHMUK014034786; 1 PT 'Para-/type', 'Ceylon./ Kuchavelli /29.3.91./Lt.Col.Yerbury/1892-192'~'209', 'Lagodias/sp.nov', 'PARATYPE ♀/ Pegesimallus/yerburyi ♂/J.G.H. LONDT' – ♀ NHMUK014034787; 1 PT 'Para-/type', 'CEYLON./R.Senior-White./B.M.1924-100./On roadside/BABARANE 10:10:19', 'gen.nr.Pseudorus/sp.2.nitidiventus/m.n.s. MS.', 'AS.??', 'PARATYPE ♀/ Pegesimallus/yerburyi ♂/J.G.H. LONDT' – ♀ NHMUK014034788; 2 PT **India** 1 PT 'Para-/type', 'Thekkadi/Periyar Dam,/Travancore 6–10.v.37'~'B.M.-C.M.Expdn./to South India./April-May 1937', 'Neolaparus ♀/ brunettii Oldr/H. Oldroyd det.1937', 'PARATYPE ♀/ Pegesimallus/yerburyi ♂/J.G.H. LONDT.' – ♀ NHMUK014034789; 1 PT 'Para-/type', 'Sethumadai 20Km./S.W.of Pollachi./S. India 24-IV-37', 'Neolaparus ♀/ brunettii Oldr/H.Oldroyd det.1937', 'PARA-TYPE ♀/ Pegesimallus/yerburyi ♂/J.G.H. LONDT.' – ♀ NHMUK014034790.

Saropogon greatheadi Londt, 1997: 141. HT & 1 PT **Eritrea** HT '15 ml N Massawa/ Eritrea /8/8/64', 'HOLOTYPE/Saropogon greatheadi sp.n./Det: J.G.H Londt/ October 1996' – ♂ NHMUK014034770. Terminalia dissected and preserved in vial attached to specimen pin; 1 PT 'Eritrea:/near/Massawa/l.iv.1961/D. J. Great-head', 'PARATYPE/Saropogon greatheadi sp.n./Det: J.G.H Londt/October 1996' – ♂ NHMUK014034771. Both with dissected male terminalia preserved in vial. In his description Londt gives the current name of the locality as " Mits'iwa" and provides its latitude and longitude: "15°36'N:39°28'E".

Saropogon kenyensis Londt, 1997: 145. 1 PT **Kenya** 'KENYA/ near ARCHER'S / POST/ 20.ii.1964/D. J. Greathead', 'Sarapogon sp./det. J.E. Chainey, 1983', 'PARATYPE/Saropogon kenyensis sp.n./Det: J.G.H Londt/October 1996' – ♂ NHMUK014034772. In his description Londt provides latitude and longitude: "0°39'N:37°41'E".

Saropogon zinidi Londt, 1997: 153. 2 PT **Tanzania** 1 PT 'TANZANIA/15 MILES S OF/LONGIDO. 30.IV.66/D.& A. GREATHEAD', 'PARATYPE/Saropogon zinidi sp.n./Det: J.G.H Londt/October 1996' – ♂ NHMUK014034774, dissected male terminalia in vial; 1 PT **Kenya** Brit. E. Africa,/ Masai Reserve/ 14.4.1913/T. J. Anderson.'; 'IMP INST/ENTOM'; 'SWBromley/ Collection/1955'), 'PARATYPE/Saropogon zinidi sp.n./Det: J.G.H Londt/October 1996'– ♀ NHMUK014034773. In his description Londt provides further location information for the two localities: "? Masai Mara Game Reserve -1°25'S:34°55'E", and the latitude and longitude of the Tanzania locality: "2°44'S:36°39'E".

Tillobromatinae

Hypenetes dorattina Londt, 1985b: 383. 2 PT **South Africa** 'PARA-/TYPE', 'SOUTH AFRICA: Natal/Cathedral Peak area/2829Cc 7–12 April 1982/ JGH Londt ex malaise', 'PARATYPE ♂♀/Hypenetes/dorattina sp.n./J.G.H. LONDT' – ♂ NHMUK014034985 & ♀ NHMUK014427904. Specimens mounted together on the same pin. Specimens donated by Londt to the NHM.

Hypenetes loewi Londt, 1985b: 391. 2 PT **South Africa** 1 PT 'Para-/type', 'Rapenburg/ Cape Flats/1–14.x.1920', 'R. E. Turner/1920-424', 'PARATYPE ♂/Hypenetes/ loewi sp.n./J.G.H. LONDT' – ♂ NHMUK014034986; 1 PT 'Para-/type', 'Stellenbosch, 19.viii. '26, R. L. Nel', 'Hypenetes/stigmatias/Lw./Dr E.O. Engel det.', 'Pres. By/Imp. Inst. Ent./Brit. Mus./1931-56', 'PARATYPE ♂/Hypenetes/loewi sp.n./J.G.H. LONDT' – ♂ NHMUK014034987. The head is missing on the latter specimen and the detached abdomen is mounted on the same strip as the rest of the specimen. In Londt (1985b) further location information is given: "3328CD" &: "3318DD" (the authors presume this is Stellenbosch (33S 28E) and Rapenburg (33S 18E) respectively).

Hypenetes macrocercus Londt, 1985b: 393 HT **South Africa** 'Holo-/type', 'Table/Mt/ AE' ~ '80, 69', 'HOLOTYPE ♂/Hypenetes/macrocercus sp.n./J.G.H. LONDT' – ♂ NHMUK014034988. Dissected male terminalia mounted on a pinned plastic strip. In Londt (1985b) further location information is given: "Cape Province, 3318CD" (the authors presume this is 33S 18E). This was part of a donation to the NHM from the Reverend Alfred E. Eaton made in 1880 of specimens collected at Table Mountain.

Hypenetes oldroydi Londt, 1985b: 395. 2 PT **South Africa** 1 PT 'PARA-/TYPE', 'STH AFRICA Cape Prov/25 km SE Citrusdal/3219CA, 30. viii. 1981, J. Londt, L Schoeman/and B. Stuckenberg/ macchia (white sand), 'PARATYPE ♂/Hypenetes/oldroydi sp.n./J.G.H. LONDT' – ♂ NHMUK014034990; 1 PT same as before except 'PARATYPE ♀/Hypenetes/loewi sp.n./J.G.H. LONDT' – ♀ NHMUK014034989. Order on label different to publication. Specimens donated by Londt to the NHM.

Hypenetes pylochrysites Londt, 1985b: 396. 1 PT **South Africa** 'PARA-/TYPE', 'SOUTH AFRICA O F S/15 km SE. of Clarens/ 2828CB, 27.iii.1982/J. Londt & L. Schoeman/ Rocky Hilltop', 'PARATYPE ♂/Hypenetes/pylochrysites sp.n./J.G.H. LONDT' – ♂ NHMUK014034991 (Fig. 18). Specimen donated by Londt to the NHM.

Hypenetes turneri Londt, 1985b: 403. HT **South Africa** 'Holo-/type', 'Camps Bay/ Cape Peninsula/ Sept 1920', 'S.Africa/R. E. Turner/1920-392', 'HOLOTYPE ♂/ Hypenetes/turneri sp.n./J.G.H. LONDT' – ♂ NHMUK014034992. Male terminalia dissected on a pinned plastic strip. In his description Londt gives further location information: "3318CD" (33S 18E).

Willistonininae

Ammodaimon acares Londt, 1985c: 497. 1 PT **Namibia** 'PARA-/TYPE', 'NAMIBIA 30 km NW of/Karasburg 2718DA/28. viii. 1983, J. Londt/& B. Stuckenberg Arid/Karroo type veget', 'PARATYPE ♀/Ammodaimon/acares sp.n./J.G.H. LONDT' – ♀ NHMUK014034881. Specimen donated by Londt to the NHM.

Ammodaimon platythrix Londt, 2010: 465. HT **Namibia** 'S. W. AFRICA (3)/ Noachabeb 27 mls./NNE. Grunau/10–12.i.1972', Southern/African Exp./B.M. 1972–1', 'Sporadothrix/gracilis Hermann/det.H.Oldroyd 1973', '**HOLOTYPE/** *Ammodaimon/platythrix* sp.n./Det JGH Londt 2009', 'BMNH(E) #948571' – ♂ NHMUK014034882 (Fig. 19), dissected male terminalia in vial. In his descrip-

Figure 18. Whole lateral image of *Hypenetes pylochrysites* paratype NHMUK014034991.

tion Londt provides further location details: "c.43Km" (the metric equivalent of 27 miles) and the latitude and longitude: "27°26'S:18°31'E".

Sisyrnodytes ausensis Londt, 2009: 146. HT & 6 PT **Namibia** HT 'Aus./Dec. 1929', 'S.W. Africa./R.E. Turner./Brit. Mus./1930-113', 'W', '**HOLOTYPE**/*Sisyrnodytes/ausensis sp.n.*/Det. JGH Londt', 'BMNH(E) #819147' – ♂ NHMUK014034870. Dissected terminalia preserved in vial. In his description Londt writes "The specimen is pinned laterally, double mounted on a strip of cellulose and had a little green verdigris (cleaned) above and below" and he also provides the latitude and longitude: "26°40'S:16°16'E"; 6 PT same as HT except '**PARATYPE**/*Sisyrnodytes/ausensis sp.n.*/Det. JGH Londt' and further with specimen numbers 'BMNH(E) #819150', 'BMNH(E) #819149', 'BMNH(E) #819148' – which has further label 'Sisyrnodytes ♀/brevis Macquart/det.H.Oldroyd.1957', 'BMNH(E) #819144', 'BMNH(E) #819143' & 'BMNH(E) #819142', respectively given new specimen numbers ♂ NHMUK014034871, ♀ NHMUK014034872, ♀ NHMUK014034873 (Fig. 20), ♀ NHMUK014034874, ♂ NHMUK014034875 & ♂ NHMUK014034876.*Sisyrnodytes dasykylon* Londt, 2009: 154. 2 PT **South Africa** 'S Africa: Cape #21/70km E of Laingsburg/33°06'S:21°35'E 500m/Date: 24.xi.1990/Whittington & Londt/Dry Dwyka River area', '**PARATYPE**/ *Sisyrnodytes/dasykylon* sp.n./Det. JGH Londt', 'BMNH(E) #819146' or 'BMNH(E) #819145' respectively – ♂ NHMUK014034878 & ♀ NHMUK014034877 (Fig. 21). Specimens donated by Londt to the NHM.

Figure 19. Whole lateral image of *Ammodaimon platythrix* holotype NHMUK014034882.

Figure 20. Whole lateral view of *Sisyrnodytes ausensis* Paratype, NHMUK014034873.

Figure 21. Whole lateral view of *Sisyrnodytes dasykylon* paratype NHMUK014034877.

Table 1. Type material from the individual subfamilies of Asilidae [subfamilies division according to Dikow (2009).

Subfamily	Holotype	Paratype	All type material
Stenopogoninae	12	121	133
Brachyrhopalinae	2	46	48
Asilinae	3	14	17
Laphriinae	6	38	44
Trigonomiminae	5	45	50
Dasypogoninae	3	13	16
Tillobromatinae	2	7	9
Willistonininae	2	9	11
Total	35	293	328

Discussion

All of the type material described by Londt has now been imaged and databased, and this can be accessed online through the NHM data portal. This comprised 35 holotypes and 293 paratypes, a total of 328 specimens from 103 species (6% of the total Afro-tropical fauna) (Table 1). Fifty type specimens were donated to the NHM collection by Londt. A further 18 non-types were added for completeness.

This work has also allowed the authors to correct the previous error of labelling that occurred for the holotype and one paratype of *Damalis neavei* and are in the

process of correcting an original depositing error of one of the paratypes of *Oligopogon napaios*, with NMSA, to reflect, and conform to, Londt's original descriptions.

This manuscript is testament to the level of expertise and dedication to furthering our taxonomic knowledge of Asilidae that Jason Londt has undertaken in his career to date. The collections at the NHM have benefited from both his description of specimens already held in the collection but also from the significant donation of both type and non-type material.

Acknowledgements

The authors would like to thank Nigel Wyatt for his assistance in providing an extensive review of the manuscript and Torsten Dikow for supplying several of the references. Finally, we would like to thank the reviewers for their suggestions to improve on the manuscript.

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African Invertebrates 64(2): 79–84 (2023)
doi: 10.3897/AfrInvertebr.64.98587
https://africaninvertebrates.pensoft.net

SHORT COMMUNICATION

African Invertebrates
A journal of biodiversity research

Beyond Asilidae: The collecting effort of Dr Jason Londt as represented by non-Asilidae Diptera, Hemiptera and Mecoptera, housed in the KwaZulu-Natal Museum, South Africa

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Academic editor: T. Dikow | Received 8 December 2022 | Accepted 25 January 2023 | Published 5 May 2023

https://zoobank.org/F353A59F-BC5F-4EE0-B55D-3BC204B0ED07

Citation: Williams KA, Steenkamp JC, Snyman LP (2023) Beyond Asilidae: The collecting effort of Dr Jason Londt as represented by non-Asilidae Diptera, Hemiptera and Mecoptera, housed in the KwaZulu-Natal Museum, South Africa. In: Dikow T, Williams K, Midgley J (Eds) Festschrift for Jason Gilbert Hayden Londt. African Invertebrates 64(2): 79–84. https://doi.org/10.3897/AfrInvertebr.64.98587

Keywords
collections, Jason Londt, types

Dr Jason Londt took up the position of Assistant Director at the Natal Museum (now KwaZulu-Natal Museum – KZN Museum. Collection acronym – **NMSA**) in 1976. In 1978 he was appointed Acting Head of Entomology – a post he held until 1990. He was appointed Director of the Natal Museum (KZN Museum) in 1994 (Barraclough and Whittington 1994). While his research focus was the taxonomy of Afrotropical Asilidae, he also contributed to the taxonomy of Mecoptera and collected impressive numbers of other Diptera and Hemiptera. Jason Londt's passion for entomology and collecting can clearly be seen in the number of specimens that he collected during his time at the KZN Museum. He also continued collecting and depositing material at the Museum well after he retired in 2003. In this tribute to Dr Jason Londt's collecting, we look at the numbers

of non-asilid Diptera, Hemiptera and Mecoptera that he collected and that are deposited in the KwaZulu-Natal Museum collection, including types that have been described from his non-asilid collecting activities and species that have been named after him.

Methods

In order to assess Jason Londt's collection efforts, all the digitised records from the KZN Museum of the orders Hemiptera, Mecoptera and Diptera with "Londt" or "JGH Londt" listed as a collector (at the time of writing) were downloaded from the Museum's database and analysed. All the Asilidae records were excluded from the analysis. There are over 21 000 Asilidae records in the collection with "Londt" as the collector.

For an evaluation of collection effort over time, all records lacking a year were excluded. The remaining records were partitioned into five-year increments. The total number of records per partition was plotted using base R in R studio.

The contribution of Jason Londt's collection efforts were evaluated in terms of diversity and type specimens. All the records were filtered to unique names and blanks were removed. A count of unique taxon determination for all records and types in terms of family, genus and species designation (unique binomial name) was done. All records lacking a full species designation (i.e. binomial name) were excluded and were thus not counted. The same unique taxon determination was applied only to records with type status. Finally, a map of the localities for all the type specimens was plotted using QGIS version 3.22.13.

Discussion

Jason Londt is best known for his extensive work on Asilidae, but he also had an interest in Mecoptera that was established well before his appointment at the then Natal Museum. He published over a dozen papers on Mecoptera during his career, described a genus, 16 species and re-described six species that created new synonymies (Londt 1970, 1972a, b, 1976, 1977, 1978, 1981a, b, 1993, 1994a, b, 2007; Londt and Byers 1974). His collection effort for Mecoptera in respect of what was deposited in the KwaZulu-Natal Museum decreased drastically after his appointment at the Museum – presumably due to his focus shifting to Asilidae. Even so, he continues to collect and deposit Mecoptera to the present day (Fig. 1). In total, he collected over 300 Mecoptera (Table 1), including nine *Bittacus livingstonei* specimens (Fig. 2), a species he described (Londt 1981a). The specimens represent 14 species and two genera from various localities across South Africa and Malawi.

The number of Hemiptera that Jason Londt collected and deposited in the Museum was at its highest in the 1980s, increasing again in the early 2000s (Fig. 1). He collected over 5000 Hemiptera representing 43 families, 217 genera and 263 species (Table 1).

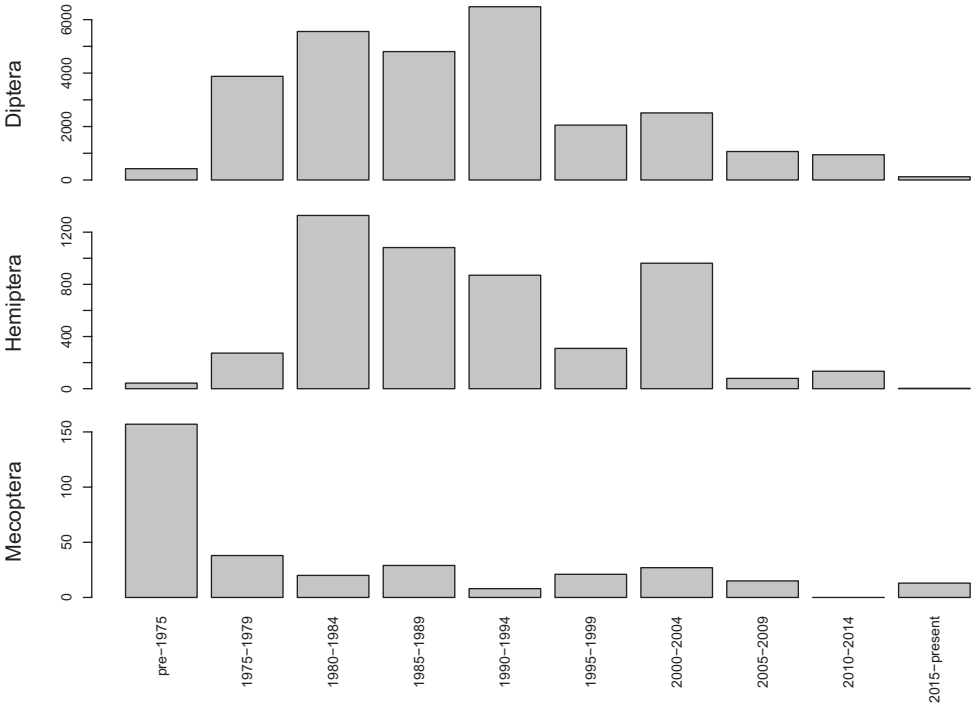

Figure 1. Non-asilid Diptera, Hemiptera and Mecoptera collecting effort by Jason Londt over time – represented by five-year increments and deposited in the KZN Museum.

Table 1. Representation of the diversity of Hemiptera, Mecoptera and non-asilid Diptera housed at the KZN Museum and collected by Jason Londt. Each record represents a specimen with digitised label data. The record data are summarised in terms of taxon-level representation.

	Total	Families	Genera	Species
Mecoptera				
Records	328	1	2	14
Holotypes	1	1	1	1
Allotypes	1	1	1	1
Paratypes	67	1	1	2
Hemiptera				
Records	5118	43	217	263
Holotypes	3	3	3	3
Allotypes	2	2	2	2
Paratypes	8	3	3	3
Diptera				
Records	27929	91	631	1139
Holotypes	95	31	61	95
Paratypes	281	32	58	89
Neotypes	1	1	1	1
MS Types	78	5	9	NA

Figure 2. Left: The holotype of *Bittacus livingstonei* Londt, 1981 (Mecoptera, Bittacidae – NMSA-MEC 137). Right: Holotype of *Anisops londti* Truxal, 1990 (Hemiptera, Notonectidae – NMSA-HEM 20420).

Three species – *Anisops londti* Truxal, 1990 (Notonectidae) (Fig. 2), *Peritropis obscurella* Gorezyca, 1998 (Miridae) and *Pseudoghiliana ornata* Maldonado, 1992 (Reduviidae) – were described from specimens he collected and are now represented by holotypes deposited in the Museum collection. Four Tingidae specimens he collected were also assigned type status – one allotype and three paratypes of *Cochlochila londti* Duarte Rodrigues, 1976.

Jason Londt not only collected Asilidae, he also collected many other Diptera. Nearly 28 000 non-asilid Diptera specimens bear his collection label in the Museum. Of those specimens, 95 have been described as new species, of which 18 were attributed to him (Table 1) – 14 as "londti", one as "londtorum and three as "jasoni". The species named after Jason Londt are from 16 different families (Table 2). This illustrates the remarkable variety of the flies he collected. Between 1975 and 1994, before he was appointed director, Jason Londt collected and deposited ~ 750 to ~ 1300 non-asilid Diptera specimens per year into the Museum collection. Even though there was a notable drop in his collecting after his appointment as director, he continued to add specimens to the collection, which is a reflection of his unwavering dedication to dipterology.

While the bulk of Jason Londt's collecting was done in South Africa and specifically the KwaZulu-Natal Province where the KZN Museum is located, he also collected specimens on several expeditions to other African countries. Several specimens collected in Namibia, Eswatini (formerly Swaziland), Kenya, Malawi and the Ivory Coast were also described as new species. (Fig. 3). Most new species, however, were non-asilid Diptera from KwaZulu-Natal Province, South Africa.

The value of Jason Londt's collecting is clearly seen in the number of new species that have been described from the material that he collected. Beyond his world-renowned contribution to the taxonomy of Asilidae, Jason Londt's collection efforts have not only helped shape the entomology collection at the KZN Museum, they have had a huge impact on the international Diptera community, as reflected by the number of species attributed to him. His interest in Mecoptera and Hemiptera has also had lasting effects. Jason Londt has undoubtedly left an impressive legacy as a highly regarded South African entomologist.

Table 2. The species named after Jason Londt from material he collected housed in the KZN Museum.

Species	Family	Author, Date
Acrocera londti	Acroceridae	Barraclough, 1984
Afrocamilla londti	Camillidae	Barraclough, 1997
Teloglabrus londti	Diopsidae	Feijen, 1983
Paracleius jasoni	Dolichopodidae	Grichanov, 2004
Pseudargyrochlamys jasoni	Dolichopodidae	Grichanov, 2020
Leucophenga londti	Drosophilidae	Bächli et al., 2005
Acarterus londti	Empididae	Sinclair, 1996
Atherigona londti	Muscidae	Muller, 2015
Mycomya londti	Mycetophilidae	Väisänen, 1994
Chaetonerius londti	Neriidae	Barraclough, 1993
Aenigmatistes londti	Phoridae	Disney, 1991
Mesanopin londti	Platystomatidae	Whittington, 2003
Nemotelus londtorum	Stratiomyidae	Mason, 1997
Syritta londti	Syrphidae	Lyneborg & Barkemeyer, 2005
Philoliche (*Ommatiosteres*) *londti*	Tabanidae	Chainey, 1983
Orthactia londti	Therevidae	Lyneborg, 1988
Vermilynx jasoni	Vermileonidae	Stuckenberg, 1996
Vermipardus londti	Vermileonidae	Stuckenberg, 1995

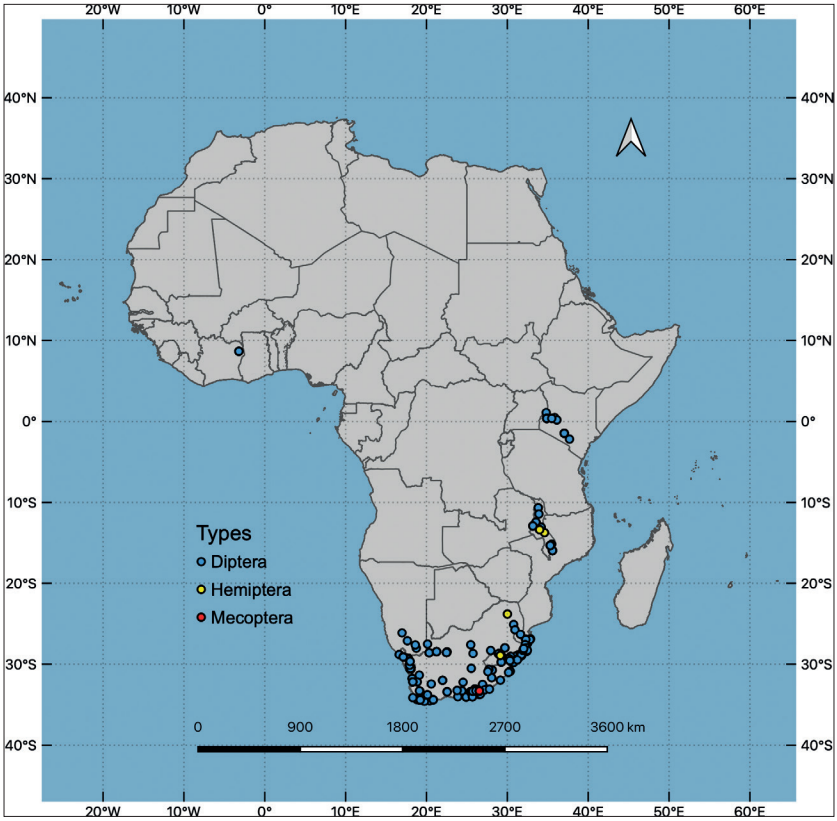

Figure 3. A map of Africa showing the localities of all the type specimens of Mecoptera, Hemiptera and non-asilid Diptera collected by Jason Londt, which are housed in the KZN Museum collection.

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African Invertebrates 64(2): 85–93 (2023)
doi: 10.3897/AfrInvertebr.64.100851
https://africaninvertebrates.pensoft.net

SHORT COMMUNICATION

African Invertebrates
A journal of biodiversity research

#SideHustle: Jason G. H. Londt's contribution to holdings of the South African Cicadidae (Hemiptera, Auchenorrhyncha) in the KwaZulu-Natal Museum

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Academic editor: John Midgley | Received 20 January 2023 | Accepted 9 March 2023 | Published 5 May 2023

https://zoobank.org/90B3E23F-FED6-46D2-B044-2B49AD67D015

Citation: Villet MH (2023) #SideHustle: Jason G. H. Londt's contribution to holdings of the South African Cicadidae (Hemiptera, Auchenorrhyncha) in the KwaZulu-Natal Museum. In: Dikow T, Williams K, Midgley J (Eds) Festschrift for Jason Gilbert Hayden Londt. African Invertebrates 64(2): 85–93. https://doi.org/10.3897/AfrInvertebr.64.100851

Abstract

Jason G.H. Londt contributed almost a quarter of the KwaZulu-Natal Museum's specimens of Cicadidae, including a strong sample of females, and probably the best set to date of African records of predation on cicadas by robber flies. The collection provides evidence that robber flies catch more male cicadas; speculatively, because attacks on the heavier-bodied female fail more often. The metadata derived from these specimens also provide a small gazetteer of Londt's collecting sites.

Keywords

behavioural ecology, cicadas, Festschrift, gazetteer, museology, predation

Introduction

Jason Gilbert Hayden Londt graduated from Rhodes University with a doctoral degree in Entomology in 1974, and briefly worked on ticks for the Agricultural Research Council at Onderstepoort, but moved to the Natal Museum late in 1976 (Guest 2006; Dikow and Midgley 2023). There he refocused his research on flies and hangingflies,

and served in several roles, including Head of Entomology, minute secretary to the Board of Trustees, Editor of the Museum's two journals, Assistant Director and, eventually, Director of the Museum from 1991 until his retirement in 2003 (Guest 2006; Stuckenberg and Mostovski 2006).

The Museum itself was initiated in 1879, passed from the Natal Society to the Natal Government in 1903, and is currently named the KwaZulu-Natal Museum. It houses internationally significant specialist collections of African insects (particularly dipterous flies and hangingflies), arachnids, molluscs, oligochaetes and cultural history. Since 1906 it has also published academic journals that are currently named "African Invertebrates" and "Southern African Humanities" and available on-line. Jason Londt was only the Museum's sixth Director in a century.

Starting in 1976, Jason's taxonomic research career focused on true flies (Diptera), particularly robber flies (Asilidae) and hangingflies (Mecoptera, Bittacidae) (Guest 2006; Londt 2006). However, he regularly accumulated specimens of other groups as by-catch during field trips. One such group is the cicadas, true hemipterous bugs of the family Cicadidae that are known for their males' conspicuous mating songs. Many of these specimens were adventitious captures, but a few resulted from capturing robber flies with their prey (Londt 2006).

This article reviews the cicada species deposited in the KwaZulu-Natal Museum by Jason, one of which is illustrated in Fig. 1.

Materials and methods

The cicada specimens in the KwaZulu-Natal Museum (**KZNM**) collection were determined by the author and their sexes noted. Metadata from the KwaZulu-Natal Museum's database were transcribed to appropriate fields in a spreadsheet and augmented with details from the specimens' labels as necessary. Other missing information was inferred through reference to the specimens' KZNM collecting event codes.

Some collectors' names that were missing from the Museum's database were inferred through the associated KZNM collecting event code, and all of these names were reviewed for completeness and consistency of initials and spelling (where possible).

The locality data were reviewed to locate the sites with appropriate precision. Where the geocoordinates of a locality were not specified on a specimen's label, the metadata of conspecific specimens from the same nominal site were consulted (on the basis that this would avoid creating spurious sites); if this produced no solution, the metadata of other species caught by the same collector were consulted (on the basis that collectors usually use locality names consistently and rarely collect over large areas in short periods). The remaining localities were attributed the geocoordinates associated with the sites' names as they appear on Google Earth (http://earth.google.com) if the identities of the taxon and the collector made them plausible. Unless a label specified a finer precision, locations were estimated to the nearest minute (~1.6 km at South African latitudes) and converted to decimal degrees with three significant decimal places, which is adequate for mapping at the national

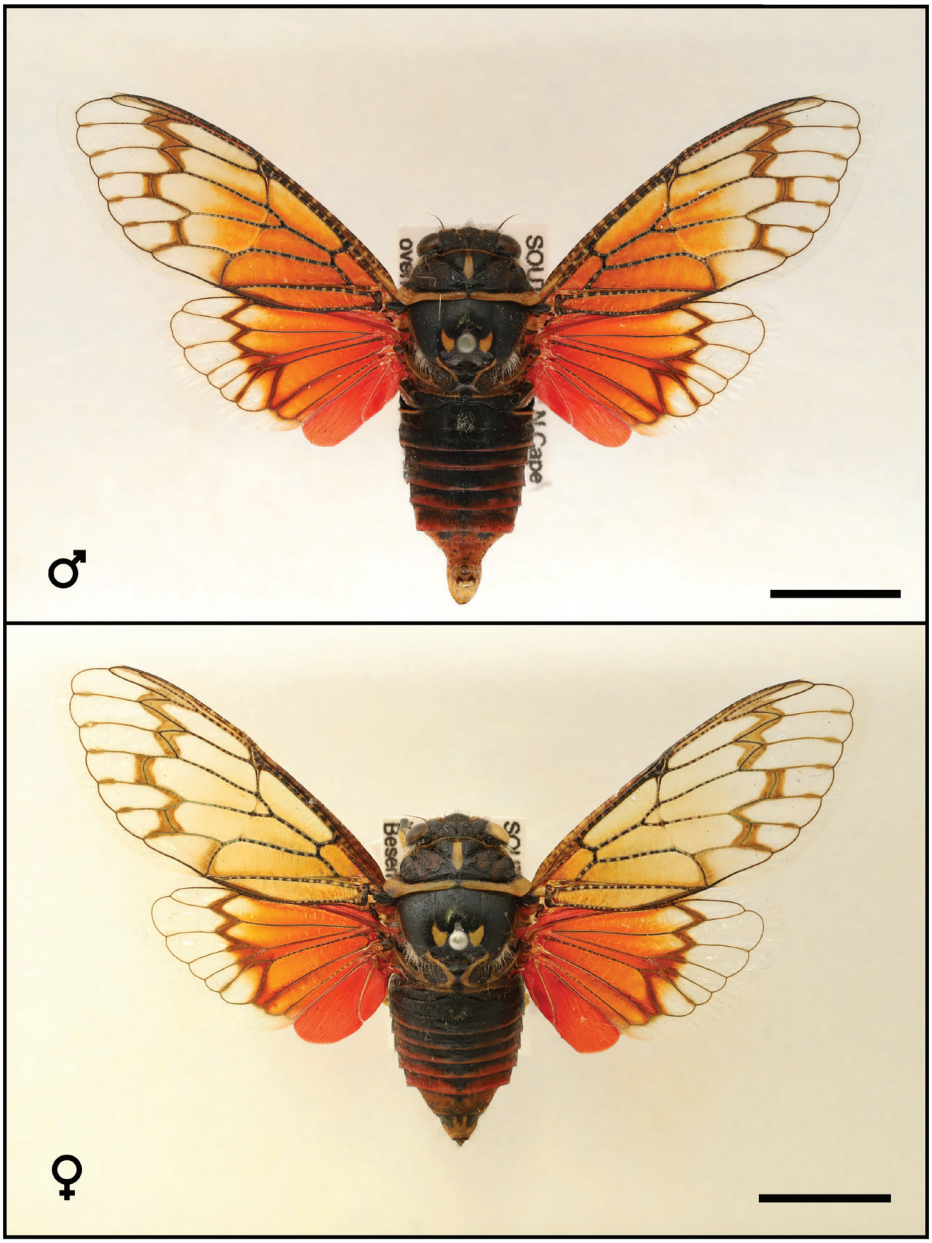

Figure 1. Male (NMSA-HEM 017489) and female (NMSA-HEM 017491) of *Quintilia aurora* (Walker, 1850) in the KwaZulu-Natal Museum collection, collected by Jason Londt in 2011, about 2 km W of Sutherland, Northern Cape. Scale bars: 10 mm. Photographs by kind courtesy of Terence Bellingan.

scale. Localities were viewed using Google Earth to affirm their plausibility (e.g., that they were not at sea).

The resulting spreadsheet was used to map the localities and to compile statistics on the collection.

Results and discussion

The collection contains 51 male and 22 female specimens from a total of 28 species, placed in five tribes and three subfamilies (Tables 1, 2). This represents most of the family-level taxa in Africa (Marshall et al. 2018) and 22.3% (74/332) of the cicada specimens in the museum. Cicadas are generally small or well camouflaged to avoid predation, but collectors (and predators) can locate males by their mating calls, which make them easier to find. Female cicadas are harder to find, but may be noticed when they are flying towards males or if (in a very few species of Platypleurini) they are attracted to lights at night. The high proportion of females in this sample is therefore a notable collecting effort for a taxon that was not Jason's research focus. In the rest of the KZNM cicada collection, the sex ratio is 139♂♂:110 ♀♀ (perhaps due to large numbers of female Platypleurini that may be attracted to lights). The majority of the specimens bear only Jason's name, but one specimen's label also bears his wife's name ("J & A. Londt"); Clive Quickleberg (1 specimen) and Torsten Dikow (4 specimens) are also credited with co-captures.

Fifteen of the specimens are predation records. These records are comparatively rich in male specimens of *Zouga*, a genus that is challenging for entomologists to sample because the cryptically-coloured, clear-winged males call intermittently while flying (making them especially hard to locate) and fly rapidly and erratically (making them hard for humans to catch; pers. obs.). It is also surprising that all but one of the records are of male cicadas (binomial probability, $p < 0.05$). Perhaps the relatively lighter body mass of males (due to the large abdominal air sacs associated with their calling organs) makes them easier to subdue than conspecific females. Londt (2006) has already noted that the predators are more usually females. Londt (2006) mentions 22 other records of cicadas (including two more of *Stagira* and eleven more of *Melampsalta*) as prey of robber flies, but some of these may originate from publications, e.g. Hobby's (1935) records (Londt 2006).

The earliest specimen, a prey item of *Microstylum* sp., was collected in 1977 (Table 2), and the first independent specimen was collected in January 1987, just before the author started to describe new species of cicada from South Africa (Villet 1987); the most recent specimen was caught in November 2019 (Table 1). These records start soon after Jason was employed in 1976 (Londt 2006) and represent 24 years (and at least 26 excursions) out of his 34 years of collecting.

The localities are generally well documented on the labels, although a few were refined from collecting event numbers and background knowledge. The sites are mostly in KwaZulu-Natal, but include records from five other South African provinces (Fig. 2) and a specimen from Malawi. The metadata in Tables 1, 2 provide a limited gazetteer of Jason's collecting sites. Such gazetteers are useful in tracing the activities of collectors and fixing type localities (e.g. Dean et al. 2022).

In summary, Jason is responsible for collecting almost a quarter of the Museum's holdings of Cicadidae, including a strong sample of females, and probably the best set of records of predation on cicadas by robber flies in Africa.

Table 1. Metadata associated with specimens of Cicadidae in the KwaZulu-Natal Museum collected by Jason Londt. The metadata are not verbatim transcriptions of the specimens' labels (see methods).

Species	Metadata
TETTIGOMYIINAE	
Tettigomyiini	
Stagira sp.	1♀; Limpopo, Happy Rest Nature Reserve; 23.015°S, 29.726°E; alt. 947 m; 15 Feb 2005; J.G.H. Londt leg.; NMSA: NMSA-HEM 017512
Stagira natalensis	1♀; KwaZulu-Natal, Umfolozi Game Reserve, Emoyeni Trail area; 28.319°S, 31.838°E; alt. 254 m; 10 Mar 2004; J.G.H. Londt leg.; NMSA: NMSA-HEM 017517
	1♀; KwaZulu-Natal, Umfolozi Game Reserve, Emoyeni Trail area; 28.319°S, 31.838°E; alt. 254 m; 10 Mar 2004; J.G.H. Londt leg.; NMSA: NMSA-HEM 017518
Stagira zuluensis	1♂; KwaZulu-Natal, Umfolozi Game Reserve, Emoyeni Trail area; 28.319°S, 31.838°E; alt. 254 m; 10 Mar 2004; J.G.H. Londt leg.; NMSA: NMSA-HEM 017516
Anopercalnini	
Quintilia aurora	1♂; Northern Cape, c. 2 km W of Sutherland; 32.388°S, 20.651°E; alt. 1515 m; 18 Nov 2011; J.G.H. Londt leg.; NMSA: NMSA-HEM 017489
	1♀; Northern Cape, c. 31 km N of Sutherland; 32.189°S, 20.601°E; alt. 1625 m; 18 Nov 2011; J.G.H. Londt leg.; NMSA: NMSA-HEM 017491
	1♂; Northern Cape, Renoster River, 18km N of Sutherland; 32.254°S, 20.695°E; alt. 1320 m; 19 Nov 2008; J.G.H. Londt leg.; NMSA: NMSA-HEM 017499
Quintilia carinata	1♀; KwaZulu-Natal, Queen Elizabeth Park Reserve; 29.567°S, 30.321°E; alt. 900 m; 11 Apr 2004; J.G.H. Londt leg.; NMSA: NMSA-HEM 017519
	1♂; KwaZulu-Natal, Springside Natural Reserve; 29.782°S, 30.776°E; alt. 630 m; 8 Jan 2013; J.G.H. Londt leg.; NMSA: NMSA-HEM 017529
	1♀; KwaZulu-Natal, Cobham Forest Reserve; 29.697°S, 29.409°E; alt. 1625 m; 8 Apr 2013; J.G.H. Londt leg.; NMSA: NMSA-HEM 017530
Quintilia cf. *carinata*	1♂; KwaZulu-Natal, Garden Castle Nature Reserve; 29.753°S, 29.197°E; alt. 1750 m; 11 Apr 2009; J.G.H. Londt leg.; NMSA: NMSA-HEM 017502
	1♂; KwaZulu-Natal, Injasuthi Nature Reserve; 29.116°S, 29.434°E; alt. 1520 m; 21 Mar 2013; J.G.H. Londt leg.; NMSA: NMSA-HEM 017527
	1♂; KwaZulu-Natal, Injasuthi Nature Reserve; 29.116°S, 29.434°E; alt. 1520 m; 21 Mar 2013; J.G.H. Londt leg.; NMSA: NMSA-HEM 017528
	1♂; KwaZulu-Natal, Royal Natal National Park; 28.683°S, 28.983°E; alt.; 18 Mar 1989; J.G.H. Londt leg.; NMSA: NMSA-HEM 017604
	1♂; KwaZulu-Natal, Royal Natal National Park, Tiger Falls area; 28.683°S, 28.983°E; alt. 1500 m; 9 Apr 2001; J.G.H. Londt leg.; NMSA: NMSA-HEM 017605
	1♂; KwaZulu-Natal, Royal Natal National Park; 28.683°S, 28.933°E; alt. 1440 m; 23 Mar 1991; J.G.H. Londt leg.; NMSA: NMSA-HEM 027002
	1♀; KwaZulu-Natal, Royal Natal National Park; 28.683°S, 28.933°E; alt. 1440 m; 23 Mar 1991; J.G.H. Londt leg.; NMSA: NMSA-HEM 027003
	1♀; KwaZulu-Natal, Royal Natal National Park; 28.683°S, 28.933°E; alt. 1440 m; 23 Mar 1991; J.G.H. Londt leg.; NMSA: NMSA-HEM 027004
	1♂; KwaZulu-Natal, Royal Natal National Park; 28.683°S, 28.933°E; alt. 1440 m; 23 Mar 1991; J.G.H. Londt leg.; NMSA: NMSA-HEM 027005
	1♂; KwaZulu-Natal, Royal Natal National Park; 28.683°S, 28.933°E; alt. 1440 m; 23 Mar 1991; J.G.H. Londt leg.; NMSA: NMSA-HEM 027006
	1♂; KwaZulu-Natal, Royal Natal National Park; 28.683°S, 28.933°E; alt. 1440 m; 23 Mar 1991; J.G.H. Londt leg.; NMSA: NMSA-HEM 027007
	1♂; KwaZulu-Natal, Royal Natal National Park; 28.683°S, 28.933°E; alt. 1440 m; 23 Mar 1991; J.G.H. Londt leg.; NMSA: NMSA-HEM 027008
Quintilia sp. 2	1♂; KwaZulu-Natal, Garden Castle Nature Reserve; 29.753°S, 29.197°E; alt. 1750 m; 11 Apr 2009; J.G.H. Londt leg.; NMSA: NMSA-HEM 017495
	1♀; KwaZulu-Natal, Garden Castle Nature Reserve; 29.753°S, 29.197°E; alt. 1750 m; 11 Apr 2009; J.G.H. Londt leg.; NMSA: NMSA-HEM 017498
CICADINAE	
Platypleurini	
Dyticopycna natalensis	1♂; KwaZulu-Natal, Itala Game Reserve, Mbiso Camp; 27.517°S, 31.2°E; alt. 750 m; 4 Nov 1997; J.G.H. Londt leg.; NMSA: NMSA-HEM 017545

Species	Metadata
Dyticopycna semiclara	1♀; KwaZulu-Natal, Karkloof Nature Reserve; 29.311°S, 30.212°E; alt. 1392 m; 17 Jan 2004; J.G.H. Londt leg.; NMSA: NMSA-HEM 017505
	1♂; KwaZulu-Natal, Pietermaritzburg, National Botanical Gardens; 29.603°S, 30.346°E; alt. 741 m; 11 Jan 2004; J.G.H. Londt leg.; NMSA: NMSA-HEM 017513
Orapa numa	1♂;, Ntchisi Forest Reserve; 13.375°S, 34.004°E; 24 Feb 1987; J.G.H. Londt leg.; NMSA: NMSA-HEM 019184
Oxypleura polydorus	1♀; KwaZulu-Natal, Umlalazi Nature Reserve, Mangrove and Forest trails; 28.961°S, 31.768°E; alt. 20 m; 23 Jan 2012; J.G.H. Londt leg.; NMSA: NMSA-HEM 017492
Kongota punctigera	1♂; KwaZulu-Natal, Kosi Bay Nature Reserve, Ugudu Lodge area; 26.958°S, 32.827°E; alt. 20 m; 8 Oct 2011; J.G.H. Londt leg.; NMSA: NMSA-HEM 017506
	1♂; KwaZulu-Natal, Umlalazi Nature Reserve; 28.95°S, 31.667°E; 26 Jan 1987; J.G.H. Londt leg.; NMSA: NMSA-HEM 019146
	1♀; KwaZulu-Natal, Umlalazi Nature Reserve; 28.95°S, 31.667°E; alt. 20 m; 28 Jan 1988; J.G.H. Londt leg.; NMSA: NMSA-HEM 019160
Platypleura bulteri	1♂; KwaZulu-Natal, Kosi Bay Nature Reserve; 26.955°S, 32.824°E; alt. 80 m; 18 Feb 2011; J.G.H. Londt leg.; NMSA: NMSA-HEM 017508
Platypleura divisa	1♀; KwaZulu-Natal, Ithala Game Reserve, Ntshondwe resort area; 27.544°S, 31.282°E; alt. 1010 m; 18 Jan 2012; J.G.H. Londt leg.; NMSA: NMSA-HEM 017493
	1♂; KwaZulu-Natal, Pietermaritzburg; 29.582°S, 30.359°E; alt. 745 m; 6 Jan 2012; J.G.H. Londt leg.; NMSA: NMSA-HEM 017494
	1♂; KwaZulu-Natal, Thobeka Lodge, 4km NE Manguzi; 26.961°S, 32.78°E; alt. 84 m; 10 Dec 2010; J.G.H. Londt leg.; NMSA: NMSA-HEM 017503
	1♀; KwaZulu-Natal, Thobeka Lodge, 4km NE Manguzi; 26.961°S, 32.78°E; alt. 85 m; 18 Feb 2011; J.G.H. Londt leg.; NMSA: NMSA-HEM 017533
	1♂; KwaZulu-Natal, Pietermaritzburg, Athlone; 29.582°S, 30.359°E; alt. 960 m; 31 Dec 1999; J.G.H. Londt leg.; NMSA: NMSA-HEM 017561
	1♀; KwaZulu-Natal, Entumeni Nature Reserve; 28.876°S, 31.382°E; 26 Jan 1988; J.G.H. Londt leg.; NMSA: NMSA-HEM 019223
Platypleura haglundi	1♂; North West, Pilanesberg National Park, Bakubung Camp; 25.344°S, 27.057°E; alt. 1170 m; 12 Nov 1999; J.G.H. Londt leg.; NMSA: NMSA-HEM 017537
	1♂; KwaZulu-Natal, Umlalazi Nature Reserve; 28.95°S, 31.667°E; alt. 20 m; 28 Jan 1988; J.G.H. Londt leg.; NMSA: NMSA-HEM 017576
Platypleura hirtipennis	1♀; KwaZulu-Natal, Cumberland Nature Reserve, near The Point; 29.513°S, 30.522°E; alt. 660 m; 3 Feb 2002; J.G.H. Londt leg.; NMSA: NMSA-HEM 017538
Platypleura maytenophila	1♂; KwaZulu-Natal, Umlalazi Nature Reserve, Mangrove and Forest trails; 28.961°S, 31.768°E; alt. 20 m; 23 Jan 2012; J.G.H. Londt leg.; NMSA: NMSA-HEM 017507
	1♀; KwaZulu-Natal, Umlalazi Nature Reserve, Mangrove and Forest trails; 28.961°S, 31.768°E; alt. 20 m; 23 Jan 2012; J.G.H. Londt leg.; NMSA: NMSA-HEM 017509
	1♀; KwaZulu-Natal, Umlalazi Nature Reserve, Mangrove and Forest trails; 28.961°S, 31.768°E; alt. 20 m; 23 Jan 2012; J.G.H. Londt leg.; NMSA: NMSA-HEM 017510
	1♂; KwaZulu-Natal, Umlalazi Nature Reserve; 28.95°S, 31.767°E; alt. 50 m; 8 Nov 1997; J.G.H. Londt leg.; NMSA: NMSA-HEM 017544
	1♂; KwaZulu-Natal, Harold Johnson Nature Reserve; 29.2°S, 31.417°E; alt. 100 m; 3 Feb 1988; J.G.H. Londt leg.; NMSA: NMSA-HEM 019173
CICADETTINAE	
Parnisini	
Zouga sp. 1	1♂; Northern Cape, c. 31 km N of Sutherland; 32.189°S, 20.601°E; alt. 1625 m; 18 Nov 2011; J.G.H. Londt leg.; NMSA: NMSA-HEM 017487
	1♂; Northern Cape, c. 31 km N of Sutherland; 32.189°S, 20.601°E; alt. 1625 m; 18 Nov 2011; J.G.H. Londt leg.; NMSA: NMSA-HEM 017488
	1♂; Northern Cape, c. 18 km N of Sutherland; 32.253°S, 20.695°E; alt. 1355 m; 14 Nov 2011; J.G.H. Londt leg.; NMSA: NMSA-HEM 017490
Zouga sp. 3	1♂; Western Cape, Bottom Ouberg Pass 54 km SE Sutherland; 32.401°S, 20.294°E; alt. 640 m; 21 Nov 2008; J.G.H. Londt leg.; NMSA: NMSA-HEM 017497
Zouga sp. 4	1♀; Eastern Cape, Graaff-Reinet Karoo Nature Reserve; 32.267°S, 24.493°E; alt. 1360 m; 26 Oct 2004; J.G.H. Londt leg.; NMSA: NMSA-HEM 017511

Species	Metadata
Zouga sp. 5	1♂; Northern Cape, c. 5 km E Augrabies Falls National Park's main gate; 28.621°S, 20.276°E; alt. 670 m; 4 Feb 2004; J.G.H. Londt leg.; NMSA: NMSA-HEM 017520
Cicadettini	
Afromelampsalta leucoptera	1♂; KwaZulu-Natal, Hilton, Jacana Eco Estate; 29.543°S, 30.294°E; 19 Nov 2019; J.G.H. Londt leg.; NMSA: NMSA-HEM 027009
Buyisa umtatae	1♀; KwaZulu-Natal, Pietermaritzburg, Bisley Valley Nature Reserve; 29.659°S, 30.392°E; alt. 715 m; 10 Jan 2004; J.G.H. Londt & T. Dikow leg.; NMSA: NMSA-HEM 017514
	1♂; KwaZulu-Natal, Pietermaritzburg, Bisley Valley Nature Reserve; 29.659°S, 30.392°E; alt. 715 m; 10 Jan 2004; J.G.H. Londt & T. Dikow leg.; NMSA: NMSA-HEM 017515
	1♂; KwaZulu-Natal, Pietermaritzburg, Hesketh Conservation area; 29.619°S, 30.429°E; alt. 676 m; 10 Jan 2004; J.G.H. Londt & T. Dikow leg.; NMSA: NMSA-HEM 017521
	1♂; KwaZulu-Natal, Pietermaritzburg, Hesketh Conservation area; 29.619°S, 30.429°E; alt. 676 m; 10 Jan 2004; J.G.H. Londt & T. Dikow leg.; NMSA: NMSA-HEM 017522

Table 2. Metadata associated with asillid predation records in the KwaZulu-Natal Museum involving Cicadidae and largely collected by Jason Londt. The metadata are not verbatim transcriptions of the specimens' labels (see methods). The flies' identifications were determined by Londt (Londt 2006).

Cicada prey	Asilid predator	Metadata
TETTIGOMYIINAE		
Tettigomyiini		
Stagira dracomontana	*Microstylum* sp.	1♂; KwaZulu-Natal, Royal Natal National Park; 28.733°S, 28.917°E; 6 Dec 1984; J.G.H. Londt & leg.; NMSA: NMSA-DIP 067085
CICADETTINAE		
Parnisini		
Koranna sp.	*Neolophonotus louisi*	1♂; Northern Cape, Akkerendam Nature Reserve, 1 km N Calvinia; 31.451°S, 19.778°E; alt. 1050 m; 14 Nov 2008; J.G.H. Londt & A. Londt leg.; NMSA: NMSA-DIP 067098
Zouga sp. 1	*Microstylum* sp.	1♂; Northern Cape, Swartkop 31 km NW Sutherland; 32.2°S, 20.6°E; alt. 1600 m; 18 Nov 1986; J.G.H. Londt & C. Quickleberg leg.; NMSA: NMSA-DIP 005287
	Microstylum sp.	1♂; Northern Cape, Sutherland, 18km N; 32.267°S, 20.683°E; alt. 1350 m; 26 Nov 1990; J.G.H. Londt & leg.; NMSA: NMSA-DIP 005352
	Microstylum sp.	1♂; Northern Cape, Akkerendam Nature Reserve, 1 km N Calvinia; 31.449°S, 19.773°E; alt. 1260 m; 9 Nov 1998; J.G.H. Londt & leg.; NMSA: NMSA-DIP 005375
	Microstylum sp.	1♂; Northern Cape, Sutherland, 30km NW; 32.2°S, 20.6°E; alt. 1600 m; 27 Nov 1990; J.G.H. Londt & leg.; NMSA: NMSA-DIP 067086
Zouga sp. 2	*Promachus* sp,	1♂; KwaZulu-Natal, Josephine Bridge; 30°S, 30.233°E; 20 Dec 1984; J.G.H. Londt & leg.; NMSA: NMSA-DIP 025380
	Promachus sp,	1♂; KwaZulu-Natal, Josephine Bridge; 30°S, 30.233°E; 20 Dec 1984; J.G.H. Londt & leg.; NMSA: NMSA-DIP 067088
Cicadettini		
Afromelampsalta leucopera	*Microstylum* sp.	1♂; KwaZulu-Natal, Royal Natal National Park; 28.733°S, 28.917°E; 6 Dec 1984; J.G.H. Londt & leg.; NMSA: NMSA-DIP 005012
	Microstylum sp.	1♀; KwaZulu-Natal, Eshowe, Dlinza Forest Reserve; 28.883°S, 31.45°E; alt. 450 m; 6 Dec 1977; J.G.H. Londt & leg.; NMSA: NMSA-DIP 005053
Ingcainyenzane umgeniensis	*Dasophrys nigroflavipes*	1♂; KwaZulu-Natal, Bishopstowe, near Pietermaritzburg; 29.571°S, 30.467°E; 11 Feb 1981; J.G.H. Londt & leg.; NMSA: NMSA-DIP 001176
Ingcainyenzane sp.	*Promachus* sp.	1♂; KwaZulu-Natal, Josephine Bridge; 30°S, 30.233°E; 20 Dec 1984; J.G.H. Londt & leg.; NMSA: NMSA-DIP 067087
	Promachus sp.	1♂; Eastern Cape, 47 km SW Matatiele; 30.333°S, 28.8°E; 8 Jan 1979; J.G.H. Londt & leg.; NMSA: NMSA-DIP 025531
Buyisa sp.	*Promachus* sp.	1♂; Northern Cape, Sutherland, 30km NW, near Besemgoedkop; 32.2°S, 20.6°E; alt. 1600 m; 27 Nov 1990; J.G.H. Londt & leg.; NMSA: NMSA-DIP 025328

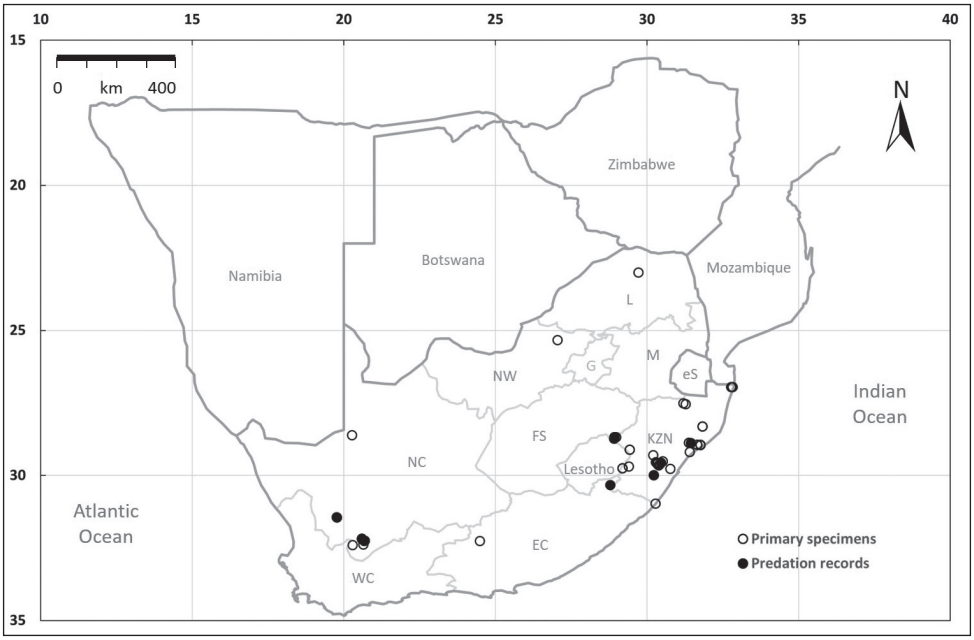

Figure 2. Map of Jason Londt's collecting sites of the KwaZulu-Natal Museum's (white circle) primary specimens of Cicadidae and (black circle) predation records involving Cicadidae. Abbreviations: EC – Eastern Cape; eS -eSwatini; FS – Free State; G – Gauteng; KZN – KwaZulu-Natal; L – Limpopo; M – Mpumalanga; NC – Northern Cape; NW -North West; WC – Western Cape.

Acknowledgements

Warm thanks are extended to Jason for collecting the specimens that made this study possible, and which has advanced knowledge of the Cicadidae of southern Africa. Thanks are also directed to John Midgley for the opportunity and encouragement to contribute this work, to Kirstin Williams, Mandisa Ndlovu and Terence Bellingan for arranging the loan of the material (loan numbers E7 2021 and E8 2021); to Terence Bellingan for providing Fig. 1; and to Adilson Pinedo-Escatel for his useful comments about the manuscript.

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Supplementary material 1

Londt Cicadidae - specimen metadata

Authors: Martin H. Villet

Data type: Occurrences

Explanation note: Spreadsheet of collecting sites and metadata.

Link: https://doi.org/10.3897/AfrInvertebr.64.100851.suppl1

African Invertebrates 64(2): 95–107 (2023)
doi: 10.3897/AfrInvertebr.64.85542
https://africaninvertebrates.pensoft.net

RESEARCH ARTICLE

African Invertebrates
A journal of biodiversity research

Notes on the *Bittacus* (Mecoptera, Bittacidae) of Mozambique, with the description of a new species

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Academic editor: Torsten Dikow | Received 19 April 2022 | Accepted 16 June 2022 | Published 5 May 2023

https://zoobank.org/20980566-544C-4F23-9686-0E70470A2ADE

Citation: Midgley JM, Bellingan TA (2023) Notes on the *Bittacus* (Mecoptera, Bittacidae) of Mozambique, with the description of a new species. In: Dikow T, Williams K, Midgley J (Eds) Festschrift for Jason Gilbert Hayden Londt. African Invertebrates 64(2): 95–107. https://doi.org/10.3897/AfrInvertebr.64.85542

Abstract

A new species of *Bittacus* Latreille, 1805 is described based on two specimens from Gorongosa National Park in Mozambique. *Bittacus londti* **sp. nov.** is the second known Afrotropical *Bittacus* with a femoral bulla and brings the number of species known from Mozambique to four. A distribution map for these species is provided.

Keywords

Biodiversity, distribution records, hangingflies

Introduction

The order Mecoptera is a relatively small group of insects, represented by a single family in the Afrotropics, the Bittacidae. There are currently three genera in the region, the monotypic *Anomalobittacus* Kimmins, 1928 and *Afrobittacus* Londt, 1994 and the remaining 51 species in the cosmopolitan *Bittacus* Latreille, 1805. While *Bittacus* can be common, adults often only fly for short periods, meaning that many regional lists underestimate the true species richness and so opportunities for expanding our knowledge exist in many regions.

Most studies on Afrotropical *Bittacus* are historical (see Londt 1972a, b, 1978, 1981, 1993, 1994, 1995, 2001; Londt and van Noort 1999) and modern descriptions are needed. Recently, new Bittacidae have been described from the Neotropical (Machado 2019) and the Oriental (Tan and Hua 2009a, b; Zhang et al. 2020) regions. Our knowledge of the Afrotropical fauna is likely to be incomplete, and collecting is likely to generate new distribution records and undescribed species.

To date, only three species of *Bittacus* (*Bittacus nebulosus* Klug, 1938, *Bittacus weelei* Esben-Petersen, 1913 and *Bittacus zambezinus* Navás, 1931) (Fig. 1) have been positively recorded from Mozambique (Londt 1972b, 1994; Londt and van Noort 1999). This number is fewer than most surrounding countries (Tanzania: nine, Malawi: eight, Zambia: five, Zimbabwe: eight, South Africa: 21) (Londt 1994), suggesting that Mozambique offers significant opportunities for further research.

We describe a new species of *Bittacus* from the Afrotropics, based on male and female specimens from Gorongosa National Park, Mozambique.

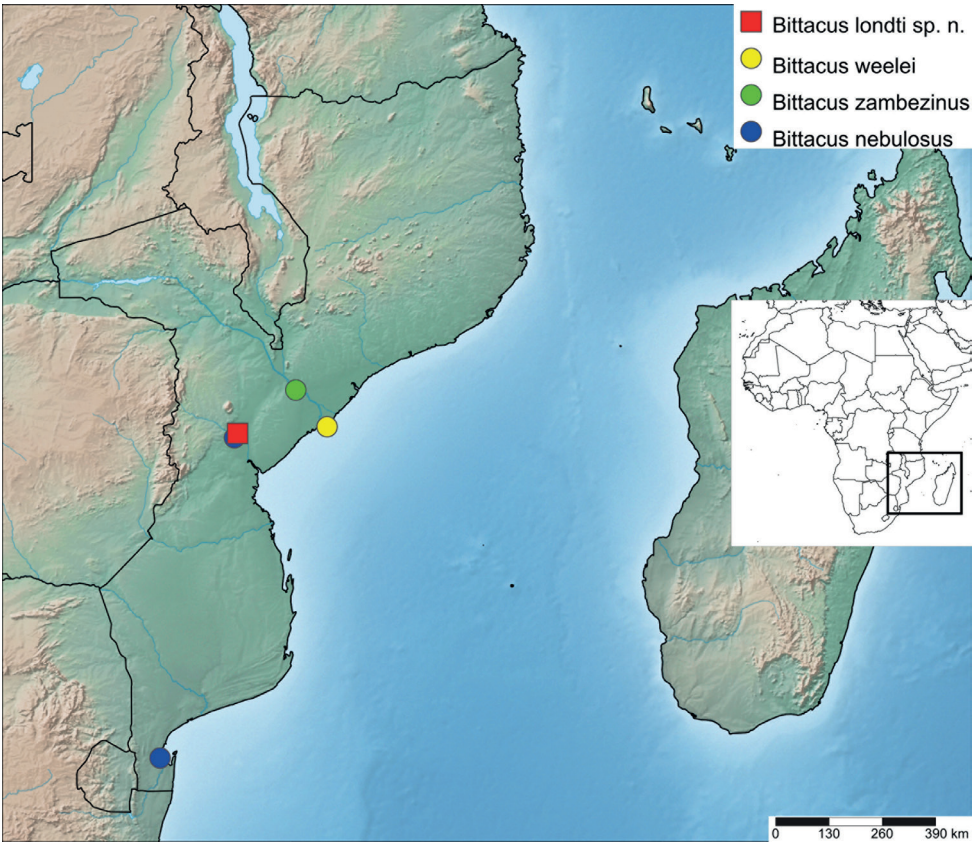

Figure 1. Known distribution records of Mozambican *Bittacus*.

Materials and methods

Study material

Material from the new species was obtained from the Iziko South African Museum, Cape Town, South Africa (**SAMC**). Comparative material from the KwaZulu-Natal Museum, Pietermaritzburg, South Africa (**NMSA**) was also studied.

Morphology

Terminology mostly follows Willman (1983). Morphological observations were made using a Leica M80 stereomicroscope. Digital images of the whole specimen were captured using a CANON 600D with a 100 mm macro lens. The open source software Digicam Controller (http://digicamcontrol.com/) was used to take images across the depth of field of the specimens. Images of the genitalia were captured using a Zeiss Axio Zoom.V16 microscope with an AxioCam ICc 5 camera and Zeiss Zen 2.3 Software. The images were stacked using Helicon Focus stacking software (https://www.heliconsoft.com) and edited in Adobe Photoshop 22.1.1. Line drawings of the wing venation were made in Adobe Illustrator 26.3.1. As the forewings of the holotype are damaged from being stored in ethanol, a composite of both wings was drawn.

Distribution records

Published records were obtained from the literature (Londt 1972b, 1994; Londt and van Noort 1999). The Global Biodiversity Information Facility (www.gbif.org) and iNaturalist (https://www.inaturalist.org/) were checked for additional records from Mozambique. The distribution map was prepared using the website SimpleMappr (www.simplemappr.net) and edited in Adobe Photoshop 22.1.1.

Results

Taxonomy

***Bittacus* Latreille, 1805**

Bittacus Latreille, 1805: 20. Type species: *Panorpa italicus* Muller, 1766.
Leptobillacus Hine, 1898: 108. Type species: *Bittacus strigosus* Hagen, 1861.
Diplostigma Navas, 1908: 413. Type species: *Bittacus sinensis* Walker, 1853.
Haplodictyus Navas, 1908: 413. Type species: *Haplodictyus pobeguini* Navas, 1908.
Klugius Navas, 1926: Type species: *Bittacus flavescens* Klug, 1836.

Bittacus londti **Midgley, sp. nov.**
https://zoobank.org/BF1BCB64-9873-4216-A315-964BD40EC0CA
Figs 2–10

Material examined. ***Holotype*** (Figs 2–5, 9, 10) Mozambique • 1 ♂; Sofala Province, Gorongosa National Park, Palm forest site 1, 18°59.518'S, 34°19.153'E; 40 m a.s.l.;10–20 Mar. 2017; S. van Noort & M. Buffington leg.; Malaise trap; Closed Palm Forest; Site code: GOR17-PALM1-M05; SAM-MEC-A000068.

Paratype (Figs 6–8) Mozambique • 1 ♀; Sofala Province, Gorongosa National Park, Palm forest site 1, 18°59.518'S, 34°19.153'E; 40 m a.s.l.;10–20 Mar. 2017; S. van Noort & M. Buffington leg.; Malaise trap; Closed Palm Forest; Site code: GOR17-PALM1-M05; SAM-MEC-A000069.

Diagnosis. *Bittacus londti* sp. nov. can be distinguished from other Afrotropical *Bittacus* (except *Bittacus bullatus* Londt, 1972b) by the bulla on the hind femur of males. The following characters permit differentiation from *B. bullatus*: *B. londti* has the femoral expansion situated more distally; a shorter pterostigma and smaller body size. Additionally, in the lateral view, *B. bullatus* has a pointed epandrium with a basodorsal projection (Londt 1972b fig. 23) while *B. londti* has a blunt epandrium without a basodorsal projection (Fig. 9). In the dorsal view, the epandrium is wide apically in *B. bullatus* (Londt 1972b fig. 24) and narrow in *B. londti* (Fig. 10). In the keys provided in Londt (1972b; 1978), this species keys as *Bittacus kunenensis* Wood 1933, but can be distinguished by the femoral bulla in the male.

Description. Measurements: Wing lengths: fore = 12.6 – 13.2 mm; hind = 11.5–11.8 mm.

Head (Figs 2–4, 6–8). Head light brown, except ocellar triangle dark brown to black; with yellowish pubescence, which is longer on the bottom half of the head and shorter above. Three distinct ocelli, lateral ocelli slightly larger (diameter approx. 1.15 times) than median. Antennae long, filiform, light brown with slightly darker pubescence. At least 15 flagellomeres in male (antennae broken), 18 in female.

Thorax (Figs 2–4, 6–8). Light brown on tergum, pale on pleuron and sternum, with yellowish pubescence. Antepronotum with one or two brown setae on lateral margins, postpronotum with yellow pubescence, but no setae. Mesonotum and metanotum with scutellum slightly paler, with scattered black setae. With ten small light brown setae and one large darker seta on basalare.

Legs (Figs 2–4, 6–8). Coxae pale, trochanters pale with dark margin to sulcus; with yellowish pubescence on both coxae and trochanters. Femur and tibia set with sparse short black setae. Femora pale, with dark apical tips. Fore- and mid- femur long, thin; hind femur in male with medial bulla with 16 to 18 short black setae. Tibia pale with dark apical tips, approx. as long as femora, with two long apical spurs; spurs about two thirds the length of the basitarsus in forelegs, about 3/4 the length of basitarsus in mid legs, one slightly shorter and one slightly longer than basitarsus in hind leg. Tarsi pale brown; male with fore- and mid- tarsi approx. the length of tibiae, hind tarsus slightly shorter length of hind tibia; female with all tarsi approx. the length of tibiae. Male tarsomere ratios: fore tarsus 5.1:2.0:1.4:1.1:1.0;

mid tarsus 5.5:2.5:1.7:1.3:1.0; hind tarsus 1.9:1.1:1.0:1.6:1.6; female tarsomere ratios: fore tarsus 4.9:2.1:1.3:1.1:1.0 mid tarsus 4.6:2.1:1.3:1.0:1.0 hind tarsus 3.8:1.3:1.0:1.7:1.7

Figure 2. Dorsal view of holotype male *Bittacus londti* sp. nov. (SAM-MEC A000068).

Figure 3. Frontal view of holotype male *Bittacus londti* sp. nov. (SAM-MEC A000068).

Wings (Figs 2–8). Narrow with apex rounded. Membrane pale brownish, pterostigma brown, 2.2 to 2.9 times longer than wide; thyridia present. Forewing: one subcostal crossvein; humeral crossvein present; Sc ending beyond first fork of Rs; Rs1+ 2 forking before end of pterostigma; Rs3+ 4 forking at level of mid distance between apex of Sc and pterostigma; one pterostigmal crossvein; M origin basal to Rs origin; M and Rs first forks at same level; Cu1 ending beyond apex of Sc; A1 ending level with origin of Rs. Hind wing similar to forewing, except Rs1+ 2 not forked in one wing on male, when present forking level with end of pterostigma; A1 ending beyond origin of Rs. In female, Rs3+ 4 forking closer to pterostigma than apex of Sc.

Abdomen (Figs 2–4, 6–8). Bearing yellowish pubescence. Pale brown, segments 1–3 with thin, dark apices.

Male terminalia (Figs 9, 10). pale brown, matching the abdomen, with yellowish pubescence. Epandrium in dorsal view: outer margins subparallel, inner margins evenly curved; internal margin with short brown setae on apical half; In lateral view: ending

Figure 4. Lateral view of holotype male *Bittacus londti* sp. nov. (SAM-MEC A000068).

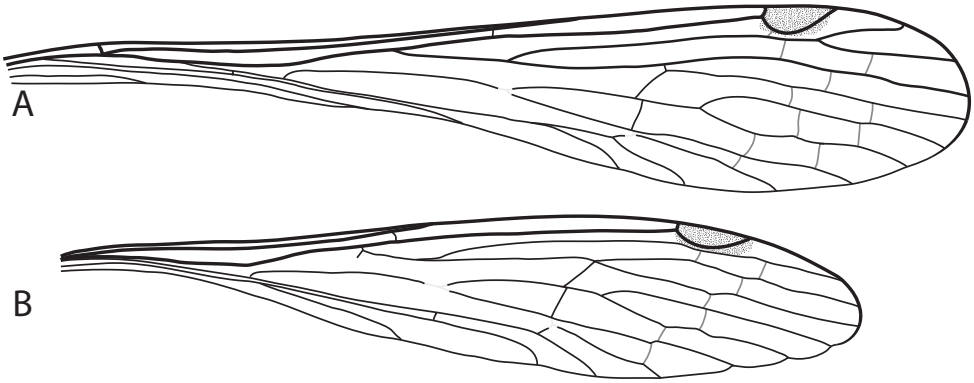

Figure 5. Wing venation of holotype male *Bittacus londti* sp. nov. **A** forewing, drawn from composite of left and right wing **B** left hindwing, digitally flipped. (SAM-MEC A000068).

Figure 6. Dorsal view of paratype female *Bittacus londti* sp. nov. (SAM-MEC A000067).

Figure 7. Frontal view of paratype female *Bittacus londti* sp. nov. (SAM-MEC A000067).

Figure 8. Lateral view of paratype female *Bittacus londti* sp. nov. (SAM-MEC A000067).

Figure 9. Dorsal view of the genitalia of holotype male *Bittacus londti* sp. nov. (SAM-MEC A000068).

Figure 10. Lateral view of the genitalia of holotype male *Bittacus londti* sp. nov. (SAM-MEC A000068).

level with end of basystilus; base and apex subequal in height, narrowed medially; dorsal corner of apical margin right angled, ventral corner rounded; in posterior view dorsal and ventral corners pointed internally, ventral point slightly larger, internal margin crescent shaped. Cercus approx. as long as sternite IX, light brown, with yellowish setae. Basystilus with yellowish pubescence, dorsal margin straight, ventral margin convex in lateral view. Gonostylus short, dark brown. Penisfilum broad at base, abruptly narrowed medially, tapering towards apex, curving backwards but not forming a complete coil.

Female terminalia. Cercus short, dark brown apically, with light brown setae. Subanal plate and tergite IX light-brown, with light-brown setae. Cercus, subanal plate extended beyond tergite IX. Gonocoxosternite light-brown, with light-brown setae which are darker near the posterior margin; fused ventrally.

Etymology. The species is named in honour of Dr Jason Londt, who has described over 25% of the Afrotropical Bittacidae, more than any other author.

Comments. The specimens were found in malaise trap samples and were mounted from ethanol. The wings are folded and legs could not be arranged neatly. The malaise trap was in a closed palm forest (Fig. 11).

Bittacus bullatus Londt, 1972

Material examined. South Africa • 2♂, 2♀; Mpumalanga, Sabie, Loerie Trail, Castlerock Camp area, 25°06'S, 30°46'E; 900 m a.s.l.; 07 Dec. 1997; J.G.H. Londt & A. Londt leg.; NMSA-Mec 000373, NMSA-Mec 000374, NMSA-Mec 000375, NMSA-Mec 000376

Bittacus testaceus Klug, 1838

Material examined. South Africa • 1♂; Mpumalanga, Sabie; -25.100566; 30.778525; 09 Jan. 1964; T.R.P. de Beer leg.; NMSA-Mec 000243

Species distributions

Bittacus londti is only known from the type locality (Fig. 1). The published Mozambican distribution records of *B. nebulosus*, *B. weelei* and *B. zambezinus* are shown in Fig. 1. No additional records from Mozambique were found on iNaturalist and a single record of *B. testaceus* was found on GBIF from "Sabie". The specimen is at the KwaZulu-Natal Museum and has been seen by the authors. The label has no country information. There are multiple specimens of other species with the same collector information (T.R.P. de Beer), all from South Africa. It therefore seems more likely that this record refers to the town of Sabie in Mpumalanga province, South Africa and not Sábiè in Província de Maputo, Mozambique. This agrees with Londt (1972b), who listed the Sabie record under "Transvaal".

Figure 11. In situ photograph of the malaise trap at the collection site and habitat of *Bittacus londti*. Photograph ©Simon van Noort (Iziko Museums of South Africa).

Discussion

The description of *B. londti* brings the number of *Bittacus* recorded from Mozambique to four and the number in the Afrotropics to 52. This is still a relatively low number for a country as large and diverse as Mozambique, and further collecting will almost certainly increase the number of species known from the country. Given this uncertainty, the keys provided by Londt (1972b, 1978) are still the most useful identification guides to the Mozambican *Bittacus* fauna, as augmented here.

While *B. londti* keys as *B. kunenensis* in these keys, confusion is unlikely as *B. kunenensis* is only known from northern Namibia and *B. londti* has an unmistakable femoral bulla. *Bittacus bullatus* has been recorded in South Africa about 100 km from Mozambique (though more than 700 km from Gorongosa) but confusion is unlikely as there are multiple morphological differences. The femoral bulla in *B. londti* and *B. bullatus* is without doubt an intriguing feature but it is unclear what role it plays in the biology of these species. Until further information comes to light suggestions on the utility of the bulla are speculative.

Beyond new country records and undescribed species, increased collecting in Mozambique will provide distribution information for the recorded species. To date, the four species known from Mozambique are known from only five collecting events (Fig. 1), clearly showing gaps in the knowledge of Mozambican *Bittacus*.

The suggestion that *B. testaceus* might occur in Mozambique (Londt 1994) was probably based on material from 'Sabie' a place name occurring both in South Africa and Mozambique (Londt pers. comm.). The record on GBIF appears to be an error, and until material confirming the presence of this species in Mozambique has been collected, *B. testaceus* should not be included in the Mozambican fauna.

Acknowledgements

We thank Simon van Noort, Aisha Mayekiso, Mujahid Hector and Zikhona Njeza for assistance during our visit to SAMC. Ms Kerry Hunter is thanked for assistance with photography. Dr Jason Londt is thanked for his comments and improvements on a draft of the manuscript. The visit to SAMC was funded by DIPoDIP (Diversity of Pollinating Diptera in South African biodiversity hotspots) which is financed by the Directorate-general Development Cooperation and Humanitarian Aid through the Framework agreement with KMMA.

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African Invertebrates 64(2): 109–138 (2023)
doi: 10.3897/AfrInvertebr.64.96577
https://africaninvertebrates.pensoft.net

RESEARCH ARTICLE

African Invertebrates
A journal of biodiversity research

Revision of the dune-associated stiletto flies of the genus *Neotherevella* Lyneborg, 1978 (Therevidae, Therevinae)

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Academic editor: Torsten Dikow | Received 21 October 2022 | Accepted 6 January 2023 | Published 5 May 2023

https://zoobank.org/BA0BC6F3-3865-4B66-AC04-6D06B5FCC385

Citation: Winterton SL, Irwin ME, Mortelmans J (2023) Revision of the dune-associated stiletto flies of the genus *Neotherevella* Lyneborg, 1978 (Therevidae, Therevinae). In: Dikow T, Williams K, Midgley J (Eds) Festschrift for Jason Gilbert Hayden Londt. African Invertebrates 64(2): 109–138. https://doi.org/10.3897/AfrInvertebr.64.96577

Abstract

The genus *Neotherevella* Lyneborg, 1978 is revised. Two new species are described from Morocco (*Neotherevella maroccanus* **sp. nov.**) and South Africa (*Neotherevella londti* **sp. nov.**), the latter named in honour of the South African Dipterist, Jason G.H. Londt.

Keywords

Asiloidea, Diptera, South Africa

Introduction

Stiletto flies (Therevidae) are found in all biogeographical major regions of world, but are particularly species-rich in Mediterranean and arid environments, where sandy soils are a preferred larval habitat (Holston 2005). In sandy regions, including coastal and desert dune systems, therevids are diverse with some genera specifically adapted to such habitats (Lyneborg 1968; Holston and Almeida 2020). One group of genera in the subfamily Therevinae appears to represent a monophyletic group of dune associates

and includes *Aristothereva* Frey, 1921, *Acantothereva* Séguy, 1935 and *Neotherevella* Lyneborg, 1978. This clade also contains genera that are frequently encountered in forest habitats with sandy soils, including *Acrosathe* Irwin & Lyneborg, 1981, *Irwiniella*, Lyneborg, 1976 and *Sinothereva* Winterton, 2020 (Holston et al. 2007; Winterton 2020). Moreover, adult stiletto flies associated with dune systems frequently have a peculiar set of morphological characteristics including pale vestiture composed of dense, erect, scale-like setae, small pulvilli, elongate tibial macrosetae and claws and opaque, white wings with dark maculation (Lyneborg 1968; Hauser and Irwin 2003; Holston 2009; Holston and Almeida 2020; Irwin and Winterton 2020, 2021). This morphological body type is seen in *Aristothereva*, *Acantothereva* and *Neotherevella*, but is also exhibited repeatedly in various distantly related genera in other subfamilies, presumably as an adaptation to living in arid, dune habitats (e.g. *Ammonaios* Irwin & Lyneborg, 1981, *Argolepida* Metz & Irwin in Metz et al. 2003, *Orthactia* Kröber, 1912a and some species of *Entesia* Oldroyd, 1968).

Neotherevella is a small genus with a wide distribution throughout the southern Palaearctic Region, as well as disparately in south-western Africa (Lyneborg 1978). With the inclusion of the two new species described herein, the genus contains five species, three in the Palaearctic and two in the Afrotropical Region. We describe two new species of *Neotherevella* from Morocco (*N. maroccanus* sp. nov.) and South Africa (*N. londti* sp. nov.). All species of *Neotherevella* are diagnosed and figured and a key to species presented.

Materials and methods

Terminology follows Cumming and Wood (2017) with additional therevid-specific genitalic morphology according to Winterton et al. (1999a, b). Genitalia were macerated in lactic acid or potassium hydroxide to remove soft tissue, then rinsed in distilled water (neutralised with acetic acid as needed) and dissected in 80% ethanol. Genitalia preparations were placed in glycerine in a genitalia vial and mounted on the pin beneath each specimen. Specimen images were taken at different focal points using a digital camera and subsequently combined into a serial montage image using Helicon Focus (HeliconSoft Ltd., Kharkiv, Ukraine). All new nomenclatural acts are registered in Zoobank (Pyle and Michel 2013). Descriptions were composed using a character matrix in Lucid Builder 3.5 (Identic Pty. Ltd., Brisbane, Australia) and exported as natural language descriptions in XML and text format. Some specimens have various data contained in a specimen database 'Mandala' (Kampmeier and Irwin 2009) and have unique numbers on separate yellow labels stating: "ME Irwin Therevidae Specimen # MEI99999". Geospatial coordinates, either included on the original collection label or approximated *a posteriori*, are listed in brackets. Collection depositories from which specimens were examined: American Museum of Natural History, New York, USA (AMNH); Canadian National Collection, Ottawa, Canada (CNC); California State Collection of Arthropods, Sacramento, USA (CSCA); The Natural History Museum,

London, United Kingdom (NHM); KwaZulu-Natal Museum, Pietermaritzburg, South Africa (NMSA); Royal Belgian Institute of Natural Sciences, Brussels, Belgium (RBINS); Senckenberg Natural History Museum, Frankfurt, Germany (SMF); Smithsonian National Museum of Natural History, Washington D.C., USA (USNM); Zoological Institute of Russian Academy of Sciences, St. Petersburg (ZISP); Museum für Naturkunde, Berlin, Germany (ZMHB).

Results

Neotherevella Lyneborg

Neotherevella Lyneborg, 1978: 75— Lyneborg (1980: 319 [catalogue]), (1989: 22 [catalogue]); Majer (1997: 527 [key]); Hauser et al. (2017: 1200 [key, synopsis]). Type species: *Thereva citrina* Becker, 1902: 35.

Neothereva Kröber, 1912b: 138, *sensu* Lyneborg (1976: 291), *nec* Kröber (1937: 276). Type species: *Thereva citrina* Becker, 1902: 35 [incorrect type species designation by Lyneborg (1976)].

Diagnosis. Extensive erect, white setae on head, body and legs; female frons wide, inner eye margins subparallel to slightly divergent; parafacial setae absent; hind coxal knob relatively minute or absent; elongate macrosetae on tibia and tarsi; series of anteroventral macrosetae on hind femur; wing opaque white with brown markings; male distiphallus narrow, short.

Description. Small to medium-sized flies extensively covered with erect, elongate pile. Head length and height subequal; frons flat, grey pubescent with pair of large matte black pubescent spots in female (rarely in male); vertex sunken (especially in female); inner margins of female eyes subparallel; gena rounded; male frons width variable, contiguous below anterior ocellus to wider than ocellar tubercle; frons width strongly sexually dimorphic; parafacial without setae; face flat; occiput pubescence dull silver to grey-brown, postocular ridge and occiput in both sexes with macrosetae few in number, single row or irregularly arranged; antenna shorter than to subequal to head length, positioned on lower half of head and directed anteriorly; flagellum shape variable, cylindrical (slightly tapered distally), elliptical or conical, length shorter than or subequal to combined scape and pedicel length, style apical; scape short, less than 3× pedicel length, cylindrical, noticeably thicker than pedicel and base of flagellum; palpus slender or crassate, mouthparts short. Thorax with central depression of prosternum setose; cervical sclerite lacking macroseta; pleuron with silver pubescence admixed with erect, filiform and lanceolate setae; metanepisternum with postspiracular setae present; metakatepisternum setae absent; scutum covered with lanceolate and filiform adpressed setae, often of variable length and white; scutal chaetotaxy (pairs of macrosetae): notopleural, 3–5; supra alar, 1– 2; post alar, 1; dorsocentral 0–6; scutellar, 2; posterior surfaces of mid- and hind coxae setose, hind coxal knob absent or reduced

in size; all legs approximately equal length; fore and mid-femoral anteroventral (av) macrosetae present or absent, hind femur with anteroventral (av) setae as series along segment, posteroventral (pv) macrosetae present or absent; femoral vestiture as filiform setae admixed with adpressed, lanceolate and scale-like setae; tibial macrosetae elongate; claws relatively small; wing cell m_3 open or closed; wing white opaque with variable mottled pattern; vein R_1 with setae absent (rarely single seta present); wing membrane densely covered with microtrichia. Abdomen shape relatively short or elongate, slightly narrowed along length. Male terminalia with gonocoxites separate medially, posteromedial margins proximal; inner gonocoxal process (igp) present, articulated; posterior outer gonocoxal process (ogp) barely evident; ventral lobe elongate, half the length of gonostylus; phallus with dorsal apodeme of parameral sheath broad, covering aedeagus dorsally or quadrangular, dorsal apodeme separate from gonocoxites, distiphallus narrow, short and directed ventrally, ventral apodeme as single lobe, narrow. Female terminalia with acanthophorite setae present as two sets (A1 and A2), A1 enlarged and elongate; sternite 8 emarginate posteromedially; tergite 8 elongate with anteromedial process; spermathecal sac as single round lobe, two round spermathecae.

Included species. *Neotherevella arenaria* (Lyneborg, 1976), *N. kozlovi* (Zaitzev, 1971a), *N. londti* sp. nov., *N. macularis* (Wiedemann, 1828), *N. maroccanus* sp. nov.

Comments. *Neotherevella* was described by Lyneborg (1978) as a clarification of the confused taxonomic concept of the genus *Neothereva* Kröber, 1912b, itself being a heterogeneous composite of species now placed in *Neotherevella* and *Thereva* — the latter of which *Neothereva* is arguably a synonym (see Lyneborg 1976, 1978). Kröber (1912b) described *Neothereva* with five Palaearctic species: *N. nitidifrons* Kröber, 1912b; *N. angustifrons*, 1912b; *N. latifrons* (Macquart, 1848); *N. citrina* (Becker, 1902) and *N. frontata* Kröber, 1912b. Lyneborg (1976) noted that the essential distinction between *Thereva* and *Neothereva* by Kröber (1912b) was that the male eyes are widely separated. Kröber (1929, 1932, 1937) subsequently identified multiple synonyms or novel combinations, as well as including *Neothereva* as a subgenus of *Thereva* (Kröber, 1932). In a catalogue of Palaearctic Therevidae, Kröber (1937) designated *N. nitidifrons* as the type species of *Neothereva*. In his revision of the Afrotropical Therevidae, Lyneborg (1976) overlooked this type species designation and incorrectly designated *N. citrina* (Becker, 1902) as the type species of the genus. Therein, *T. frontata* and *T. nitidifrons* were moved to *Thereva*, *T. latifrons* implied as a *nomen dubium*, while *Neothereva* was more narrowly circumscribed around *N. citrina* along with the newly-described *N. arenaria*. Lyneborg (1976) also synonymised *N. angustifrons* with *N. citrina* and *Thereva macularis* Wiedemann, 1828 was moved to *Neothereva*. Recognising his previously incorrect type species designation for *Neothereva*, Lyneborg (1978) synonymised *Neothereva* (*sensu* Kröber, 1937) with *Thereva* and transferred *N. arenaria*, *N. citrina* and *N. macularis* to a new genus *Neotherevella* (again based on the type species as *T. citrina*) along with a species described previously in *Aristothereva* (*A. kozlovi* Zaitzev, 1971a).

Neotherevella, *Aristothereva* and *Acantothereva* form a closely related group of specialised genera associated with sandy habitats, especially dunes, that is part of a larger clade also comprising the species-rich and widely distributed genera *Irwiniella* and

Acrosathe (see Holston et al. 2007; Holston 2009; Winterton et al. 2016). *Neotherevella* is differentiated from other therevine genera by the presence of paired dark maculae on a wide female frons (also in the male of *N. londti* sp. nov.), parafacial setae absent (present in *Acrosathe* and *Acantothereva*, variable in *Aristothereva*) and a distiphallus that is narrow and curved ventrally (bulbous in *Acantothereva*; ornately spinose in *Aristothereva*). Other features of this genus variably shared with *Acantothereva* and *Aristothereva* include a wide, sunken vertex (especially in females), opaque white wings with dark maculation, reduced hind coxal knob, elongate tibial macrosetae and extensive white pile on the head and body frequently admixed with white scale-like setae. Paired matte-black pubescent maculae on the female frons are present in all species of *Neotherevella*, but are also found in some species of *Acrosathe* (for example, notably *Acrosathe vialis* (Osten Sacken, 1877), suggestive also of the close relationship of these genera.

Neotherevella is widely distributed throughout the Palaearctic Region and disparately in southern Africa. The most eastern species, *N. kozlovi*, is recorded from China and Uzbekistan. In the Mediterranean Region, *N. macularis* is widely distributed throughout northern Africa from Israel to Mauritania; the apparently closely related and distinctively coloured *N. maroccanus* sp. nov. is known only from Morocco.

Key to species of *Neotherevella*

1 Macrosetae on head, thorax and legs black; matte-black pubescent spots on female frons admixed with erect black setae (southern Africa) **2**

– Macrosetae on head, thorax and legs pale yellow to white, barely distinguishable from extensive white pile; matte-black pubescent spots on female frons without setae (northern Africa to Mongolia) **3**

2 Wing cell m_3 open; palpi crassate; all femora with ventral macrosetae; male eyes separated by distance greater than width of ocellar tubercle; male frons with two matte- black spots admixed with elongate, erect setae (South Africa) ..... ***Neotherevella londti* sp. nov**

– Wing cell m_3 closed; palpi slender; only hind femur with ventral macrosetae; male eyes almost contiguous below anterior ocellus; male frons lacking matte-black spots (Namibia) ..... ***Neotherevella arenaria* (Lyneborg)**

3 Wing cell m_3 open; male eyes separated by distance greater than width of ocellar tubercle (China, Uzbekistan) ..... ***Neotherevella kozlovi* (Zaitzev)**

– Wing cell m_3 closed; male eyes separated by distance less than width of ocellar tubercle (northern Africa, Middle East) **4**

4 Male eyes contiguous below anterior ocellus; male covered with extensive yellow pile on scutum, dorsal portion of occiput and dorsally on abdomen, white pile on pleuron lower half of head and laterally on abdomen; flagellum narrow (Morocco) (female unknown) ..... ***Neotherevella maroccanus* sp. nov.**

– Male eyes separated at narrowest point by width subequal to width of ocellar tubercle; uniform white pile on head, thorax and abdomen; flagellum conical, tapered (Mauritania to Israel, Sudan) ... ***Neotherevella macularis* (Wiedemann)**

***Neotherevella arenaria* (Lyneborg)**
Figs 1–3, 11C, D, 12A, B, 13A, B, 14B, 15

Neothereva arenaria Lyneborg, 1976: 293.
Neotherevella arenaria (Lyneborg, 1976)— Lyneborg (1978: 76 [combination change], 1980: 319 [catalogue]); Hauser et al. (2017: 1200 [faunal synopsis, wing figure]).

Holotype. Namibia • male; **Erongo Region**, Swakopmund; 26–30 Jan 1972; NHM.

Other material. Namibia • 8 males, 7 females; **Erongo Region**, Swakopmund, Swakop River mouth; [-22.6886, 14.5275]; 8 m alt.; 9 Feb 1974; M.E. & B.J. Irwin leg.; coastal and riverbed dunes; CSCA; MEI028397–400, 120720–23, 120760–1, 178074–8 • 3 males; **Erongo Region**, Swakopmund, Swakop River mouth; [-22.6925, 14.5269]; 03 Feb 2012; T. Dikow leg.; sandy river bed and vegetated dunes; USNM; USNMENT01576797–9 • 2 males, 1 female; **Karas Region**; Lüderitz District, Agate Beach, 10 km N Lüderitz; [-26.5949, 15.1792]; 3 m alt.; 18 Feb 1974; M.E. & B.J. Irwin leg.; low coastal vegetated dunes; CSCA; MEI120715, 178075–6.

Diagnosis. Male frons lacking dark maculae; female frontal maculae with short pile of erect macrosetae; male eyes contiguous below ocellar tubercle; wing cell m_3 closed; all macrosetae black; single pair (sometimes two) of dorsocentral macrosetae; palpus slender.

Redescription. Body length: 6.0–6.5 mm (male), 7.0–7.5 mm (female). ***Head***. Frons profile flat, wholly pubescent; male frons narrower than anterior ocellus, but eyes not contiguous, female frons broad with eyes slightly narrowed dorsally; frontal pubescence silver with dark yellow suffusion, female with paired matte-black maculae admixed with short, erect, black setae; male frons with small patch of short setae above antenna, female sparse short setae, frontal setae admixed black and yellow; postocular setae black, arranged in single row immediately laterad of ocellar tubercle (male), additional setae irregularly arranged medially (female); occiput relatively flat, silver pubescence admixed with white, scale-like setae, more abundant medially; genal setae pale, palpus narrow, covered with pale setae; antennal scape shorter than flagellum, slightly thickened and cylindrical, brown, overlain with grey pubescence admixed with erect black setae of varying lengths; flagellum conical, brown with grey pubescence. ***Thorax***. Scutum grey-tan with brown markings, short erect filiform setae admixed with adpressed white scale-like setae, denser anteriorly; macrosetae black; scutellum concolourous with scutum; pleuron with dense silver-grey pubescence admixed with extensive semi-erect, white, scale-like setae; anepisternum with brownish suffusion dorsally; coxae with pale macrosetae admixed with erect white, scale-like setae; femora with dense covering of white, scale-like, adpressed setae (sparser in female); legs dark yellow, macrosetae black; hind femur with 3–4 anteroventral macrosetae distributed along distal half; tarsi dark yellow with apices brown; tibial and tarsal macrosetae elongate; wing white with irregular-sized brown maculae (darker in female), spur veins often present in maculae; cell m_3 closed; wing venation yellow basally along major veins, darker distally; haltere dark yellow; scutal chaetotaxy (macrosetae pairs): notopleural, 3; supra alar, 1–2; post alar, 1; dorsocentral, 1–2;

Figure 1. *Neotherevella arenaria* (Lyneborg, 1976), female **A** oblique view **B** lateral view.

Figure 2. *Neotherevella arenaria* (Lyneborg, 1976), male **A** oblique view **B** lateral view.

scutellar, 2. ***Abdomen***. Male base colour yellow, grey pubescent, filiform setae admixed with adpressed setae, very dense in male; terminalia dark yellow; female abdomen dark yellow; acanthophorite spines black. ***Male genitalia***. Epandrium sub-quadrangular, posterolateral corners thickened, rounded; sternite 8 rounded posteriorly with thickened margin and short series of elongate, marginal macrosetae; gonocoxite with extensive pale setae, outer gonocoxal process relatively narrow, angular; gonocoxal apodeme absent; inner gonocoxal process rounded apically; gonostylus narrow; ventral lobe short, rounded; distiphallus narrow, gradually curved ventrally; ventral apodeme triangular.

Distribution. Coastal Namibia.

Ecology. *Neotherevella arenaria* sp. nov. adults are found in coastal dune systems associated with low vegetation (Fig. 3).

Conservation status. Unknown; this species is apparently locally abundant in relatively undisturbed habitats.

Comments. *Neotherevella arenaria* sp. nov. is closely related to *N. londti* sp. nov. and represents a species pair sharing characters not found in other *Neotherevella* species, including erect macrosetae on the frontal maculae, black thoracic macrosetae (pale in other species) and distinct dorsocentral macrosetae (absent or indistinct in other species). These two species are found in south-western Africa, relatively disparately distributed from other *Neotherevella* species, which are found throughout the southern Palaearctic Region.

Figure 3. Vegetated sand dunes at the Swakop River mouth, Swakopmund (Namibia); habitat of *Neotherevella arenaria* (photo copyright: Torsten Dikow).

***Neotherevella kozlovi* (Zaitzev)**
Figs 4, 11A, B, 12C, D, 13C, D, 14A, 15

Aristothereva kozlovi Zaitzev, 1971a: 66— Zaitzev (1971b: 39 [key]); Gorodkov et al. (1974: 226 [faunal record]).
Neotherevella kozlovi Zaitzev (1971a)— Lyneborg (1978: 76 [new combination]; 1989: 22 [catalogue]).

Holotype. Peoples Republic Of China • male; **Inner Mongolia**, Etsin Gol, North Alashan, Gobi; [41.8056, 100.9883]; 23 Jun 1926; P. Kozlov leg.; ZISP; N2236.

Paratypes. Peoples Republic Of China • 3 males, 6 females; **Inner Mongolia,** same data as holotype; [41.8056, 100.9883]; 14–15 Mar 1908, 23 Jun 1926; P. Kozlov leg.; ZISP, CSCA. Uzbekistan • 1 female; **Xorazm Region**, Khiva; [41.3847, 60.3655]; 20 Apr 1927; L. Zimin leg.; ZISP.

Diagnosis. Male frons lacking dark maculae, wider than ocellar tubercle at narrowest point; female frontal maculae without erect macrosetae; scape macrosetae white to yellow; palpus narrow; wing cell m_3 open; all macrosetae yellow-white; dorsocentral macrosetae absent.

Redescription. Body length: 8.0 mm (male), 10.5 mm (female). ***Head***. Frons profile flat to slightly rounded (female), male frons width at narrowest point slightly wider than ocellar tubercle, female frons wide, inner eye margins subparallel; pubescence greyish-silver, paired matte-black pubescent maculae present (female), male frons with setae absent, female frons with patch of pale setae beside and slightly below antennal base; postocular setae white, arranged in single row, occiput relatively convex, pubescence grey admixed with white, scale-like setae, abundant medially; genal setae pale; palpus narrow, with white setae; antennal scape bulbous, equal length to flagellum, brown, overlain with grey pubescence (male) or dark yellow-orange, overlain with grey pubescence (female), numerous large white-yellow setae; flagellum brown. ***Thorax***. Scutum grey pubescent, erect, filiform setae admixed with adpressed, white, scale-like setae, denser anteriorly; thoracic macrosetae yellow; scutellum concolourous with scutum; pleuron with dense silver-grey pubescence admixed with extensive semi-erect, white, scale-like setae; coxae yellow, overlain with silver-grey pubescence, macrosetae few in number, setae white; femora uniform yellow (female) or dark grey-brown with apices yellow (male), dense covering of white, scale-like adpressed setae, macrosetae white, hind femur with 3–4 anteroventral macrosetae in distal half; tibiae and tarsi dark yellow, macrosetae elongate, white; wing opaque white, brown along veins; cell m_3 open; venation yellow basally along major veins, darker distally; haltere dark yellow; scutal chaetotaxy: notopleural, 5; supra alar, 1; post alar, 2; dorsocentral, 0; scutellar, 2. ***Abdomen***. Male base colour grey pubescent with extensive long, pale filiform setae admixed with adpressed setae; terminalia dark yellow; female abdomen brown, tergites yellow posteriorly and laterally; acanthophorite spines yellow. ***Male genitalia***. Epandrium ovoid, brown

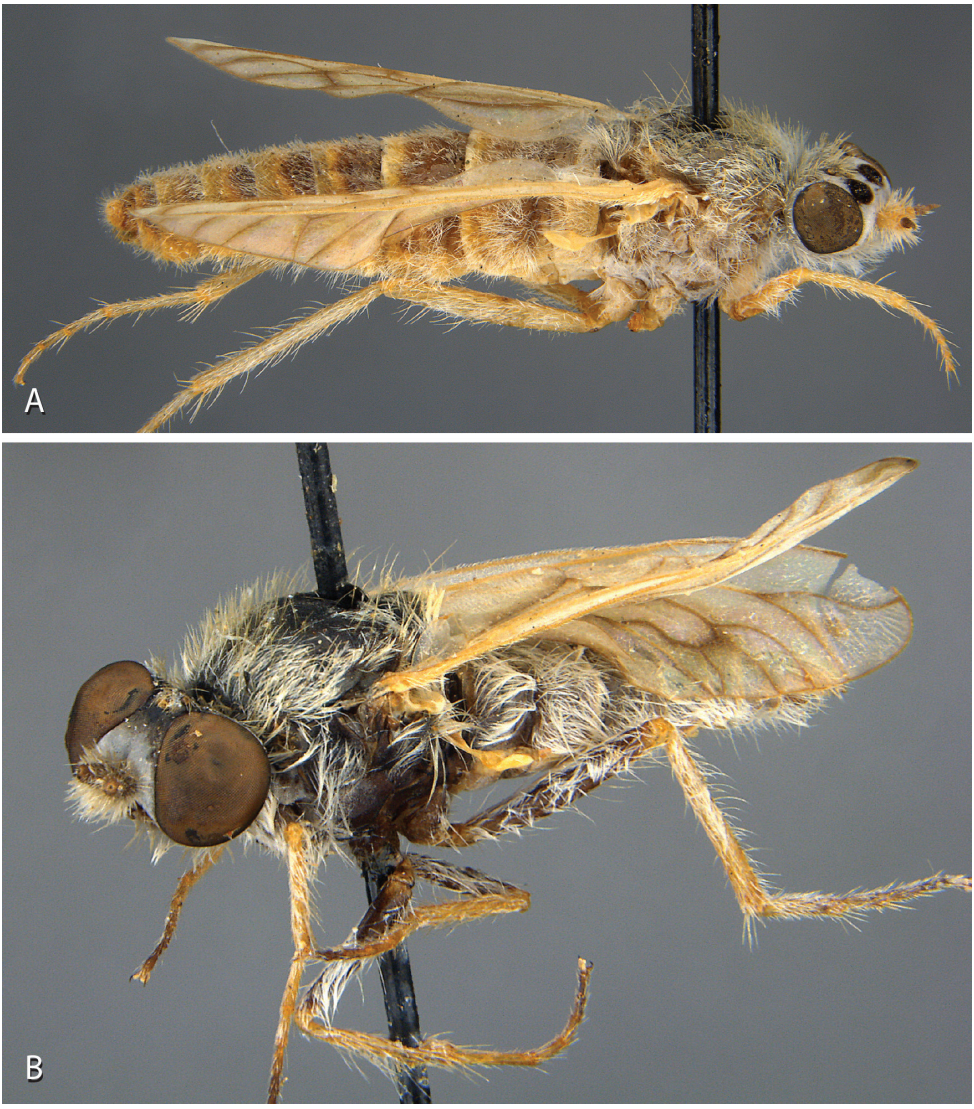

Figure 4. *Neotherevella kozlovi* (Zaitzev, 1971) **A** female, lateral view **B** male, oblique view.

anteromedially, covered with pale setae, corners pointed posterolaterally; sternite 8 narrowed posteriorly, emarginate apically with elongate setae in posterior half; gonocoxites with dense white setae, outer gonocoxal process reduced to small ridge, inner gonocoxal process narrowed apically, gonostylus truncated apically, angular ridge on outer surface, ventral lobe relatively large, rounded; gonocoxal apodeme small; phallus with broad dorsal apodeme of parameral sheath, ventral apodeme triangular, distiphallus broad and curved ventrally.

Distribution. China (Inner Mongolia), Uzbekistan.

Ecology. *Neotherevella kozlovi* adults are found in sand dunes habitats.

Conservation status. Not threatened; apparently widely distributed in relatively undisturbed areas.

Comments. *Neotherevella kozlovi* was originally described in *Aristothereva* by Zaitzev (1971a) and later transferred to *Neotherevella* by Lyneborg (1978). The presence of distinctive frontal maculae of the female frons supports this combination. This species is distinct from other *Neotherevella* species by the shape of the frons in both sexes and yellow scape macrosetae.

***Neotherevella londti* sp. nov.**
https://zoobank.org/167C5044-7846-48EC-8D75-233077B9125C
Figs 5–7, 11E, F, 12E, F, 13E, F, 14C, E, 15

Holotype. South Africa • male; **Western Cape Province**, Cape Vermont, nr. Onrus; [-34.4013, 19.1352]; 6 Apr 1979; J. Londt & B. Stuckenberg leg.; dune vegetation and sandy road; 3419AC; NMSA; MEI115849.

Paratypes. South Africa • 3 males, 7 females; **Western Cape Province**, same data as holotype; NMSA, CSCA; MEI115850–6, 115857–9. • 3 females; **Western Cape Province**, Glencairn, pres. Simonstown; [-34.1646, 18.4291]; M. Bequaert leg.; R.I.Sc.N.B., 24.236; RBINS. • 5 males; **Western Cape Province**, Fish Hoek; M. Bequaert leg.; [-34.1449, 18.4323]; R.I.Sc.N.B,. 24.236; RBINS.

Diagnosis. Male frons with dark maculae present, frontal maculae with elongate pile of erect macrosetae, male frons wider than ocellar tubercle at narrowest point; cell m_3 open; all macrosetae black, elongate and numerous; two pairs of dorsocentral macrosetae; palpi crassate and acuminate; all femora with ventral macrosetae.

Description. Body length: 8.0–8.5 mm (male), 7.5–8.5 mm (female). ***Head***. Frons profile flat, wholly pubescent; vertex excavated (more so in male); male frons slightly wider than ocellar tubercle at narrowest point, female frons broad with eyes slightly narrowed dorsally; frontal pubescence silver ventrally, grey-tan dorsally, paired matte-black maculae with erect black setae (longer in male); postocular setae black, elongate, strongly curved anteriorly in a single row, additional setae irregularly arranged medially on occiput; male occiput relatively concave, pubescence silver with scale-like setae medially; antennal scape slightly longer than flagellum, slightly thickened, cylindrical, brown, overlain with grey pubescence, densely covered with large, dark setae; flagellum brownish-orange, darker distally; genal setae dark; palpus crassate, acuminate with extensive erect white and black setae. ***Thorax***. Scutum pubescence grey-tan with brown mottling, erect filiform setae admixed with adpressed, white, scale-like setae, denser anteriorly (longer in male), thoracic macrosetae black and relatively elongate; scutellum concolourous with scutum; pleuron with dense silver-grey pubescence admixed with extensive, semi-erect, white, scale-like setae; anepisternum with brownish suffusion dorsally;

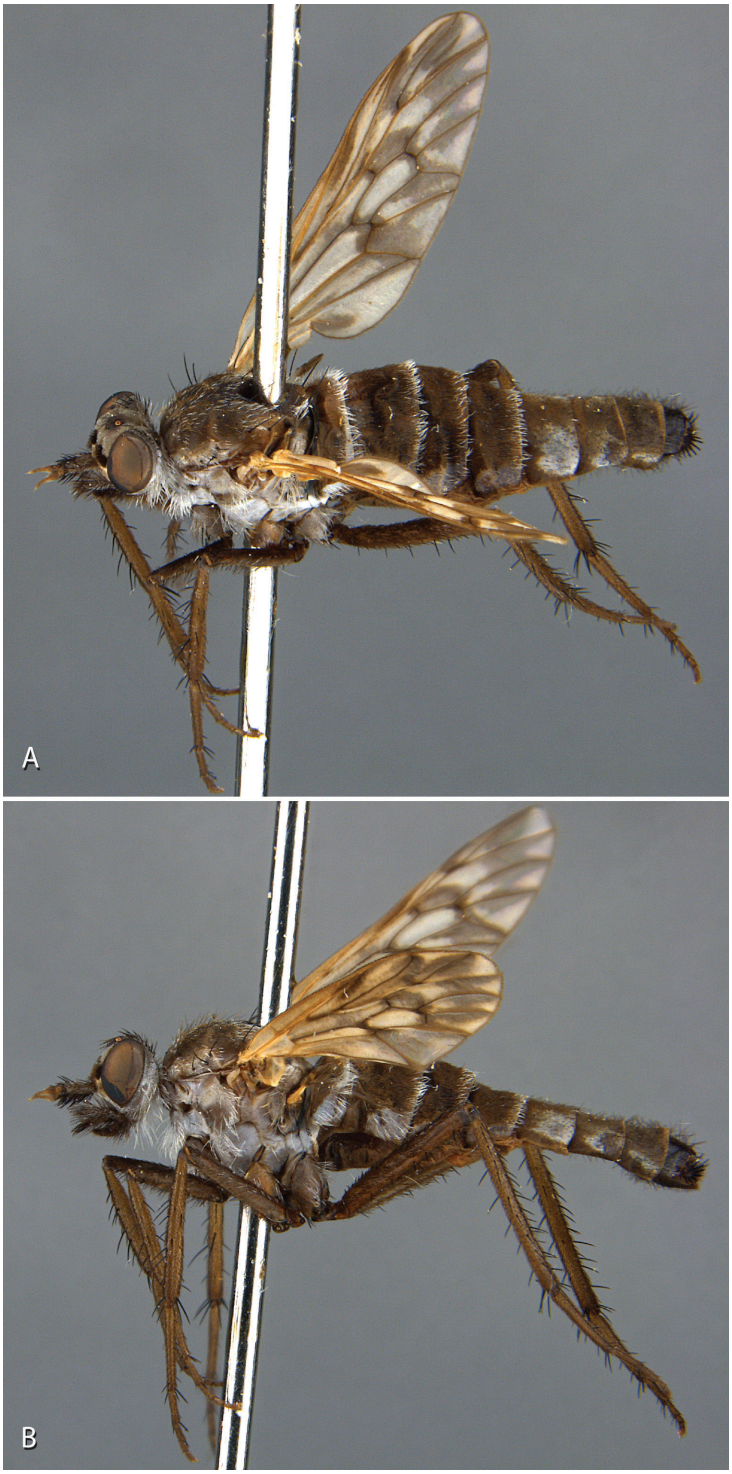

Figure 5. *Neotherevella londti* sp. nov., female **A** oblique view **B** lateral view.

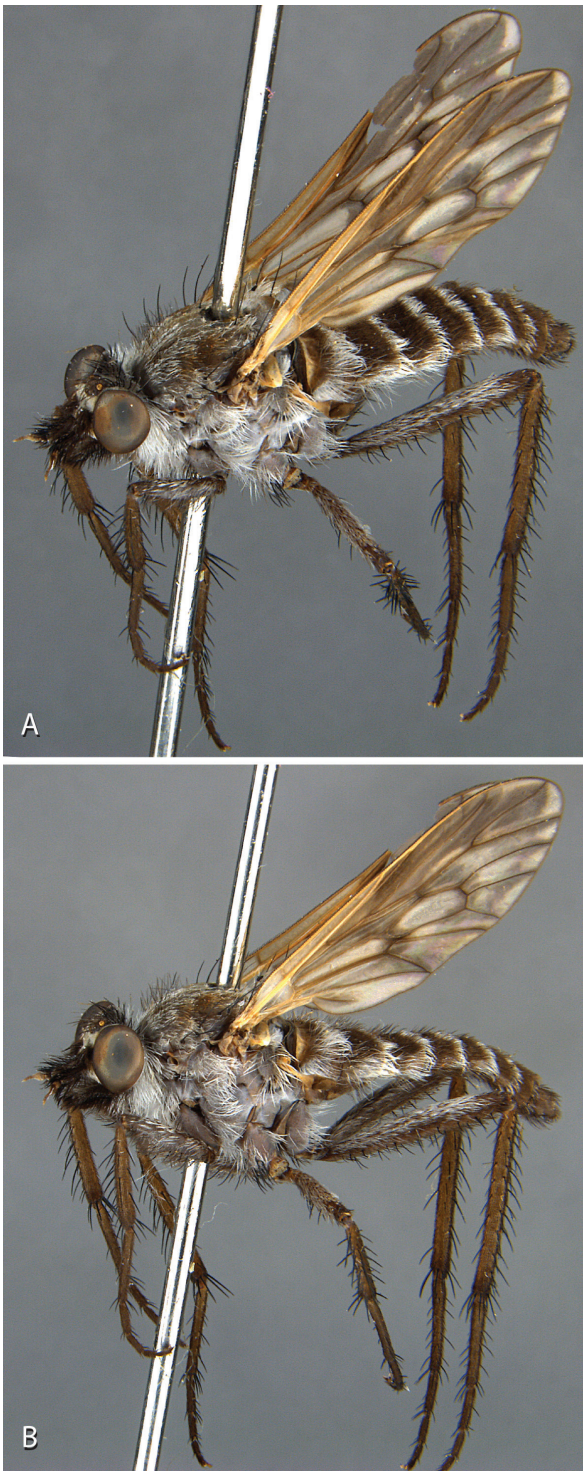

Figure 6. *Neotherevella londti* sp. nov., male **A** oblique view **B** lateral view.

Figure 7. *Neotherevella londti* sp. nov. **A** male head, lateral view **B** female head, lateral view.

coxae dark, overlain with silver-grey pubescence, setae white and black, macrosetae numerous, strong, black; femora dark brown, short black setae admixed with longer setae, sparse covering of white scale-like adpressed setae (denser in male), all femoral anteroventral and posteroventral macrosetae black, more numerous on hind femur, hind femur with 3–12 anteroventral macrosetae along entire length; tibiae and tarsi brown, macrosetae elongate, black; wing opaque yellow-tan and white with irregular dark brown markings in most cells; some individuals with a short, black macroseta distally on R_1; cell m_3 open; venation yellow basally along major veins, darker distally; haltere stem pale with knob mostly brown; scutal chaetotaxy: notopleural, 3; supra alar, 2; post alar, 1; dorsocentral, 2; scutellar, 2. ***Abdomen***. Abdomen dark brown dorsally, grey pubescent laterally, dense pile of filiform erect and adpressed, scale-like setae, brown medially, white marginally on all tergites, denser laterally and posteriorly; female abdomen similar to male, except setal pile much sparser; acanthophorite spines black. ***Male genitalia***. Dark brown with brown setae; epandrium sub-quadrangular, posterior margin thickened and posterolateral corners rounded; sternite 8 ovoid; gonocoxites with outer gonocoxite process relatively short, truncated; gonocoxal apodeme narrow; inner gonocoxal process rounded apically; gonostylus with small angular ridge medially; ventral lobe relatively large and spatulate; phallus with dorsal apodeme broad, ventral apodeme triangular; distiphallus narrow.

Etymology. This species is named in honour of Jason Londt, who, along with Brian R. Stuckenberg, collected most of the known specimens.

Distribution. South-western South Africa.

Ecology. *Neotherevella londti* sp. nov. adults were collected on vegetated coastal sand dunes.

Conservation status. Unknown; this species is known from two small series of specimens from a relatively small area in Western Cape region. The type locality has residential developments along the coast in dune habitats where this species is known.

Comments. *Neotherevella londti* sp. nov. is unique in the genus in having crassate palpi, frontal maculae in both sexes and extensive dark, elongate macrosetae on the head, body and legs. Some individuals have a small macroseta present distally on wing vein R_1, a feature found disparately in some distantly-related genera.

Neotherevella macularis **(Wiedemann)**

Figs 8, 9, 11G, H, 12G, H, 13G, H, 14D, F, 15

Thereva macularis Wiedemann, 1828: 558— Bezzi (1903: 209 [catalogue], 1906: 264 [catalogue]); Kertész (1909: 155 [catalogue]); Kröber (1912c: 254 [checklist], 1912d: 409 [redescription], 1913: 49, 58 [key, checklist], 1924a: 100 [possible synonymy], 1924b: 17 [synonymy]).

Neothereva macularis (Wiedemann, 1828)— Kröber (1937: 276 [combination change, catalogue]); Lyneborg (1976: 294 [redescription]); Steyskal & El-Bialy (1967: 53 [checklist]).

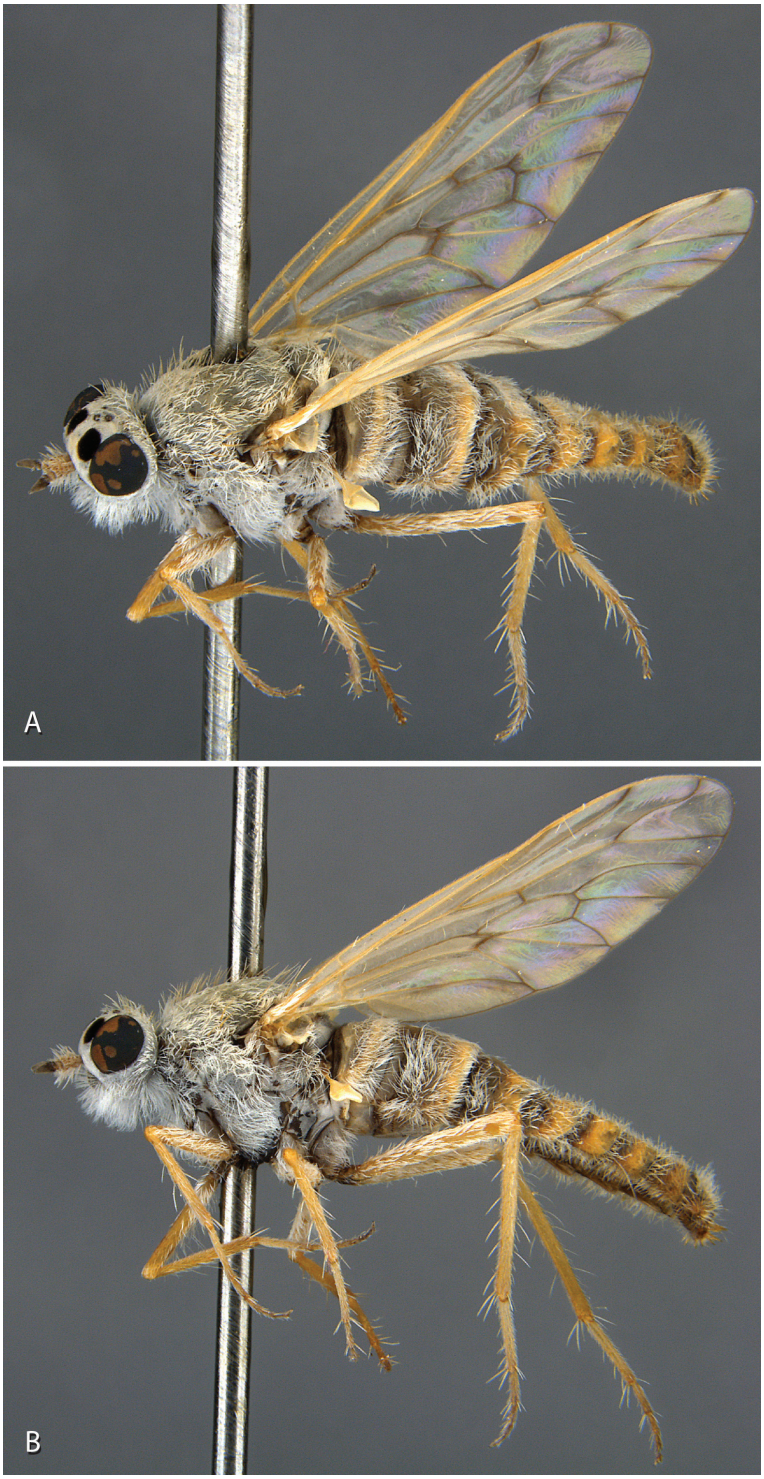

Figure 8. *Neotherevella macularis* (Wiedemann, 1828), female **A** oblique view **B** lateral view.

Neotherevella macularis (Wiedemann, 1828)— Lyneborg (1978: 76 [combination change], 1980: 319 [catalogue], 1989: 22 [catalogue]); El-Hawagry et al. (2011: 152 [catalogue]; Kettani et al. (2022: 213 [catalogue]).

Thereva citrina Becker, 1902: 35— Bezzi (1903: 208 [catalogue], 1906: 264 [catalogue]); Kertész (1909: 152 [catalogue]). syn. nov.

Neothereva citrina (Becker, 1902)— Kröber (1912b: 138, 139 [key, redescription], 1913: 42 [key, checklist], 1924a: 17 [key redescription], 1937: 276 [catalogue]).

Neotherevella citrina (Becker, 1902)— Lyneborg (1978: 76 [combination change], 1989: 22 [catalogue]); El Hawagry et al. (2011: 151 [catalogue]).

Neothereva angustifrons Kröber, 1912b: 139— Kröber (1913: 42 [key, checklist], 1924a: 100 [redescription, antennae figure], 1924b: 17 [key, redescription], 1929: 75 [catalogue, possible synonymy]).

Type material. *Thereva macularis* Wiedemann, 1828— ***Holotype*** Sudan • female; Abyssina; Dr. Rüppell; SMF. *Thereva citrina* Becker, 1902— ***Lectotype*** Egypt • male; ZMHB. *Neothereva angustifrons* Kröber, 1912b— ***Holotype*** Egypt • male; ZMHB.

Other material. Egypt • 1 male, 1 female; **Giza Governorate**, Abu [Abou] Rowash; [30.0451, 31.0899]; 12 Sep 1924, 11 Mar 1925; Min. Agric. (Egypt), R.M. leg.; AMNH; MEI084347–8. Israel • 7 males, 1 female; **Haifa District**, Sdor Yam (nr. Caesarea); [32.4831, 34.8985]; 30 m alt.; 14 Apr 1995; M.E. Irwin leg.; shifting coastal dunes; CSCA; MEI028294–5, 02827, 030658, 030661–2, 030667, 060671 • 2 males, 1 female; **Southern District**, Nizzamin [Nitsanim] Beach; [31.7368, 34.6148]; 15 Apr 1995; M.E. Irwin leg.; 43 m; shifting coastal dunes; CSCA; MEI030677–8, 030680 • 1 female; **Tel Aviv District**, Holon, nr. Tel Aviv; [31.9999, 34.7793]; 6 Apr 1968; S. Bleszynski leg.; CNC; MEI079732. Tunisia • 1 female; **Kebili Governorate** [Qibili], Jebil National Park; [32.9777, 9.0425]; 5–13 Oct 2010; H. Pohl leg.; sand dunes; CSCA. Morocco • 1 female; **Agadir-ida Ou Tanane Province**, 10 km S Agadir, Tifnit; [30.1972, -9.6383]; 15.IV.2015; Schmid-Egger leg., 43 m; CSCA.

Diagnosis. Male frons lacking dark maculae (small light brown suffused areas present); male frons slightly narrower than ocellar tubercle at narrowest point; female frontal maculae without erect macrosetae; cell m_3 closed; all macrosetae white; dorsocentral macrosetae absent; palpi slender.

Redescription. Body length: 5.5–7.0 mm (male), 7.5–11.0 mm (female). ***Head***. Frons profile flat, pubescence grey, silver ventrally and on face, pair of suffused brown marks dorsally along eye margin (male) or matte-black maculae (female), lacking setae on frons; male frons width at narrowest point slightly wider than anterior ocellus; female frons broad with inner margins of eyes sub-parallel; white postocular setae arranged in single row immediately laterad of ocellar tubercle, barely discernible from pale setae; male occiput relatively convex, pubescence silver admixed with white, scale-like setae abundant medially; antennal scape length equal to flagellum, brown (male) or dark yellow (female), overlain with grey pubescence admixed with numerous large pale macrosetae; flagellum brown; genal setae white, palpi slender,

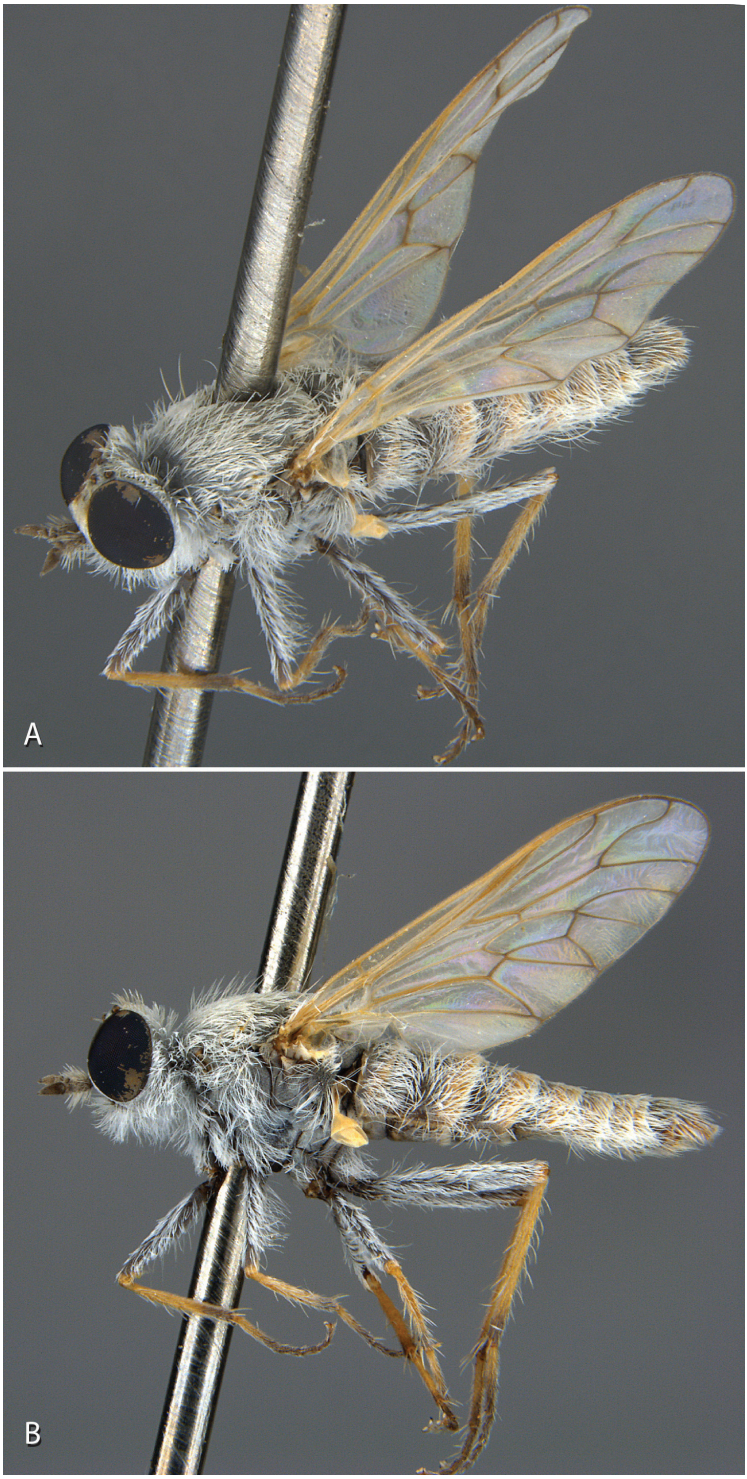

Figure 9. *Neotherevella macularis* (Wiedemann, 1828), male **A** oblique view **B** lateral view.

setae white. ***Thorax***. Scutum grey, with erect filiform setae admixed with adpressed, white, scale-like setae, denser anteriorly; thoracic macrosetae white to yellow; scutellum concolourous with scutum; pleuron with dense silver-grey pubescence admixed with extensive semi-erect, white, scale-like setae; coxae dark, overlain with silver-grey pubescence, setae white, macrosetae few in number and pale; femora uniform yellow (female) or dark brown (male), dense covering of white, scale-like adpressed setae, macrosetae white; hind femur with 3–4 fine anteroventral macrosetae spaced along entire length; tibiae yellow, dark grey-brown apically (male) or dark yellow (female); tarsi dark yellow, brown apically in male; wing opaque white, brown along veins (darker in female); cell m_3 closed; venation yellow basally along major veins, darker distally; haltere stem orange-brown, knob yellow; scutal chaetotaxy: notopleural, 3; supra alar, 1; post alar, 1; dorsocentral, 0; scutellar, 2. ***Abdomen***. Dark brown, yellow posteriorly on all tergites, pale filiform setae admixed with adpressed, white, scale-like setae (denser in male); terminalia dark yellow; female acanthophorite spines yellow. ***Male genitalia***. Epandrium with extensive pale setae, narrowed posteriorly with posterolateral corners acute and divergent; sternite 8 quadrangular with strongly emarginate posterior margin, elongate pale setae on entire surface; gonocoxites with small ridge-like outer gonocoxal process; inner gonocoxal process narrow; gonostylus with angular ridges along outer surface; phallus with dorsal apodeme broader posteriorly with shoulder like ridges; ventral apodeme broad, triangular; distiphallus short, narrow.

Distribution. Egypt, Israel, Mauritania, Morocco, Sudan, Tunisia.

Ecology. *Neotherevella macularis* adults are found on vegetated sand dunes.

Conservation status. Not threatened; a widely distributed species.

Comments. *Neotherevella macularis* was originally described in the genus *Thereva*, based on a single female specimen from Abyssinia (Sudan), although listed as Egypt by Wiedemann (1828) and Kröber (1912d). Kröber (1912d) and Lyneborg (1976) redescribed this species, noting that, despite the poor condition of the type specimen, it retained the distinctive colouration and markings typical of the genus. The species was transferred to *Neothereva* (*sensu* Lyneborg, 1976) and subsequently to *Neotherevella* by Lyneborg (1978). Lyneborg (1976) redescribed it briefly and compared it with his newly-described *N. arenaria* from southern Africa, although surprisingly not with the geographically nearby *N. citrina*. At the time, the male of *N. macularis* was unknown, but Lyneborg (1976) assumed that it would certainly have the eyes well separated, a character which is indeed typical of *N. citrina*. As mentioned previously, in his revision of *Neothereva*, Lyneborg (1976) incorrectly designated *T. citrina* as the type species of the genus, something he subsequently corrected (Lyneborg 1978) by describing *Neotherevella* and designating *T. citrina* as the type species. Lyneborg (1976) indicated his placement of *T. macularis* in *Neothereva* was novel, apparently being unaware that it had already been proposed by Kröber (1937). Moreover, his synonymy of *N. angustifrons* with *N. macularis* was also not novel, as Kröber (1937) had previously identified *N. angustifrons* as a synonym of

N. macularis along with *T. nuba* Wiedemann, 1828 (the latter species is now placed in *Irwiniella*). Indeed, Kröber (1924b, 1929) suggested that *T. macularis* and his own *N. angustifrons* might be synonymous, although Kröber (1924a) erroneously considered *T. macularis* as a junior synonym of *N. angustifrons*; he later recognised this error and reversed the synonymy (Kröber 1937) as *T. macularis* is the senior name and, thus, takes precedence.

On the status of three names in question (i.e. *T. macularis*, *T. citrina* and *N. angustifrons*), *T. citrina* being a junior synonym of *T. macularis* is the only one that has not been previously proposed. The male is known for *N. citrina* and *N. angustifrons*, but not *N. macularis*, but comparison of types and a series of specimens (males and females) indicates that characters used previously to separate them (notably scutal colour and markings or frontal markings) tend to be highly variable or obscure. Moreover, the recorded distributions of all three overlap: *N. citrina* is recorded from Mauritania to Israel, *N. angustifrons* from Egypt and *N. macularis* from Sudan, Egypt and Mauritania.

Neotherevella macularis can be separated from all other species of *Neotherevella* by the male frons being only slightly wider than the anterior ocellus, wing cell m_3 closed and by the shape of the male epandrium and phallus.

***Neotherevella maroccanus* sp. nov.**
https://zoobank.org/F2CE53CA-52C1-4758-865B-718F442FACB6
Figs 10, 11I, 15

Holotype. Morocco • male; **Drâa-Tafilalet Region**, Merzouga, 45 km S Erfoud; [31.0847, -4.0055]; 19 Nov 1989; M.E. Irwin leg.; sieved from dune sand beneath vegetation, pupated 21 Oct 1990, eclosed 8 Nov 1990; [pupal case attached to pin]; CSCA; MEI120637.

Diagnosis. Male eyes contiguous below ocellar tubercle, male frons lacking dark maculae; wing cell m_3 closed; all macrosetae white; dorsocentral macrosetae absent; palpi slender.

Description. Body length: 7.5 mm (male). ***Head***. Male frons flat in profile, pubescence grey with orange suffusion, setae absent, eyes contiguous below ocellar tubercle; postocular ridge with white macrosetae arranged in single row immediately laterad of ocellar tubercle; male occiput relatively concave, pubescence grey with abundant yellow adpressed scale-like setae over occiput; antennal scape shorter than flagellum, slightly thickened, cylindrical, brown with grey pubescence admixed with numerous large, pale setae; flagellum brown, elongate cylindrical, pale setae basally; genal setae pale, palpi narrow with pale setae. ***Thorax***. Scutal vestiture with yellow, adpressed, scale-like setae abundant, denser laterally and anteriorly; thoracic macrosetae yellow; scutellum similar to scutum; pleuron dark with sparse grey pubescence admixed with extensive semi-erect, white, scale-like setae, yellow on dorsal part on anepisternum;

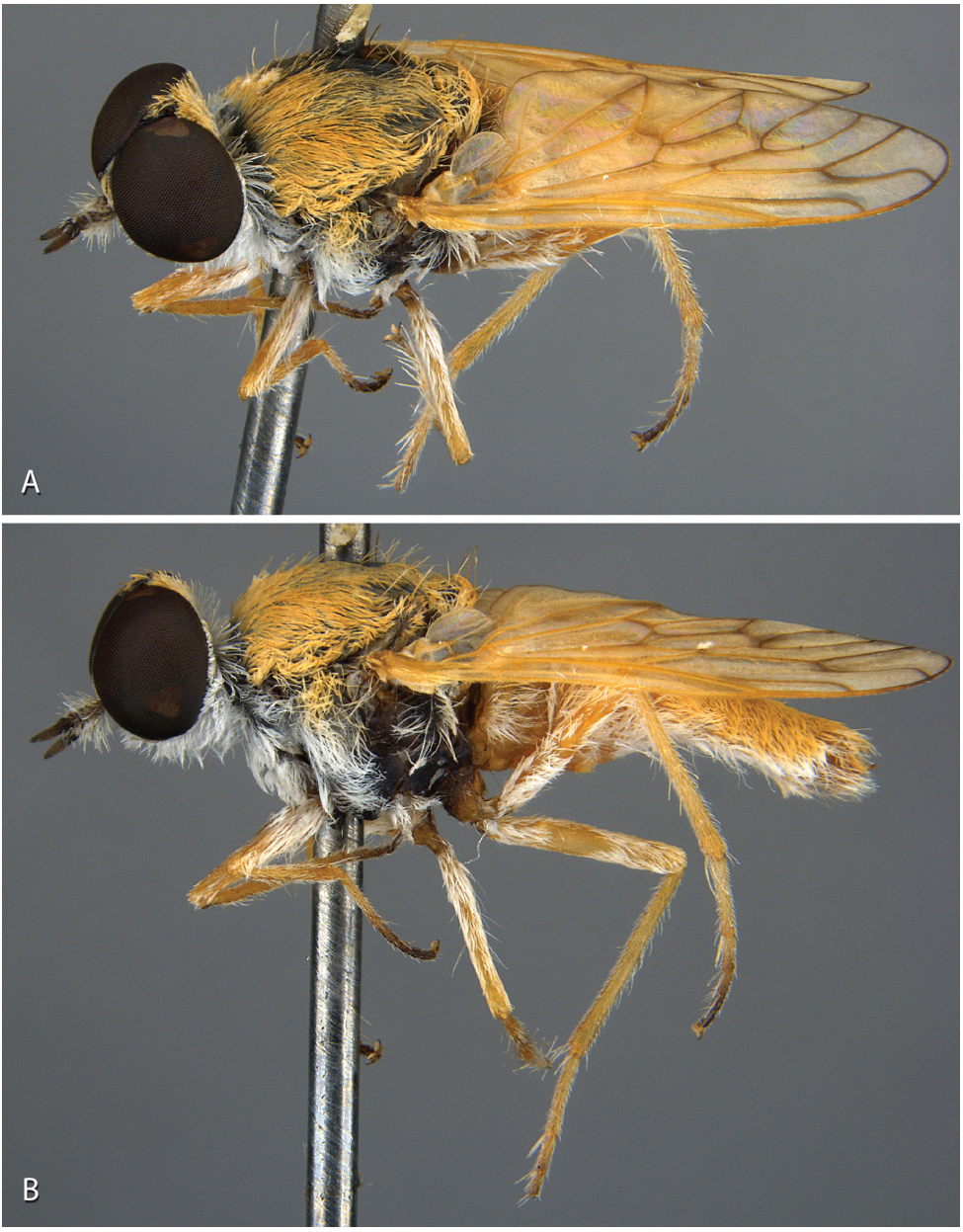

Figure 10. *Neotherevella maroccanus* sp. nov., male **A** oblique view **B** lateral view.

coxae yellow, overlain with silver-grey pubescence, setae white, coxal macrosetae few in number, white; femora orange, dense covering of adpressed, white, scale-like setae, macrosetae white, hind femur with 1–2 subapical anteroventral macrosetae; tibiae dark

Figure 11. *Neotherevella* species, head, frontal view **A** *Neotherevella kozlovi* (Zaitzev, 1971a), male **B** same, female **C** *Neotherevella arenaria* (Lyneborg, 1976), male **D** same, female **E** *Neotherevella londti* sp. nov., male **F** same, female **G** *Neotherevella macularis* (Wiedemann, 1828), male **H** same, female **I** *Neotherevella maroccanus* sp. nov., male.

yellow; tarsi dark yellow with apices brown; wing opaque white, brown along veins; cell m_3 closed; venation yellow basally along major veins, darker distally; haltere dark yellow; scutal chaetotaxy: notopleural, 3; supra alar, 1; post alar, 1; dorsocentral, 0; scutellar, 2. ***Abdomen***. Male abdomen dark yellow, extensive long, setae, yellow dorsally, white laterally and ventrally; terminalia dark yellow. ***Male genitalia***. Not dissected. Externally, extensive long pale setae; gonocoxite with ridge-like outer gonocoxal process, tuft of elongate setae along ventral part of outer gonocoxal process; inner gonocoxal process narrow, spatulate apically. Female unknown.

Etymology. The species epithet is the adjective latinised version of Morocco.

Distribution. Morocco.

Ecology. Typical of many Therevidae, especially dune-associated species, *N. maroccanus* sp. nov. larvae are found around the bases of plants in dune vegetation, where the larvae predate on soil arthropods amongst the plant roots.

Conservation status. Undetermined; this species is only known from a single specimen from the Erg Chebbi sand dunes, which is a popular tourist destination.

Comments. *Neotherevella maroccanus* sp. nov. is a delicate, distinctively coloured species with an extensive covering of yellow and white pile. It appears closely related to *N. macularis*, sharing features such as a narrow male frons and wing cell m_3 closed. This species is known only from a single male specimen reared from a larva.

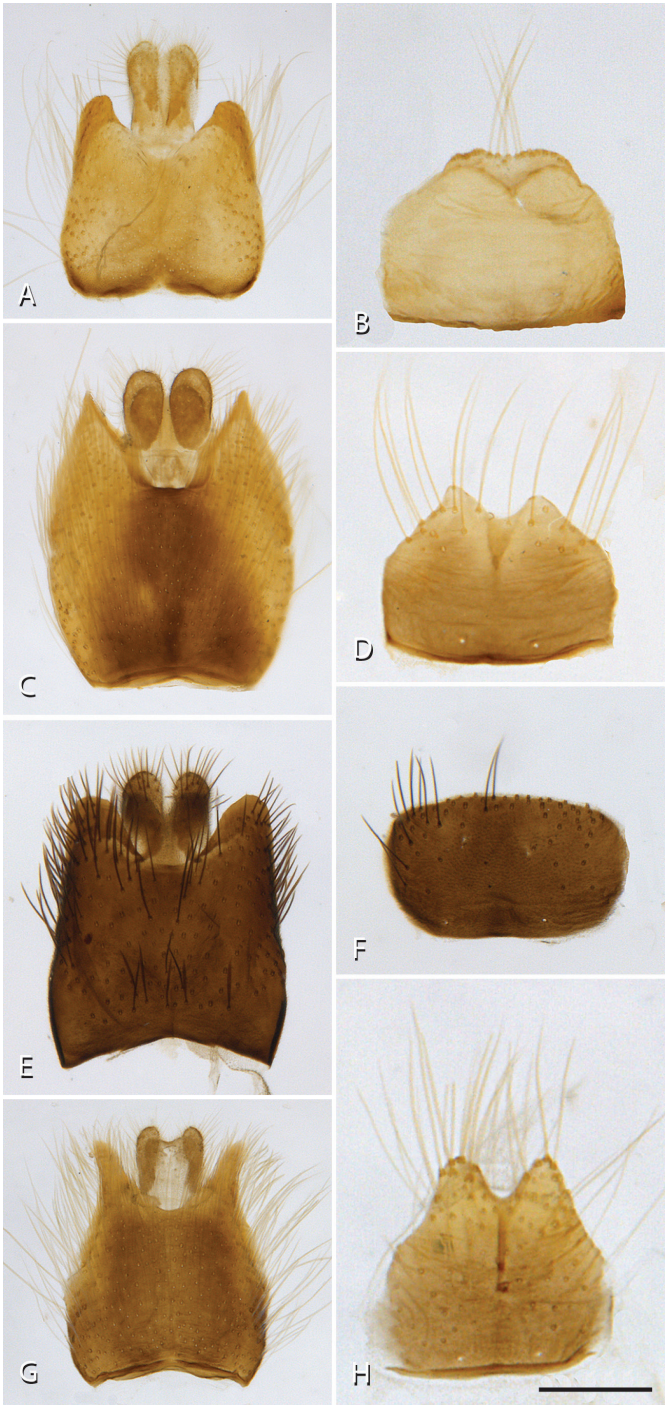

Figure 12. *Neotherevella* species, male epandrium and sternite 8 **A, B** *Neotherevella arenaria* (Lyneborg, 1976) **C, D** *Neotherevella kozlovi* (Zaitzev, 1971a) **E, F** *Neotherevella londti* sp. nov. **G, H** *Neotherevella macularis* (Wiedemann, 1828). Scale bar: 0.25 mm.

Figure 13. *Neotherevella* species, male gonocoxites (ventral view left, dorsal view right) with phallus *in situ* **A, B** *Neotherevella arenaria* (Lyneborg, 1976) **C, D** *Neotherevella kozlovi* (Zaitzev, 1971) **E, F** *Neotherevella londti* sp. nov. **G, H** *Neotherevella macularis* (Wiedemann, 1828). Scale bar: 0.25 mm.

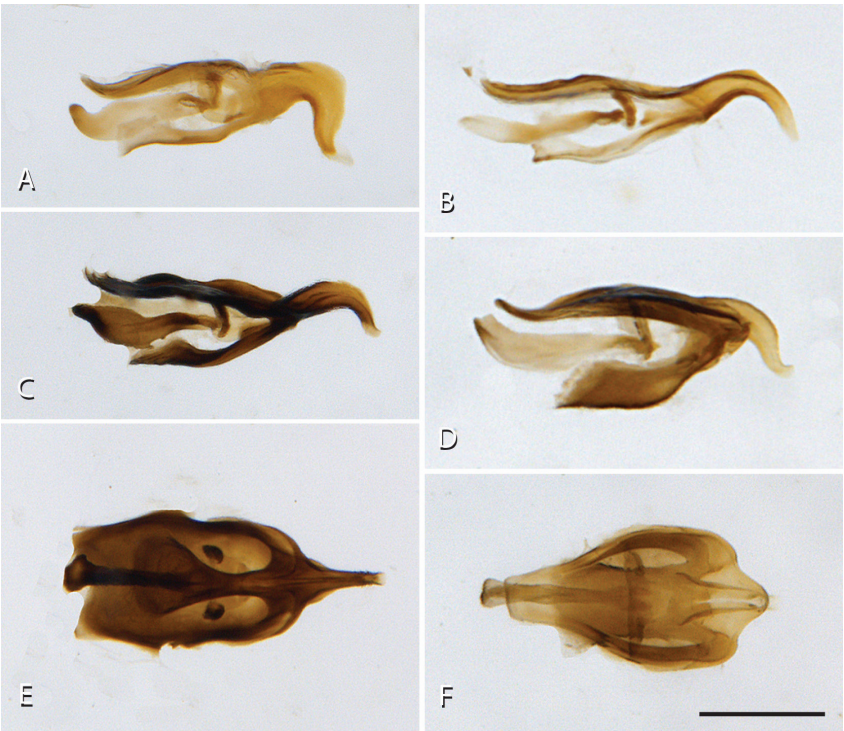

Figure 14. *Neotherevella* species, male phallus **A** *Neotherevella kozlovi* (Zaitzev, 1971), lateral view **B** *Neotherevella arenaria* (Lyneborg, 1976), lateral view **C** *Neotherevella londti* sp. nov., lateral view **D** *Neotherevella macularis* (Wiedemann, 1828), lateral view **E** *Neotherevella londti* sp. nov., ventral view **F** *Neotherevella macularis* (Wiedemann, 1828), dorsal view. Scale bar: 0.25 mm.

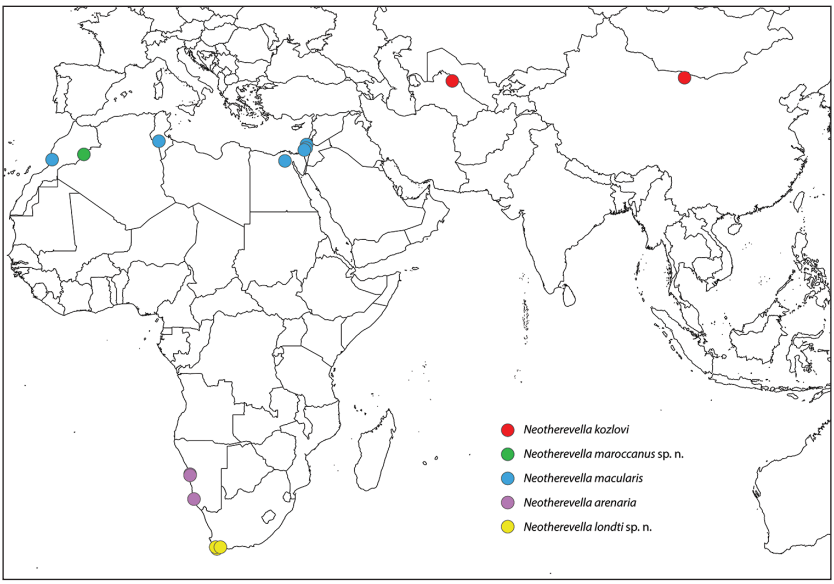

Figure 15. *Neotherevella* distribution.

Acknowledgements

We thank Severyn Korneyev and Martin Hauser for their assistance with translating original descriptions. Thank you to John Midgley for assistance with specimen loans. The authors have no funding to report and declare that no competing interests exist.

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African Invertebrates 94(2): 139–147 (2023)
doi: 10.3897/AfrInvertebr.64.91446
https://africaninvertebrates.pensoft.net

RESEARCH ARTICLE

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New Afrotropical species of *Wiedemannia* Zetterstedt (Diptera, Empididae, Clinocerinae)

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Academic editor: Kirstin Williams | Received 9 August 2022 | Accepted 26 September 2022 | Published 5 May 2023

https://zoobank.org/C41321E7-060F-460E-A894-61759A1176F7

Citation: Sinclair BJ (2023) New Afrotropical species of *Wiedemannia* Zetterstedt (Diptera, Empididae, Clinocerinae). In: Dikow T, Williams K, Midgley J (Eds) Festschrift for Jason Gilbert Hayden Londt. African Invertebrates 94(2): 139–147. https://doi.org/10.3897/AfrInvertebr.64.91446

Abstract

Two new species of Afrotropical *Wiedemannia* Zetterstedt are described: *W. kilimanjaro* **sp. nov.** (Tanzania), *W. londti* **sp. nov.** (Malawi). Both species are illustrated and an updated key to Afrotropical species of *Wiedemannia* is provided. The distributions of all Afrotropical species of *Wiedemannia* are mapped and the disjunct distribution briefly discussed.

Keywords

aquatic dance flies, Malawi, new species, Tanzania

Introduction

Aquatic dance flies of the subfamily Clinocerinae (Diptera: Empididae) are associated with streams, rivers and boggy areas and found worldwide, except Antarctica. Species are found from lowlands to high altitudes, usually associated with less human-impacted habitats. In the Afrotropical Region, there are 30 described species and six genera of Clinocerinae (Sinclair 1999a, b; Sinclair and Daugeron 2017). Some additional 18 undescribed species of Afrotropical Clinocerinae have so far been identified (Sinclair, unpubl. obs.).

The genus *Wiedemannia* Zetterstedt are among the larger-sized flies of Clinocerinae and often occur in broader streams and rivers. The Afrotropical species of *Wiedemannia* form a monophyletic group, supported by characters of the male terminalia (i.e., prolongation of subepandrial sclerite and base of distiphallus with paired spicule-clothed membranous sacs and attached at antero-apical margin of phallic shaft) (Sinclair 1999a, b) and appears to be most closely related to the *W. zetterstedti* group based on several long, erect setae on the fore coxae and acrostichal setae greatly reduced, only a few present anterior to second dorsocentral setae (Sinclair 1999a, b; Ivković et al. 2019, 2022). The Afrotropical species of *Wiedemannia* are divided into three species-groups: *W. rudebecki*-group from southern Africa (*W. edendalensis* Smith, *W. hughesi* Smith, *W. gorongoza* Smith, *W. rudebecki* Smith), the *W. reducta*-group from Uganda (*W. reducta* Garrett Jones, *W. submarina* Garret Jones) and the *W. aquatica*-group from Kenya (*W. aquatica* (Becker), *W. kenyae* Sinclair) (Sinclair 2003). In addition to the above eight species, two new species from Malawi and Tanzania (Sinclair and Daugeron 2017) are described in the present study.

Materials and methods

This study is based on material loaned from the following institutions:

NMSA KwaZulu-Natal Museum, Pietermaritzburg, South Africa;
ZMUC Natural History Museum of Denmark, Zoological Museum, Copenhagen, Denmark.

Label data for primary types are cited from the top downward, with the data from each label in quotation marks. Labels are cited in full, with original spelling, punctuation, and date, and label lines are delimited by a slash (/). The repository of each type is given in parentheses. Terms used for adult structures primarily follow those of Cumming and Wood (2017). Photographs of pinned specimens were taken with a Leica camera model DFC5400 using Leica Application Suite X. SimpleMappr (Shorthouse 2010) was used to plot the distribution of each species.

Taxonomy

***Wiedemannia kilimanjaro* sp. nov.**
https://zoobank.org/E7CC8AE9-ABA7-4060-9A42-961245D1DE75

Recognition. This species is distinguished by its fully developed wings, numerous slender setae scattered over the hypandrium and three inner lobes of the elongate clasping cercus.

Etymology. This species is a noun in apposition, named after the type locality.

Description. Male. Holotype mostly dark brown (see Remarks) (Fig. 4). ***Head*:** ocellar setae lost; several pairs of short posterior setulae; 3–5 upper postocular setae strong,

spine-like, not overlapping eye; lower postocular setae slender, longer. Genal width one-fourth height of eye. Antenna brown; scape slightly longer than pedicel; postpedicel pointed ovate; arista-like stylus short, tip blunt, about twice as long as postpedicel.

***Thorax*:** antepronotum with strong, long lateral seta, nearly as long as postpronotal seta. Proepisternum with several long, brown setae. Mesonotum with 5 rather weak dorsocentral setae, with several short setulae intermixed; several short acrostichal setulae, anterior to second dorsocentral seta; 1 postpronotal seta, with several short, dark setulae; 2 notopleural setae, lower seta weaker, shorter than upper; 1 presutural supra-alar seta; 1 postsutural supra-alar seta, with several setulae; 1 postalar seta; 1 pair short scutellar setae, similar to dorsocentral setae, with dark marginal and discal setulae. Laterotergite with cluster of brown setae.

***Wing*:** length 4.6 mm; membrane infuscate, veins darker; basal costa seta not extending to humeral crossvein. Origin of veins M_1 and M_2 widely separated at end of cell dm, subequal to length of crossvein r-m. Vein CuA+CuP absent. Pterostigma not visible. Costal margin with short, strong erect setae beyond apex of Sc. Halter with dark knob.

***Legs*:** uniformly covered with rows of small dark setulae, slightly longer on ventral side of fore femur; fore femur without strong preapical setae; fore coxa with 2 long erect setae; hind tibia with 4–5 erect, spine-like posterodorsal setae.

***Abdomen*:** concolourous with thorax, covered in short setae. Tergite 8 narrow, band-like.

***Terminalia* (Figs 1, 2):** hypandrium longer than length of epandrium, with numerous long, slender setae extending onto lateral face; membrane at base of hypandrium with sclerotized strips. Epandrium subtriangular, densely covered with dark, long setae; surstylus with snout-like apex and long lateral setae. Subepandrial sclerite with pointed apex, projecting free between bases of clasping cercus. Clasping cercus L-shaped in lateral view; apex rounded; inner face without peg-like setae; subequal in length to height of epandrium; inner base expanded medially into one elongate lateral, tapered lobe and medially into forked process with stout setae on rounded lobe. Cercal plate with 4 long setae confined to upper sclerite. Phallus slightly arched; apex of shaft with pair of membranous sacs on either side; distiphallus sinuous, tapered, without swelling in middle.

Female. Unknown.

Distribution. This species is known only from Mt. Kilimanjaro, Tanzania (Fig. 8).

Type material. ***Holotype*** ♂, labelled (Fig. 5): "Tanzania, Kilimandjaro/ Shira Plateau [-3.054°, 37.275°], 4000 m./ 27.-28. Dec. 1975/ N. Møller Andersen leg."; "HOLOTYPE/ Wiedemannia/ kilimanjaro/ Sinclair" [dissected] (ZMUC).

Remarks. *Wiedemannia kilimanjaro* is most closely related to *W. kenyae* on the basis of the elongate, narrow clasping cercus and numerous slender setae on the hypandrium and assigned to the *W. aquatica* group.

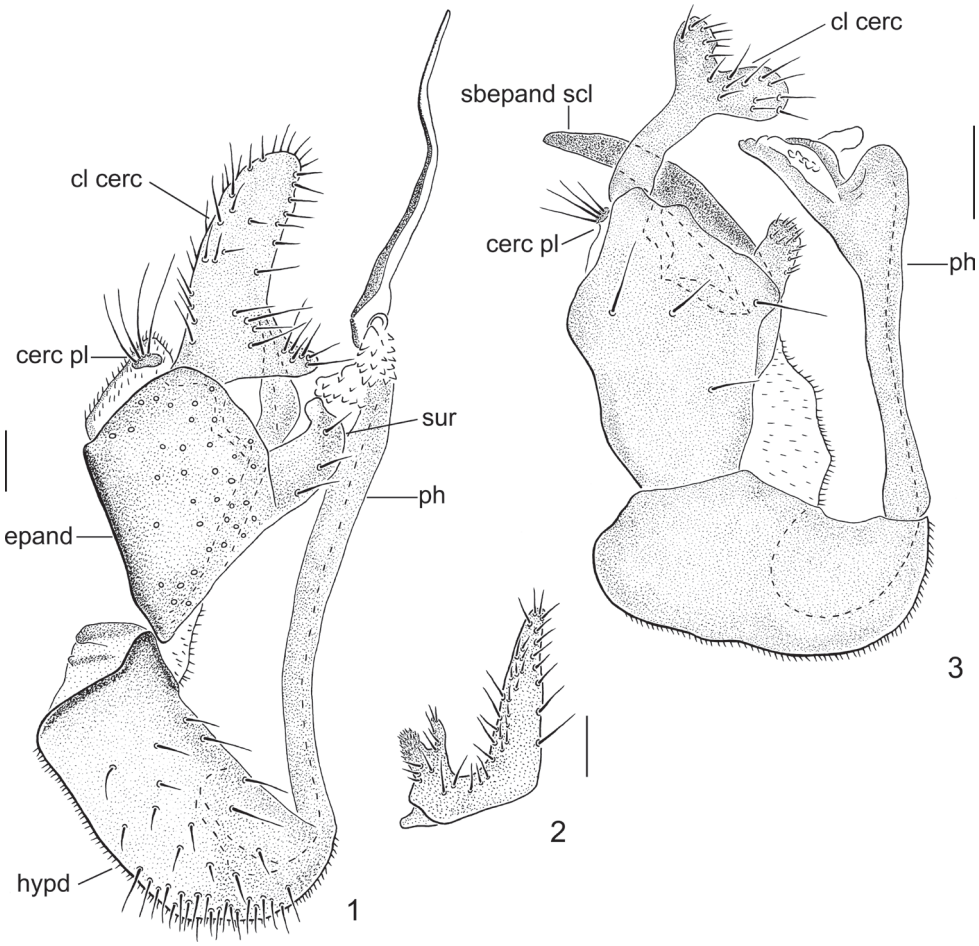
The holotype is dark brown, which is unusual for specimens of *Wiedemannia*, which usually have distinct bluish pruinescence. Some bluish pruinescence is visible at certain angles, but the brownish colouration could have resulted during the preservation process. Additional specimens of this species will certainly assist in resolving its true colouration.

***Wiedemannia londti* sp. nov.**
https://zoobank.org/23A887FB-D28F-49D1-BA14-78C77CD16AC2

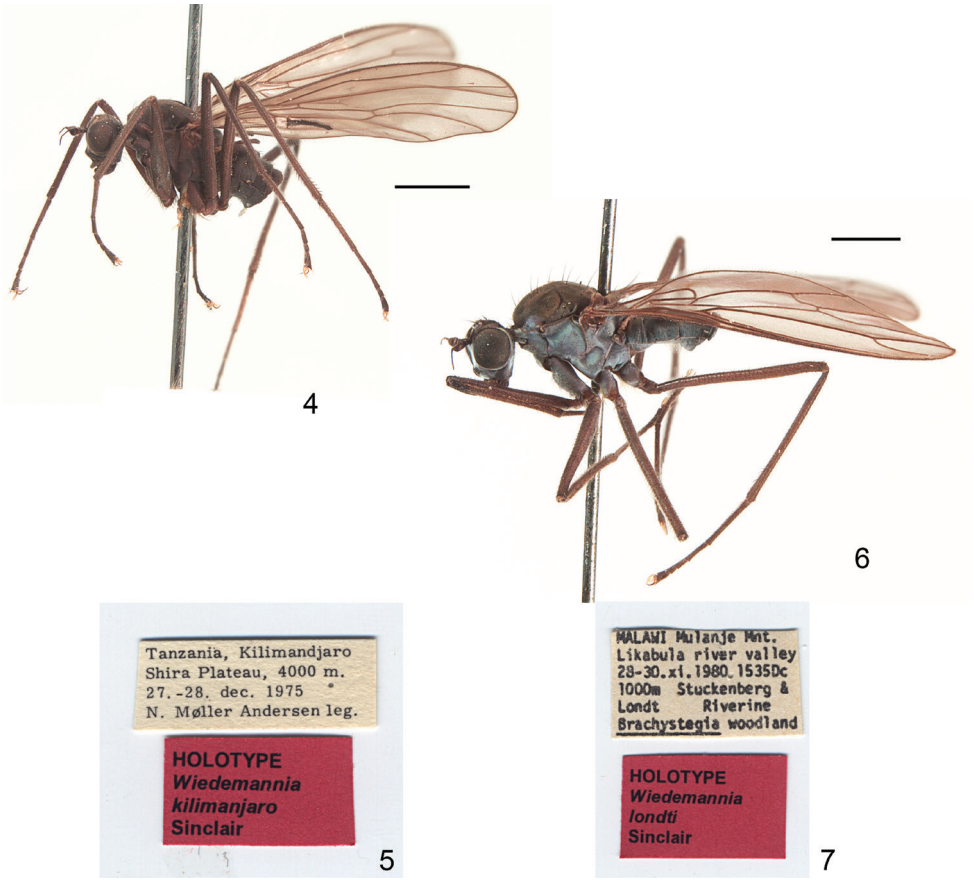
Recognition. This species is distinguished by its fully developed wings, fore coxae without erect, outstanding setae, clasping cercus with narrow base and Y-shaped apex, blade-like subepandrial sclerite and oddly shaped phallus, with reduced distiphallus.

Etymology. It is my pleasure to name this species in honour of Jason Londt. Jason was very welcoming to me as a young visitor to the Natal Museum in 1994 and I always look forward to meeting up with him at meetings of the International Congress of Dipterology.

Description. Male. ***Head*:** face, gena and occiput with blue pruinescence (Fig. 6); vertex brown. Face with faint brownish median stripe; apex of facial cleft velvety brown with bright oval blue pruinescent patches on either side of cleft in frontal view. Ocellar



Figures 1–3. Male terminalia of Afrotropical *Wiedemannia* **1** *W. kilimanjaro* sp. nov.. lateral view **2** *W. kilimanjaro* sp. nov., clasping cercus, anterior view **3** *W. londti* sp. nov., lateral view. Scale bars: 0.1 mm. Abbreviations: cerc pl – cercal plate; cl cerc – clasping cercus; epand – epandrium; hypd – hypandrium; ph – phallus; sbepand scl – subepandrial sclerite; sur – surstylus.



Figures 4–6. Afrotropical *Wiedemannia*, holotypes **4** *W. kilimanjaro* sp. nov., habitus, lateral view **5** *W. kilimanjaro* sp. nov., labels **6** *W. londti* sp. nov., habitus, lateral view **7** *W. londti* sp. nov., labels. Scale bar: 1.0 mm (**4**); 0.75 mm (**6**).

triangle thinly pruinescent; ocellar setae long, slender, longer than postpronotal seta; several pairs of short posterior setulae; 4 upper postocular setae strong, spine-like, not overlapping eye; lower postocular setae slender, longer. Genal width one-third height of eye. Antenna brown; scape slightly longer than pedicel; postpedicel pointed ovate; arista-like stylus short, tip blunt, about twice as long as postpedicel.

***Thorax*:** pleura and postpronotal lobe with blue pruinescence; scutum brown with faint pair of black vittae. Antepronotum with strong, long lateral seta, nearly as long as postpronotal seta. Proepisternum with several long, pale setae. Mesonotum with 5 long dorsocentral setae, with several short setulae intermixed; several short acrostichal setulae, anterior to second dorsocentral seta; 1 postpronotal seta, with several short, dark setulae; 2 notopleural setae, lower seta weaker, shorter than upper, with numerous black setulae; 1 presutural supra-alar seta, with numerous black setulae; 1 postsutural supra-alar seta, with several setulae; 1 postalar seta; 1 pair scutellar setae, longer than dorsocentral setae, with dark marginal and discal setae and setulae. Laterotergite with cluster of pale setae.

***Wing*:** length 4.1 mm; membrane infuscate, veins darker; basal costa seta not extending to humeral crossvein. Origin of veins M_1 and M_2 widely separated at end of cell dm, subequal to length of crossvein r-m. Vein CuA+CuP absent. Pterostigma not visible. Costal margin with short, strong erect setae beyond apex of Sc. Halter with dark knob; base of shaft pale brown.

***Legs*:** coxae with blue pruinescence, concolourous with pleura; remaining leg segments dark brown. Fore femur with posteroventral row of fine setae, shorter than width of femur; fore tibia with erect ventral setae, shorter than width of tibia; otherwise uniformly covered with rows of small dark setulae; fore femur without strong preapical setae; fore coxa without erect setae; hind tibia with 2–3 pairs of strong ventral setae.

***Abdomen*:** blue pruinescent, concolourous with thorax, covered in short setae. Tergite 8 narrow, band-like.

***Terminalia* (Fig. 3):** hypandrium robust, subequal to length of epandrium. Epandrium subrectangular, produced dorsally; surstylus rounded, knob-like, with several marginal setulae. Clasping cercus arched, Y-shaped in lateral view; apical lobes, broadly rounded; inner face without peg-like setae; shorter than height of epandrium; without inner basal lobes. Subepandrial sclerite robust, blade-like, with pointed apex, projecting free beyond bases of clasping cercus. Cercal plate with 4 long setae confined to upper sclerite. Phallus straight; apex of shaft without membranous sacs, broadly rounded; apex of shaft prolonged anteroapically as slender process; distiphallus greatly reduced.

Female. Unknown.

Distribution. This species is known only from the type locality in Malawi (Fig. 8).

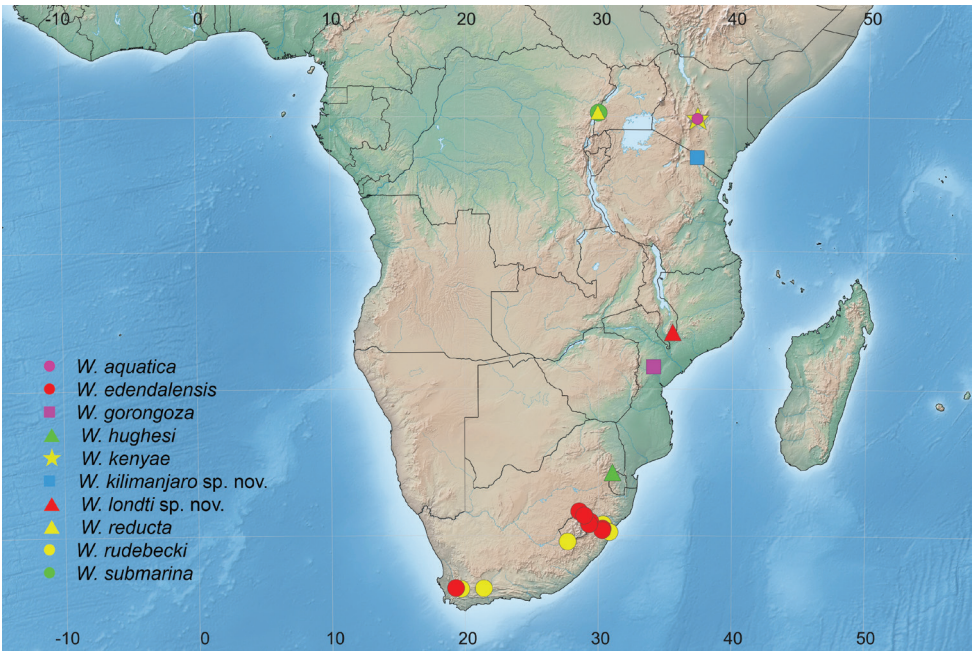


Figure 8. Distribution of *Wiedemannia* in the Afrotropical Region.

Type material. ***Holotype*** ♂, labelled (Fig. 7): "MALAWI Mulanje Mnt./ Likabula river valley [-15.938°, 35.519°]/ 28–30.xi.1980 1535Dc/ 1000m Stuckenberg &/ Londt Riverine/ Brachystegia woodland"; "HOLOTYPE/ Wiedemannia/ londti/ Sinclair" [dissected] (NMSA).

Remarks. This is the first species of Empididae to be described from Malawi. *Wiedemannia londti* is most similar to the odd South African species, *W. hughesi* with absence of erect setae on the fore coxae, enlarged hypandrium and reduction of the distiphallus.

Key to males of Afrotropical species of *Wiedemannia*

1 Wings greatly reduced and strap-like ..... ***W. reducta* Garrett Jones**
– Wings normally developed..... **2**
2 Fore coxae without 2–3 erect setae; apical filament of phallus or distiphallus greatly reduced; apex of phallic shaft broader than base, without membranous sacs..... **3**
– Fore coxae with 2–3 erect setae; apical filament of phallus or distiphallus long and slender; apex of phallic shaft at most slightly broader than base, with membranous sacs..... **4**
3 Clasping cercus deeply divided into separate lobes; phallus strongly bent near mid-length (Sinclair 1999b, fig. 19)..... ***W. hughesi* Smith**
– Clasping cercus with apex shallowly divided into forked, broadly rounded paired lobes; phallus nearly straight (Fig. 3) ..... ***W. londti* sp. nov.**
4 Clasping cercus deeply U-shaped (Sinclair 1999b, fig. 21) .... ***W. rudebecki* Smith**
– Clasping cercus not deeply U-shaped..... **5**
5 Clasping cercus mitten-shaped in lateral view **6**
– Clasping cercus slender with expanded base in lateral view **8**
6 Apex of phallic shaft somewhat expanded (Sinclair 1999b, fig. 18) .... ***W. edendalensis* Smith**
– Apex of phallic shaft slender, not expanded..... **7**
7 Clasping cercus with distinct, broadly rounded anterior lobe; posterior lobe of clasping cercus expanded posteriorly (Smith 1969, fig. 378) .... ***W. gorongoza* Smith**
– Clasping cercus with weakly developed and broadly rounded anterior lobe; posterior lobe of clasping cercus expanded dorsally (Sinclair 1999a, fig. 5) ... . ***W. submarina* Garrett Jones**
8 Clasping cercus without distinct inner basal lobes; surstylus short and rounded (Sinclair 1999a, fig. 4)..... ***W. kenyae* Sinclair**
– Clasping cercus with distinct inner basal lobes; surstylus truncate or with attenuated apex..... **9**
9 Clasping cercus with pair of separate inner basal lobes; surstylus truncate and broad (Sinclair 1999a, figs 2, 3) ..... ***W. aquatica* (Becker)**
– Clasping cercus with single inner basal lobe, divided apically; surstylus with attenuated and hooked apex (Figs 1, 2)..... ***W. kilimanjaro* sp. nov.**

Discussion

There are now 10 described species of *Wiedemannia* in the Afrotropical Region. The species are rather disjunct in Africa (Fig. 8) and are mostly confined to > 2000 m in the Afromontane region of the tropics, but reaching near sea-level in more temperate latitudes of southern Africa (Sinclair 1999a, b). The genus occurs in cooler water environments with rocky substrates. The geographical distribution and evolution of the group in Africa was discussed by Sinclair (1999a). Most collections for Clinocerinae have focused on South Africa. Greater collecting efforts throughout Africa are likely to produce additional records and species.

Acknowledgements

I am indebted to the following curators and their respective institutions for the loan of specimens: D.A. Barraclough (NMSA); T. Pape (ZMUC). Jessica Hsiung (Ottawa) competently inked the genitalia illustrations. Marija Ivković (Croatia) kindly commented on the manuscript.

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African Invertebrates 64(2): 149–163 (2023)
doi: 10.3897/AfrInvertebr.64.100481
https://africaninvertebrates.pensoft.net

RESEARCH ARTICLE

African Invertebrates
A journal of biodiversity research

A revision of the hover fly genus *Amphoterus* Bezzi, 1915 (Diptera, Syrphidae) with the description of one new species

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Academic editor: Torsten Dikow | Received 13 January 2023 | Accepted 16 March 2023 | Published 5 May 2023

https://zoobank.org/6EC41DFD-B88A-4265-BC1D-269F6933D60F

Citation: Midgley J, Bellingan T, Jordaens K (2023) A revision of the hover fly genus *Amphoterus* Bezzi, 1915 (Diptera, Syrphidae) with the description of one new species. In: Dikow T, Williams K, Midgley J (Eds) Festschrift for Jason Gilbert Hayden Londt. African Invertebrates 64(2): 149–163. https://doi.org/10.3897/AfrInvertebr.64.100481

Abstract

Amphoterus Bezzi, 1915 is a genus of rarely collected Afrotropical hover flies (Diptera, Syrphidae). We present the first description of the female of *A. braunsi* van Doesburg, 1956, redescribe the males of *A. braunsi* van Doesburg, 1956 and *A. cribratus* Bezzi, 1915, and describe a new species, *A. londti* **sp. nov.** We also provide the first colour photographs of two of the species, the first DNA barcodes for the genus and a key to identify the species.

Keywords

Afrotropical Region, flower fly, taxonomy

Introduction

The genus *Amphoterus* Bezzi, 1915 is a rare group of Afrotropical hover flies (Diptera, Syrphidae), known from only three published records. They are medium-sized (9–11 mm) with elongate antennae, dichoptic males and wing venation that resembles that of *Eumerus* Meigen, 1822 (Ssymank et al. 2021). It has been suggested that they

might represent aberrant species of *Eumerus* (Whittington 2003) but it is accepted that the genus is valid (Smith and Vockeroth 1980; Dirickx 1998; Ssymank et al. 2021).

The genus was erected based on the single male type specimen of *Amphoterus cribratus* Bezzi, 1915 from Kenya (as British East Africa) (Bezzi 1915) (Fig. 1). Later, a female *A. cribratus* was described from Kalemie (as Albertville) (Fig. 1) in the eastern Democratic Republic of the Congo (Brunetti 1926) and a male *Amphoterus braunsi* van Doesburg, 1956 was described from Barberton in Mpumalanga (as Transvaal), South Africa (van Doesburg 1956) (Fig. 1). All three descriptions are brief and based on a single specimen and Brunetti (1926) and van Doesburg (1956) make their descriptions in reference to Bezzi's (1915) description only. In addition, the only published diagrams are a dorsal habitus drawing of the holotype male of *A. cribratus* (Bezzi 1915) and lateral habitus, lateral head and wing photographs of a female *A. braunsi* (Ssymank et al. 2021). The female of *A. braunsi* remains undescribed.

In the 65 years since van Doesburg (1956), several specimens of the genus have been accumulated in collections, including two female *A. braunsi* specimens collected by Jason Londt. Here, we redescribe the known males of *Amphoterus*, based on known and new material, describe the female of *A. braunsi* for the first time, describe a new species in the genus, provide high-quality images of all species and provide the first DNA barcodes for the genus.

Material and methods

Material of the following institutions was studied:

AMGS Albany Museum, Makhanda, South Africa;
ICIPE International Centre of Insect Physiology and Ecology, Nairobi, Kenya;
KMMA Koninklijk Museum voor Midden-Afrika, Tervuren, Belgium;
NMSA KwaZulu-Natal Museum, Pietermaritzburg, South Africa;
NHMUK Natural History Museum, London, United Kingdom;
MZHC Finnish Museum of Natural History, Helsinki, Finland;
RMNH Naturalis Biodiversity Centre, Leiden, The Netherlands.

Despite searching the KMMA collection, the female *A. cribratus* described by Brunetti (1926) could not be located. The two specimens mentioned in De Meyer et al. (1995) are also missing (L. Njoroge pers. comm.).

Morphological terminology largely follows Cumming and Wood (2017) except that we used the suffixes pro-, meso- and meta- to refer to the first, second and third pair of legs or leg parts, respectively, pilosity to refer to hairs and pollinosity to refer to scutal microtrichia. Morphological observations were made with a Leica MZ8 stereomicroscope. Since the original description was very brief and used non-standard terminology, the male was redescribed to allow comparison with the female character states and indicate variation. Body length and wing length ranges given are minimum and maximum

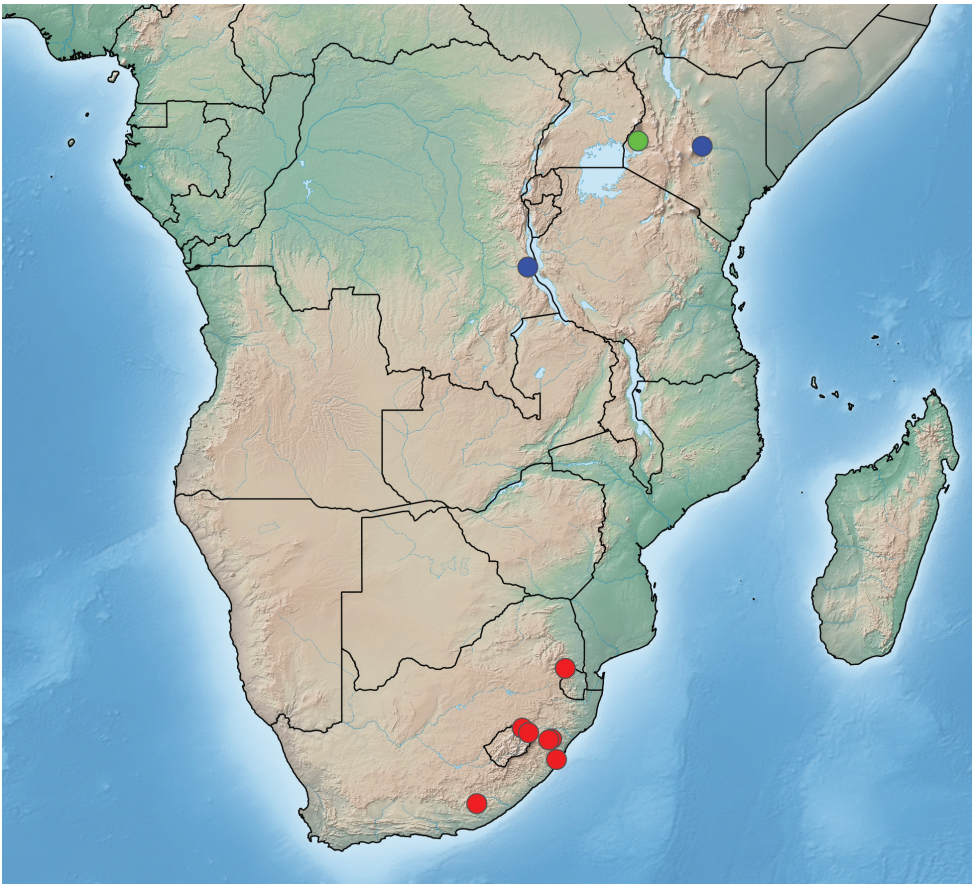


Figure 1. Distribution of *Amphoterus* species. Red: *A. braunsi*, green: *A. londti* sp. nov., blue: *A. cribratus*.

values observed in the studied material. Body measurements were taken between the frons and the posterior end of tergite IV; wing measurements were taken between the tegula and the apex of the wing. Stacking images were made using the set-up as outlined in Brecko et al. (2014) and stacking was done with the Zerene Stacker software (https://zerenesystems.com/cms/home). Literature references are given for the original taxon description. The distribution map was made using SimpleMappr (Shorthouse 2010).

Procedures for DNA barcoding followed Jordaens et al. (2015). To summarize, genomic DNA was extracted from a single leg using the NucleoSpin Tissue Kit (Macherey-Nagel, Düren), following the manufacturer's instructions. PCR reactions were undertaken in 25 µl reaction volumes, that contained 1.5 mM $MgCl_2$ in 1× PCR buffer (Invitrogen), 0.2 mM of each dNTP, 0.2 µM of each primer and 0.5 units of Taq polymerase (Invitrogen). The DNA barcode fragment of the mitochondrial cytochrome *c* oxidase subunit I (COI) gene was amplified using primer pair LCO1490 and HCO2198 (Folmer et al. 1994). The PCR profile was an initial denaturation step of 5 min at 95 °C, followed by 35 cycles of 45 s at 95 °C, 45 s at an annealing

temperature of 50 °C and 1.5 min at 72 °C, and ending with a final extension step of 5 min at 72 °C. PCR products were purified using the ExoSap protocol (Invitrogen) following the manufacturer's instructions. PCR-products were bidirectionally sequenced using the ABI PRISM BigDye Terminator v3.1 Cycle Sequencing Kit and run on an ABI3130xl Genetic Analyzer. Sequences were assembled in SEQSCAPE v2.5 (Life Technologies) and inconsistencies were checked by eye on the chromatogram. Uncorrected p-distances were calculated with MEGA v7 (Kumar et al. 2016). We did not attempt to obtain a DNA barcode for *A. cribratus* to avoid damaging the holotype, knowing that the specimen (collected > 100 years ago) was unlikely to yield a successful DNA barcode.

Results

Key to the species of *Amphoterus* (Figs 2–20)

1 All legs reddish brown, only coxae and bases of meta femorae and metatibiae darkened (Figs 7, 8); suture on thorax with contrasting golden fasciae (Figs 3, 4), which do not meet in the middle of the thorax; antenna dark reddish brown (Figs 11, 12); face with golden pollinosity and golden setae (Figs 11, 12); pedicel and postpedicel of the equal or subequal length ..... ***A. braunsi* van Doesburg**

– Legs black to very dark brown (Figs 9, 10); suture without golden fasciae (Figs 5, 6), uniform like the rest of the thorax; antenna black (Figs 13, 14); face with yellow or white silver pollinosity and white setae (Figs 13, 14) **2**

2 Postpedicel long, in female 4.1× as long as high (Fig. 14); face covered with white pollinosity; allula narrow, 2.9 times as long as broad; pedicel shorter than postpedicel (0.8:1) ..... ***A. londti* sp. nov.**

– Postpedicel 2.8 × as long as high (Fig. 13); face covered with yellow pollinosity; allula broader, 2.3 times as long as broad; pedicel longer than postpedicel (1.25:1) ..... ***A. cribratus* Bezzi**

Species accounts

***Amphoterus* Bezzi, 1915**

Amphoterus Bezzi, 1915: 116. Type species: *Amphoterus cribratus* Bezzi (by original designation).

Notes. *Amphoterus* species have bare eyes (not setulose as stated in Ssymank et al. 2021) and the antennae are elongate (short in *Eumerus* and *Megatrigon*) with a bare antennal arista. The body is dark (brown or black) and strongly punctate. The males are broadly dichoptic. The wing venation resembles that of *Eumerus* and *Megatrigon* with a nearly straight vein R_{4+5} and a recessive vein M_1.

Figure 2. Live *Amphoterus braunsi*, collected from sunny patch in indigenous forest at Rainbow Gorge, KwaZulu-Natal, South Africa. Specimen at AMGS.

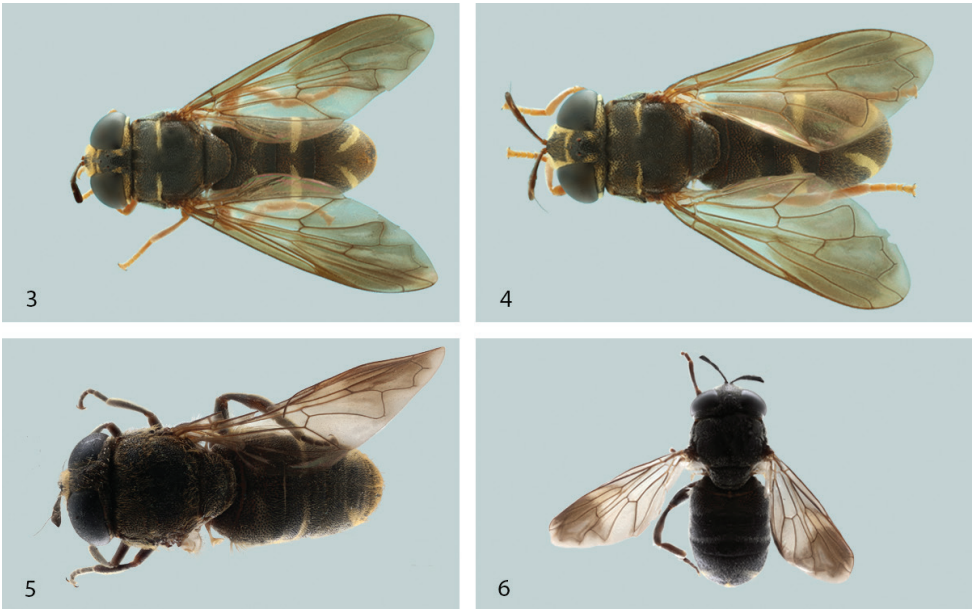
Amphoterus braunsi van Doesburg, 1956

Figs 2, 3, 4, 7, 8, 11, 12, 15–17

Amphoterus braunsi van Doesburg, 1956, 22: 517.
Amphoterus braunsi van Doesburg – Smith and Vockeroth 1980: 497; Dirickx 1998: 4.
Eumerus braunsi (van Doesburg) – Whittington 2003, 10: 592. [citation only]

Material examined. ***Holotype*:** South Africa • 1♂; Mpumalanga, Barberton; Dr Brauns leg.; NMSA-Dip 051409, NMSA type number 731.

***Other material*:** South Africa • 1♂; Eastern Cape, Katberg; 15–30 Jan. 1933; R.E. Turner leg. (NHMUK). • 1♂; KwaZulu-Natal, Karkloof nr Mount Alida, Geekies Farm; 1500 m a.s.l.; 3 Jan. 1962; B. & P. Stuckenberg leg.; NMSA-Dip 052854 (NMSA). • 3♀♀; KwaZulu-Natal, Royal Natal National Park; 2828DB; late Jan. 1971; H. Townes leg.; NMSA-Dip 059707, 059708, 051873 (NMSA). • 1♂; KwaZulu-Natal, Karkloof, Geekies Farm; 2930AB; 21 Dec. 1983; B.R. Stuckenberg leg.; NMSA-Dip 056083 (NMSA). • 2♀♀; KwaZulu-Natal, Karkloof Nature Reserve; 29°18'10"S, 30°13'40"E; 1260 m a.s.l.; 10 Dec. 1987; J. & H. Londt leg.; Mixed *Podocarpus* forest edge; NMSA-Dip 059706, 064223 (NMSA). • 1♀; KwaZulu-Natal, Vernon Crookes Nature Reserve near Umzinto; 30°16'S, 30°36'E; 2–7 Nov. 2008; G. Davies leg.; RMCA DNA 165C02; NMSA-Dip 75216, GenBank: OQ706113 (NMSA). • 1♀; KwaZulu-Natal, Karkloof, near Benvie Farm; 29°15'36.8"S, 30°21'08"E; 1392 m a.s.l.; 10 Jan. 2015; M. Reemer



Figures 3–6. *Amphoterus* species, dorsal view **3** *A. braunsi* (♂) **4** *A. braunsi* (♀) **5** *A. cribratus* (♂) **6** *A. londti* sp. nov. (♀).

leg.; MRSA078; (RMNH). • 1♂ 1♀, KwaZulu-Natal, Karkloof Canopy tour forest; 29°19'18"S, 30°15'43"E; 03 Dec. 2017; G. Ståhls & E. Rättel leg.; http://id.luomus.fi/GJ.2928, Stahls_Y2423, GenBank: OQ706109 (MZHC). • 1♀; KwaZulu-Natal, Karkloof, Shawswood; -29.30356, 30.30606; 12 Nov. 2020; J. Midgley leg.; NMSA-Dip 206396 (NMSA). • 1♂ 2♀♀; KwaZulu-Natal, Karkloof, Shawswood; -29.30356, 30.30606; 24 Nov. 2020; J. Midgley leg.; RMCA DNA 1370E06, 1370E07, 1370E08; NMSA-Dip 206389, 206390, 206391, GenBank: OQ706110, OQ706111, OQ706112 (NMSA). • 2♀♀; KwaZulu-Natal, Karkloof, Shawswood; 9 Jan. 2021; L. Mva leg.; NMSA-Dip 209856, 209857 (NMSA). • 1♂ 1♀ KwaZulu-Natal, Didima, Rainbow Gorge forest, -28.959933, 29.226848; 22 Jan. 2023; T. Bellingan, K. Jordaens & J. Midgley leg. (RMCA). • 1♂ 1♀ KwaZulu-Natal, Didima, Rainbow Gorge forest, -28.959933, 29.226848; 23 Jan. 2023; T. Bellingan, K. Jordaens & J. Midgley leg. (AMGS).

Description. Male: length 9.5–9.7 mm, wing: 7.5–8 mm.

***Head*:** Eyes broadly dichoptic. Face dark brown; golden yellow pilose; evenly dense golden yellow pollinose. Gena dark brown; golden yellow pilose; sparse golden yellow pollinose. Oral opening occupies about ½ of width between eyes. Frons dark brown; golden yellow pilose; golden yellow pollinose, with a bare patch above the antennae and a bare band between the eyes about ⅔ of the way to form the antennal bases to the anterior ocellus, with a short suture from the angle of the eye extending about 1/6 of the width of the frons on the bare band. Ocellar triangle dark brown; bare anteriorly, with golden brown to dark brown pilosity posteriorly; lacking pollinosity. Ocellar triangle obtuse, distance between posterior ocelli 1.5 times the distance between anterior

ocellus and posterior ocellus. Occiput dark brown; golden yellow to golden brown pilose, darker dorsally and paler laterally; golden yellow pollinose laterally, bare dorsally. Eye bare, facets of equal size across eye. Scape short, brown, with a few thick dark brown hairs at the dorsoapical and ventroapical margins, lateroapical margins bare. Antenna with pedicel elongate, about as long as postpedicel, 4.1 times as long as high, brown, covered in stout dark brown hairs, sparser basally, some white pollinosity near apex. Postpedicel elongate, 3.1 times as long as high, dorsal and ventral margin almost parallel basally, widest at ¾ of length, rounded apically; slightly darker brown than basal antennal segments and darker at apex; sparse white pollinose. Arista brown.

***Thorax*:** Scutum dark brown, punctate; postpronotum, the lateral part of the transverse suture and the posterior part of the postalar callus paler, brownish yellow; golden yellow pilose, with denser patches at the posterior margin between the postalar calli, with some darker brown pilosity on the margin between the suture and the postalar callus and on the postalar callus; with a horizontal vitta of sparse golden yellow pollinosity from the postpronotum to in line with the posterior corner of the eye and a horizontal vitta of dense golden yellow pollinosity along the transverse suture and three vittae of sparse white pollinosity, one medial and two mediolateral, reaching from the anterior margin of the scutum to in line with the suture. Scutellum with flattened apical rim, dark brown, golden yellow pilose. Posterior anepisternum, anterior anepimeron and dorsal katepisternum with pale pilosity which is golden yellow dorsally gradually becoming white ventrally. Katatergite with thin, fine golden pilosity. Anterior anepisternum, katepisternum, katepimeron and meron with sparse white pollinosity, which extends slightly onto the posterior anepisternum and anepimeron. Metasternum with white pilosity.

***Legs*:** Reddish brown, except for the coxa, which is dark brown and the metafemur and metatibia, which have some darker markings; golden yellow pilose and a few darker pile on the tarsus. Metafemur somewhat thickened medially, with a shallow, darkened suture posteroventrally at middle of length; metatibia expanded apically, with a small groove ventrally at middle of length. Metabasitarsus large, as thick as metatibia and as long as other tarsal segments combined.

***Wing*:** Brown infuscated, darker anterior to the spurious vein, sometimes with a small hyaline patch at the base of cell r_1. Cell r_1 open for about ⅓ of its length. Vein R_{2+3} straight for most of its length, turning sharply upwards as it joins the wing margin. Vein R_{4+5} straight. Crossvein *r-m* with a bend posteriorly, at about ⅔ of length of vein where the spurious vein would cross crossvein *r-m*. Vein M_1 recessive, with one or two appendices projecting towards the wing margin. Cell *dm* usually with a single appendix at posterior corner. Spurious vein weak, indistinct, only visible as a thickened fold. Entire wing microtrichose. Alula about 2.2 times as long as broad. Calypter yellowish, with long golden yellow pilosity. Haltere stem brown basally, becoming lighter distally, knob white.

***Abdomen*:** Punctate, dark brown, with yellow golden pilosity. Tergite (hereafter "T") 2 somewhat trapezoidal, about half as long as wide, with longer pilosity at anterior corners, anterolateral and dorsomedial sections raised somewhat, with diagonal vittae of golden yellow pollinosity in the grooves between these sections. T3 parallel sided, about half as long as wide, with diagonal vittae of golden yellow pollinosity in shallower

grooves than T2. T4 parallel sided anteriorly, rounded posteriorly, about as long as wide, evenly rounded dorsally, diagonal golden yellow pollinose vittae not in grooves.

***Genitalia*:** Hypandrium broad in lateral view, cerci trapezoid (Figs 15–17).

Female (as for male, except as noted): length 8.3–10.4 mm, wing 6.7–8.5 mm.

***Head*:** Dense golden yellow pollinosity over most of the face, but with two vittae of less dense pollinosity running from base of antennae to outer oral margin. Ocellar triangle obtuse, distance between posterior ocelli 1.6 times the distance between anterior ocellus and posterior ocellus. Frons more extensively bare than in male, golden yellow pilosity limited to lateral margins and a thin vitta bellow ocellar triangle, without sutures. Pedicel similar colour brown to basal antennal segments.

***Thorax*:** Entire postalar calli pale.

***Wing*:** Vein M_1 often with a third appendix projecting into cell r_{4+5}. Allula 2.1 times as long as broad.

***Abdomen*:** T2 parallel sided.

Comments. Compared to other species in the genus, a large number of specimens of *A. braunsi* are available for study. This is likely due to higher collecting effort in South Africa than in other African countries and not necessarily an indication of relative abundance. Several collecting events resulted in multiple specimens, suggesting that adults of this species may be abundant at particular times or in particular habitats. In specimens where habitat information is available, individuals were collected from indigenous forests. From our own observations, they are collected in sunny patches with or without flowers, where they rest on leaves or flowers (Fig. 2). Detailed flower visiting information is not available at present.

Amphoterus cribratus Bezzi, 1915

Figs 5, 9, 13, 18–20

Amphoterus cribratus Bezzi, 1915: 117.
Amphoterus cribratus Bezzi – Brunetti 1926, 13: 166; Smith and Vockeroth 1980: 497; De Meyer et al. 1995: 7; Dirickx 1998: 5.
Eumerus cribratus (van Doesburg) – Whittington 2003, 10: 592. [citation only]

Material examined. ***Holotype*:** Kenya • 1♂; British East Africa; T. J. Anderson leg.; NHMUK 010861152.

Description. Male: length 9.5 mm, wing: 8.2 mm.

***Head*:** Eyes broadly dichoptic. Face pale brown; yellowish white pilose; covered with dense yellow pollinosity. Gena pale brown; white pilose; with white pollinosity. Oral opening occupies about ⅓ of the distance between eyes. Frons reddish brown, with a short suture from the angle of the eye extending about ⅓ of the width of the frons, yellowish white pilose ventrally, darkening to pale brown dorsally; dense yellow pollinosity restricted to the area below the suture, though some sparse pollinosity may be present between the suture and the ocellar triangle. Ocellar triangle reddish brown; with sparse yellow to pale brown pilosity; lacking pollinosity. Ocellar triangle obtuse, posterior ocelli 1.25 times as far apart as the distance between anterior ocellus and

Figures 7–10. *Amphoterus* species, lateral view **7** *A. braunsi* (♂) **8** *A. braunsi* (♀) **9** *A. cribratus* (♂) **10** *A. londti* sp. nov. (♀).

posterior ocellus. Occiput reddish brown; pale brown pilose; sparsely yellowish white pollinose laterally, bare dorsally. Eye bare, facets of equal size across the eye. Scape short, reddish brown, with a few pale brown spines at the dorsoapical margin, lateroapical and ventroapical margins bare. Pedicel elongate, 1.25 times as long as postpedicel, 5 times as long as high, dark brown, covered in stout dark brown hairs, sparsely white pollinose. Postpedicel elongate, 2.8 times as long as high, dorsal and ventral margin almost parallel basally, widest at ¾ of length, dorsal margin sloping downwards in final ¼ and rounded ventroapically; dark brown; sparse white pollinose. Arista reddish brown.

***Thorax*:** Scutum brown, punctate; postpronotum, the lateral part of the transverse suture and the postalar callus paler, brownish yellow; golden brown pilose, with longer, denser patches at the posterior margin between the postalar calli, and with longer pilosity on the postalar callus; with a horizontal vitta of sparse white pollinosity from the postpronotum to in line with the posterior corner of the eye and a horizontal vitta of sparse white pollinosity along the transverse suture and five vertical vittae of sparse white pollinosity, one medial and two mediolaterally reaching from the anterior margin of the scutum to ¾ of the distance to the suture and two laterally, between postpronotum and postalar calli. Scutellum with flattened apical rim, brown, yellow pilose, pilosity longer on rim. Posterior anepisternum, anterior anepimeron and dorsal katepisternum with golden pilosity. Katatergite with thin, fine golden pilosity. All lateral sclerites with white pollinosity, sparse on dorsal anepisternum. Metasternum with pale yellow pilosity.

***Legs*:** Dark brown, except for the metafemur, which has some darker markings, and metatibia, which has a pale brown patch posteromedially; with pale yellow to

white pilosity. Metafemur somewhat thickened medially, metatibia expanded apically, with a small groove venteromedially. Metabasitarsus large, as thick as metatibia and as long as other metatarsal segments combined.

***Wing*:** grey infuscated in distal region, from subcostal anteriorly to branch of veins R_{2+3} and R_{4+5}, to crossvein *r-m* to posterior margin of *dm*, hyaline basally. Cell r_1 open for about ¼ of its length. Vein R_{2+3} straight for most of its length, turning sharply upwards as it joins the wing margin. Vein R_{4+5} straight. Crossvein *r-m* virtually straight. Vein M_1 recessive, with two appendices projecting towards the wing margin. Cell *dm* with a single appendix at posterior corner. Spurious vein developed, though less than other veins. Wing microtrichose over most of the surface, bare only in posterobasal part of cell *br*, basal part of cell *bm*, anterobasal part of cell *cup* and anterior part of alula. Allula 2.3 times as long as broad. Calypter yellowish white, with darker margin, with long white pilosity. Haltere stem brown basally, becoming lighter distally, knob yellow.

***Abdomen*:** Punctate, brown, with pale yellow pilosity anteriorly, yellow orange pilosity on apex of final segment. T2 slightly trapezoidal, about 2.5 times as wide as long, with longer pilosity at anterior corners, anterolateral and dorsomedial sections raised somewhat, with grooves between these sections, with white pollinosity from the anterior margin to the grooves, posteromedial section without pollinosity. T3 parallel sided, about 4 times as wide as long, with shallower grooves than T2, with a transverse vitta of white pollinosity on the anterior margin and diagonal vittae of white pollinosity from the medial part of the transverse vitta to the margin of the tergite. T4 parallel sided anteriorly, rounded posteriorly, about as long as wide, evenly rounded dorsally, without grooves; with a transverse vitta of white pollinosity on the anterior margin and diagonal vittae of white pollinosity from the medial part of the transverse vitta to the margin of the tergite.

***Genitalia*:** Hypandrium narrow in lateral view, cerci rounded (Figs 18–20).

Comments. Bezzi (1915) describes the integument as black, but the holotype has brown integument with black punctation. This may be degradation, as other specimens from this collection appear to have lightened similarly (e.g., the *A. braunsi* specimen from Katberg, South Africa), or may be an interpretation error due to the quality of historic microscopes and light sources. Integument colouration should be interpreted with care in *Amphoterus*. The female described by Brunetti (1926) and specimens mentioned in De Meyer et al. (1995) could not be located and are considered lost. The figure caption in Bezzi (1915) refers to a female specimen, but the description is of a male, correctly referred to as such in the text. Likewise, Brunetti (1926) refers to the holotype in text as both female (line 16, page 166) and male (line 17, page 166). These are both likely typological errors.

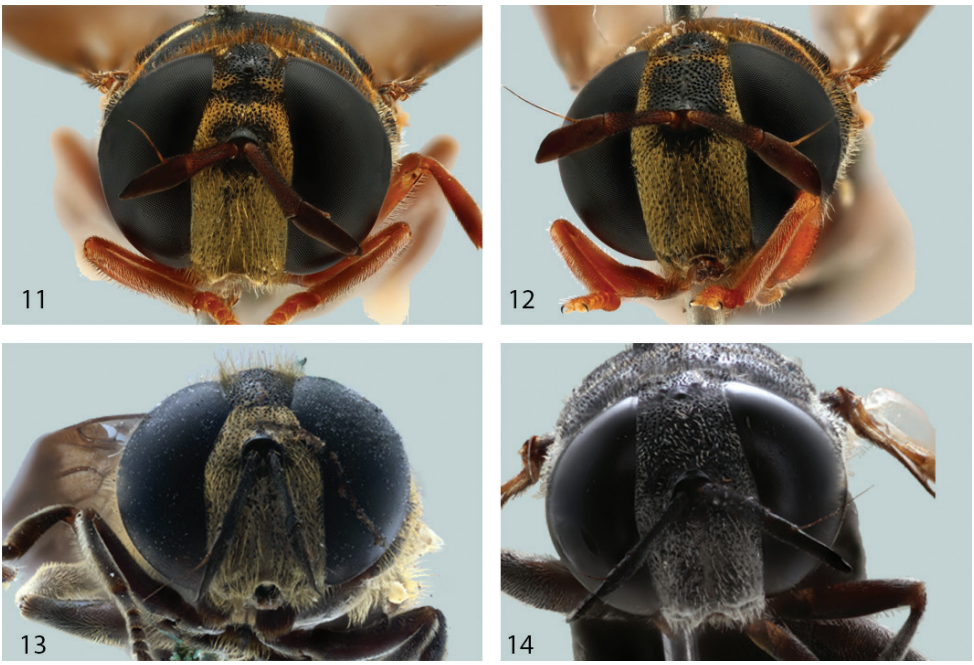
***Amphoterus londti* sp. nov.**
https://zoobank.org/759CC7CE-350A-4FFD-9024-2F4370D6A4E1
Figs 6, 10, 14

Material examined. ***Holotype*:** Kenya • 1♀; Eastern Province, Kibwe Forest; 2.41649°S, 37.95560°E; 925 m a.s.l.; 18 Nov.–2 Dec. 2017; R. Copeland leg.; Malaise trap in indigenous forest; RMCA DNA 1300E02; ICIPE 2973, GenBank: OQ706114 (ICIPE).

Diagnosis. Distinguishable from the other known species in the genus by the narrow alula which is almost three times as long as broad (slightly more than twice as long as broad in others) the long postpedicel, which is about 4.1 times as long as high (2.8–3.1 times in other species); the pedicel is shorter than the postpedicel (0.8:1) (longer in *A. cribratus* (1.25:1) or equal in length in *A. braunsi*), and the white pollinosity of the face (yellow to golden in other species).

Description. Female: length 9.2 mm, wing: 7.1 mm.

***Head*:** Face black; white pilose; covered with dense white pollinosity but with two vittae of less dense pilosity running from base of antennae to outer oral margin. Gena black; white pilose; with white pollinosity. Oral opening occupies about ⅓ of distance between eyes. Frons black; white pilose; dense white pollinosity restricted to ventrolateral corners and eye margin, though some sparse pollinosity may be present below ocellar triangle, without sutures. Ocellar triangle black; with sparse white to pale yellow pilosity; lacking pollinosity. Ocellar triangle obtuse, distance between posterior ocelli 1.7 times the distance between anterior ocellus and posterior ocellus. Occiput black; white to pale grey pilose, darker dorsally and paler laterally; white pollinose laterally, bare dorsally. Eye bare, facets of equal size across eye. Scape short, dark brown, with a few black spines at the dorsoapical margin and thinner hairs at the ventroapical margin, lateroapical margins bare. Pedicel elongate, 0.8 times as long as postpedicel, 7.5 times as long as high, dark brown, covered in stout black hairs dorsally, ventrally and laterally, with white spines medially, sparser basally, white pollinose. Postpedicel elongate, 4.1 times as long as high, dorsal and ventral margin almost parallel basally,



Figures 11–14. *Amphoterus* heads, frontal view **11** *A. braunsi* (♂) **12** *A. braunsi* (♀) **13** *A. cribratus* (♂) **14** *A. londti* sp. nov. (♀).

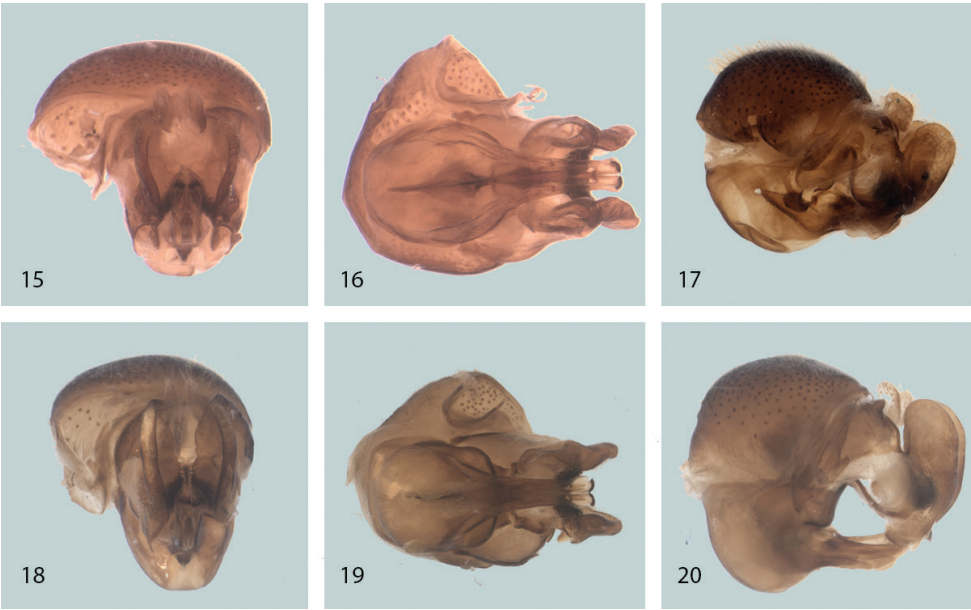
widest at ¾ of length, dorsal margin sloping downwards in final ¼ and rounded venteroapically; dark brown; sparse white pollinose. Arista brown.

***Thorax*:** Scutum black, punctate; postpronotum, the lateral part of the transverse suture and the postalar callus paler, brownish yellow; pale yellow to white pilose, with denser patches at the posterior margin between the postalar calli, with some darker brown pilosity on the margin between the suture and the postalar callus and with longer white pilosity on the postalar callus; with a horizontal vitta of sparse white pollinosity from the postpronotum to in line with the posterior corner of the eye and a horizontal vitta of sparse white pollinosity along the transverse suture and five vertical vittae of sparse white pollinosity, one medial and two mediolaterally reaching from the anterior margin of the scutum to in line with the suture and two laterally, between postpronotum and postalar calli. Scutellum with flattened apical rim, black, pale yellow to white pilose, pilosity longer on rim. Posterior anepisternum, anterior anepimeron and dorsal katepisternum with white pilosity. All lateral tergites with white pollinosity, sparse on dorsal anepisternum. Metasternum with white pilosity.

***Legs*:** Dark brown, except for the metafemur, which has some black markings, and metatibia, which has a pale brown patch posteromedially; with pale yellow to white pilosity. Metafemur somewhat thickened medially, metatibia expanded apically, with a small groove venteromedially. Metabasitarsus large, as thick as metatibia and as long as other tarsal segments combined.

***Wing*:** grey infuscated in distal region, from subcostal anteriorly to branch of veins R_{2+3} and R_{4+5}, to crossvein *r-m* to posterior margin of cell *dm*, hyaline basally. Cell r_1 open for about ¼ of its length. Vein R_{2+3} straight for most of its length, turning sharply upwards as it joins the wing margin. Vein R_{4+5} straight. Crossvein *r-m* with a bend posteriorly, at about ⅔ of length of vein where the spurious vein would cross crossvein *r-m*. Vein M_1 recessive, with two appendices projecting towards the wing margin. Cell *dm* with a single appendix at posterior corner. Spurious vein developed, though less than other veins. Wing microtrichose over most of the surface, bare only in basal 1/6 of cell r_1, anterior margin and posterobasal part of cell *br*, basal part of cell *bm*, basal part of cell *cua*, anterobasal part of cell *cup*, and anterior part of alula. Allula 2.9 times as long as broad. Calypter white, with long white pilosity. Haltere stem brown basally, becoming lighter distally, knob yellow.

***Abdomen*:** Punctate, black, with pale yellow to white pilosity anteriorly, yellow orange pilosity on apex of final segment. T2 parallel sided, about 2.5 times as wide as long, with longer pilosity at anterior corners, anterolateral and dorsomedial sections raised somewhat, with grooves between these sections; with white pollinosity from the anterior margin to the grooves, posteromedial section without pollinosity. T3 parallel sided, about 4 times as wide as long, with shallower grooves than T2; with a transverse vitta of white pollinosity on the anterior margin and diagonal vittae of white pollinosity from the medial part of the transverse vitta to the margin of the tergite. T4 parallel sided anteriorly, rounded posteriorly, about as long as wide, evenly rounded dorsally, without grooves; with a transverse vitta of white pollinosity on the anterior margin and diagonal vittae of white pollinosity from the medial part of the transverse vitta to the margin of the tergite.



Figures 15–20. *Amphoterus* male genitalia **15–17** *A. braunsi* **15** apical view **16** ventral view **17** lateral view **18–20** *A. cribratus* **18** apical view **19** ventral view **20** lateral view.

Etymology. The new species is named in honour of Dr Jason Londt, who not only collected material used in this study, but a wide variety of other Afrotropical Syrphidae. The specific epithet should be treated as a noun in the genitive case.

Comments. The male of the species is unknown.

DNA barcodes

We obtained six DNA barcodes which were submitted to GenBank under accession numbers OQ706109–OQ706114. The mean intraspecific p-distance within the five *A. braunsi* DNA barcodes was very low (0.004), while the mean interspecific p-distance between *A. braunsi* and the single *A. londti* was 0.05 and of a magnitude of what is observed between Afrotropical Eristalinae (Jordaens et al. 2015).

Discussion

We have revised the genus *Amphoterus*, providing detailed descriptions, photographs and DNA barcodes for the first time. The genus now contains three recognised species. Information on the genus is sparse, and this work is the first taxonomic contribution in more than 65 years (Bezzi 1915; Brunetti 1926; van Doesburg 1956).

In taxa that are seldom collected, it can be difficult to accurately link conspecific males and females. While the advent of DNA barcoding has made this easier, this

does not solve the problem for old specimens (Jordaens et al. 2015). Furthermore, specimens that were not kept in optimal conditions may also not yield DNA barcodes.

Enough male and female specimens of *A. braunsi* were studied to give some insight into sexual dimorphism. Males and females showed a high degree of similarity, and the differences that are present appear subtle. In contrast, the male of *A. cribratus* and female of *A. londti* show other differences between each other (e.g., the long and narrow alula and the long post pedicel). The description of the female *A. cribratus* (Brunetti 1926) also differs from the specimen of *A. londti* (particularly in the pattern of pollinosity on the scutum and tergite 4), while we observed little intra specific variation in the females of *A. braunsi*. Notably, Brunetti (1926) did not mention the antennal morphology, suggesting that he did not observe a difference between the sexes of *A. cribratus*, but the long postpedicel is a notable feature in *A. londti*. These observations support our decision that they are not conspecific, despite occurring in the same general area. Kenya is an ecologically diverse country containing three biodiversity hotspots (Marchese 2015). Regions within Kenya have distinct floras and faunas and the specimens may come from different regions within the country. Further collecting of *Amphoterus* in East and Central Africa may result in more specimens of these species becoming available for study, which may elucidate habitat preferences.

Despite the low number of specimens of *A. braunsi* available for study, multiple collecting events resulted in more than one specimen being collected. Three specimens were collected over eight weeks using Malaise traps at Shawswood (KwaZulu-Natal, South Africa) and a further three being hand-collected on one day during this period. Four specimens were also collected in two days at Rainbow Gorge (KwaZulu-Natal, South Africa). This suggests that, while never high in abundance, adults show distinct temporal patterns and may be locally common in certain habitats or at certain times.

Acknowledgements

Thomas Pape and Laban Njoroge are thanked for their assistance in trying to locate the missing specimens of *A. cribratus*. The following people are thanked for loaning material for study: Erica McAlister (NHMUK), Gunilla Ståhls (MZHC), Robert Copeland (ICIPE) and Menno Reemer (RMNH). Menno Reemer and Martin Hauser are thanked for comments on the manuscript. This project was financed through the JRS Biodiversity Foundation projects 60512 and 60868 PINDIP (Pollinator Information Network for two-winged insects (Diptera); www.pindip.org), Belspo-NRF joint network project DIPTATEACH (Diptera Museum collections as a source for Taxonomic research and Teaching activities) and DIPoDIP (Diversity of Pollinating Diptera in South African biodiversity hotspots) which is financed by the Directorate-general Development Cooperation and Humanitarian Aid through the Framework agreement with KMMA. Ezemvelo KZN Wildlife (Permit Nos. OP 2823/2020, OP 29/2020 and OP 3213-2022) are thanked and acknowledged for issuing the permits to conduct this work.

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African Invertebrates 64(2): 165–206 (2023)
doi: 10.3897/AfrInvertebr.64.104283
https://africaninvertebrates.pensoft.net

RESEARCH ARTICLE

African Invertebrates
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A review of the assassin-fly genus *Anypodetus* Hermann, 1907 with the description of a new species (Insecta, Diptera, Asilidae)

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Academic editor: Kirstin Williams | Received 29 March 2023 | Accepted 17 April 2023 | Published 5 May 2023

https://zoobank.org/23832803-9A79-416E-BF0D-7462CEC2A862

Citation: Dikow T, Dubus M (2023) A review of the assassin-fly genus *Anypodetus* Hermann, 1907 with the description of a new species (Insecta, Diptera, Asilidae). In: Dikow T, Williams K, Midgley J (Eds) Festschrift for Jason Gilbert Hayden Londt. African Invertebrates 64(2): 165–206. https://doi.org/10.3897/AfrInvertebr.64.104283

Abstract

The genus *Anypodetus* Hermann, 1907 (Diptera, Asilidae, Laphriinae) is reviewed. Currently, eight species are recognized from Botswana, Mozambique, Namibia, South Africa, Zimbabwe, and southern-most Zambia, i.e., *Anypodetus arachnoides* Oldroyd, 1974 widespread, *Anypodetus fasciatus* Hermann, 1907 widespread, *Anypodetus fascipennis* Engel, 1924 widespread, *Anypodetus leucothrix* Londt, 2000 restricted to southern Namibia and south-western South Africa, *Anypodetus macroceros* Londt, 2000 restricted to west-central Namibia, *Anypodetus nigrifacies* Ricardo, 1925 restricted to eastern-most South Africa and southern Mozambique, *Anypodetus phalaros* Londt, 2000 Namibia and South Africa, and *Anypodetus unicolor* Oldroyd, 1974 Namibia, eastern South Africa, adjacent Mozambique, and southern Zimbabwe. One new species, *Anypodetus londti* **sp. nov.** from Mozambique and Zimbabwe, is described for a total of nine species in the genus. Study of the secondary type specimens of *A. unicolor* from Namibia revealed that these specimens do not represent this species, reducing the number of species recorded from Namibia to six. *Anypodetus leucothrix* is recorded with several additional collecting events in central and northern Namibia extending its range significantly. Distribution, biology, occurrence in biodiversity hotspots *sensu* Conservation International, and seasonal imago flight activity are discussed. Diagnoses, photographs, specimen occurrence data, and an identification key to species are provided with the new species described in detail. The sexual dimorphism in the development of the mystax and wing vein variation in regard to the alignment of M_2 and M_3 are discussed and illustrated.

Keywords
Afrotropical, mystax sexual dimorphism, robber fly, wing vein variation

Introduction

Anypodetus Hermann, 1907 is a morphologically unique genus of assassin flies. It is one of two Afrotropical Laphriinae genera without pulvilli (Londt and Dikow 2017a, Figs 1, 12, 16) – the other one being *Prytanomyia* Özdikmen, 2006 (Londt and Dikow 2017b). Furthermore, the majority of species exhibit a unique arrangement of wing veins in that the proximal portion of vein M_2 and the distal portion of vein M_3 form a line from anterior to posterior with the crossvein m-m being absent or highly reduced (Figs 13, 19, 23, 31, 36, 47, 49). This venation is known from genera of Atomosiini (Laphriinae, Hermann 1912; Hull 1962; Dikow 2009) including the Afrotropical genera *Dichaetothyrea* Meijere, 1914, *Goneccalypsis* Hermann, 1912, and *Loewinella* Hermann, 1912 reviewed by Londt (1982) as well as *Orthogonis* Hermann, 1914 (Londt and Dikow 2017a). *Anypodetus fascipennis* Engel, 1924 is the exception as it is the only species of this genus with a distinct crossvein m-m (Figs 25, 29) but it is important to note that there appears to be intraspecific variation in the arrangement of these veins (see Discussion). Another interesting morphological feature is that several species exhibit distinct mystax morphology in females and males. In Asilidae, the sexes are usually only distinguishable morphologically by examining the tip of abdomen and features such as the mystax cannot be used to determine the sex of a specimen with a broken abdomen.

Anypodetus was reviewed by Londt (2000) who recognized eight species, which are restricted to southern Africa with a single specimen record from southern Zambia to date. These species have been collected throughout southern Africa (Figs 1–11). The highest species diversity is found in Namibia with seven recorded species (Londt 2000, Figs 51, 52, but see below).

This study was instigated by the discovery and collection of unique flies belonging to *Anypodetus* in the Namib Desert in west-central Namibia by the senior author that did not key out immediately to one of the known eight species in the identification key published by Londt (2000). Further study of these specimens revealed that they belong to a described species, *A. leucothrix* Londt, 2000 (Figs 30–35), but that they exhibit variation in the wing venation not originally described for this species. In addition, an undescribed species was discovered among natural history museum collections and is described below. This study was impacted by the Sars-CoV-2 pandemic in that not all specimens were available as a loan from museums. Even in the absence of seeing every single specimen, the identifications by Londt (2000) are regarded as accurate and have been included in the material examined adding their unique specimen identifier (NMSA-DIP-XXXXX) now established at the NMSA for future reference. Nonetheless, this review includes many specimens not studied by Jason Londt in 2000 from the NMBZ, SMNS, and USNM that greatly expand our understanding of the distribution of *Anypodetus* species (see also Fig. 11).

Figures 1–4. Photographs of *Anypodetus* species in nature **1** *A. fasciatus* male near Windhoek, Khomas, Namibia, 12 Nov 2012 **2** *A. fasciatus* male at Namib-Naukluft NP, Erongo, Namibia (23°34'05"S, 015°48'16"E) (see habitat photo in Fig. 7, iNaturalist observation https://www.inaturalist.org/observations/63337147), 8 Feb 2012 **3, 4** *A. fascipennis* female and male in copula at Aberdeen NR, Eastern Cape, South Africa (32°28'11"S, 024°01'23"E) (see habitat photo in Fig. 6, iNaturalist observation https://www.inaturalist.org/observations/152200595), 5 Dec 2015. Photographs by S. Marshall (**1**) and T. Dikow (**2–4**).

The taxonomic history of *Anypodetus* can be summarized as follows:

Hermann (1907) described the genus *Anypodetus* with its type species *Anypodetus fasciatus* Hermann, 1907 from Lichtenburg in the North-West province of South Africa.

Engel (1924) described *Anypodetus fascipennis* Engel, 1924 and *Anypodetus semirufus* Engel, 1924 both from Willowmore, Eastern Cape province of South Africa.

Ricardo (1925) described *Anypodetus maculipennis* Ricardo, 1925 from Sawmills and Bulawayo, Zimbabwe and *Anypodetus nigrifacies* Ricardo, 1925 from Lourenço-Marqués (= Maputo), Mozambique.

Engel (1929) highlighted the fact that J. Brauns, the collector of the types series of both *A. fascipennis* and *A. semirufus* at Willowmore, suggested that *A. semirufus* is a variety of *A. fascipennis* with which Engel agrees, therefore synonymyzing the two species. He furthermore synonymized *A. maculipennis* with *A. semirufus* (an unusual action since *semirufus* was just made a junior synonym) and *A. nigrifacies* with *A. fascipennis* (an action no other authors have accepted).

Figures 5–10. Habitat photographs where *Anypodetus* specimens were observed and collected **5** acacia savanna and white sand dune at Witsand NR, South Africa (28°34'42"S, 022°27'45"E), *A. fasciatus* collected, 31 Jan 2004 **6** Acacia bushveld and dry pan at Aberdeen NR, South Africa (32°28'11"S, 024°01'23"E), *A. fascipennis* collected (see Figs 3, 4), 5 Dec 2015 **7** sand dune and adjacent sandy area at Namib-Naukluft NP, Namibia (23°34'05"S, 015°48'16"E), *A. fasciatus* collected (see Fig. 2), 8 Feb 2012 **8** sparsely vegetated sand dune at Namib-Naukluft NP, Namibia (23°34'22"S, 015°48'37"E), *A. leucothrix* collected, 26 Sep 2017 **9** Acacia savanna at Fort Francois, Namibia (22°40'08"S, 016°37'15"E), *A. fascipennis* collected, 31 Jan 2012 **10** partly vegetated sand dune at Rooisand Desert Ranch, Namibia (23°16'27"S, 016°06'51"E), *A. fasciatus* collected, 19 Nov 2018. Photographs by T. Dikow.

Engel and Cuthbertson (1934) reviewed the biology of several Asilidae species from Zimbabwe and established the synonymy of *A. maculipennis* with *A. fascipennis*. They furthermore recorded *A. fasciatus* from northern Zimbabwe with grasshop-

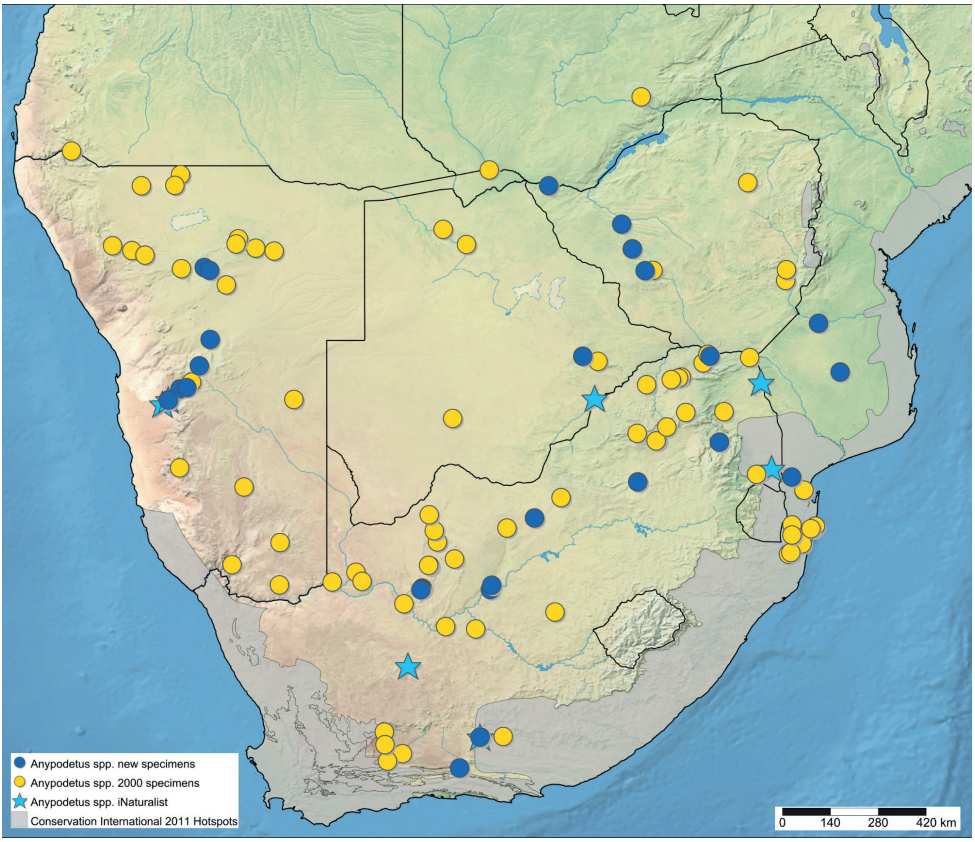


Figure 11. Map of southern Africa with elevational relief and biodiversity hotspots (*sensu* Conservation International in gray) and distribution of *Anypodetus* specimens studied by Londt (2000) and now (SimpleMappr https://www.simplemappr.net/map/20262). Distribution and occurrence data available in Google Earth KML file https://www.simplemappr.net/map/20262.kml.

per prey and *A. fascipennis* from southern Zimbabwe in Mopane forests (Fabaceae, *Colophospermum mopane*).

Oldroyd (1974) reviewed the genus and described *Anypodetus arachnoides* Oldroyd, 1974 from Sawmills, Zimbabwe, *Anypodetus rigidis* Oldroyd, 1974 also from Sawmills, and *Anypodetus unicolor* Oldroyd, 1974 from Ndumu Game Reserve in eastern-most South Africa. He synonymized *A. semirufus* and *A. maculipennis* with *A. fascipennis*, being unaware of Engel's (1929) and Engel and Cuthbertson's (1934) earlier actions, recognizing six valid species.

Oldroyd (1980) catalogued the following species: *Anypodetus fasciatus*, *A. fascipennis* with *A. maculipennis* as a junior synonym, *A. nigrifacies*, *A. arachnoides*, *A. rigidis*, and *A. semirufus*, and *A. unicolor* for a total of seven valid species.

Londt (1998) reported on the species of Asilidae recorded from the southern-most Nama Karoo in and around the town of Willowmore by J. Brauns in the NMSA collection and listed three *Anypodetus* species identified by F. Hermann:

A. fascipennis, *A. semirufus*, and an undescribed species '*A. varipennis*' (an unpublished name, see under *A. fascipennis*).

Londt (2000) reviewed the genus and described *Anypodetus leucothrix* from the Gamka River in the Western Cape province of South Africa, *A. macroceros* Londt, 2000 from west-central Namibia, and *A. phalaros* Londt, 2000 from near Louis Trichardt, Limpopo province, South Africa. He synonymized *Anypodetus rigidis* with *A. fasciatus* and supported the synonymy of *A. maculipennis* and *A. semirufus* with *A. fascipennis* recognizing a total of eight valid species. The male terminalia of all species were illustrated to aid in the identification. He commented on Oldroyd's error who listed *A. semirufus* as a valid species in 1980 while he had synonymized it in 1974.

Londt and Dikow (2017a) provided a review of the Afrotropical Asilidae with an updated key to the genera including *Anypodetus* and summarized what was known about this genus.

At the commencement of this study, *Anypodetus* was, therefore, known from eight species: *A. arachnoides*, *A. fasciatus*, *A. fascipennis*, *A. leucothrix*, *A. macroceros*, *A. nigrifacies*, *A. phalaros*, and *A. unicolor*.

Materials and methods

Morphological features were examined using Zeiss SteREO Discovery.V8 and V12 stereo microscopes. Wing length is measured from the tegula to the distal tip of the wing.

Terminology

Terminology follows Dikow (2009), Cumming and Wood (2017), and Londt and Dikow (2017a) (general morphology and abbreviations for setae), Stuckenberg (1999) (antennae), and Wootton and Ennos (1989) (wing venation). 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 generalized terms follow the Torre-Bueno Glossary of Entomology (Nichols 1989).

Species description

The species description is based on composites of all specimens and not exclusively on the holotype and is compiled from a character matrix of 230 features assembled with Lucid Builder (version 4.0.10) and eventually exported as natural-language descriptions. The species description includes therefore features that might not vary within *Anypodetus* but represents a comprehensive morphological description to al-

low future species discoveries and comparisons to other Asilidae genera. The species description has been deposited in the Zenodo data depository and can be accessed in XML-format following the SDD (Structure of Descriptive Data) standard. All taxon names have been registered in ZooBank (Pyle and Michel 2008). If available, permanent URLs or Digital Object Identifiers (DOIs) to the original species descriptions on the Biodiversity Heritage Library (BHL, www.biodiversitylibrary.org) or other online sources are provided. The species record for each species at the Global Biodiversity Information Facility (GBIF, www.gbif.org) provides a summary of occurrence data, images, or taxonomic treatments from natural history collections. The species descriptions from Londt (2000) have been marked up in TaxonX XML language (Catapano 2010) and uploaded to the Plazi TreatmentBank from where they are accessible in human- and machine-readable formats and a permanent URL is provided under each respective species.

Specimen occurrence data

The following data on species occurrences are given (where available): country, state/province, county, locality, geographic co-ordinates, elevation (in meters), date of collection, time of day at collection (if available), habitat information, sampling protocol (if other than hand netting), collector, catalog number (a unique specimen identifier and any other identifying number), depository (institution code), number of specimens, sex, life stage, and any other previous identifications. Each specimen is listed with a unique specimen identifier (either an institutional catalog number or an AAM-XXXXXX number used by the senior author) that will allow the re-investigation as well as provide a unique Life Science Identifier (LSID). The occurrence of all species is illustrated in distribution maps plotted with SimpleMappr (Shorthouse 2010) with all of those localities for which co-ordinates are available or could be gathered from online gazetteers or Google Earth. Type localities are plotted with a square symbol, other specimens are plotted with a circular symbol, and iNaturalist observations are plotted with a star symbol. The distribution maps include Biodiversity Hotspots *sensu* Conservation International (Mittermeier et al. 1998; Myers et al. 2000; Mittermeier et al. 2005).

Photographs and illustrations

Whole habitus photographs of pinned USNM specimens were taken with a GIGA-macro Magnify^2 system, a Canon EOS D5 Mark IV full-frame DSLR, a Canon MP-E 65 mm f2.8 macro-lens, and illuminated by a Canon MR-14EX II Macro Ring Lite. Individual RAW-format images were stacked using HeliconFocus Pro (version 8.+) and exported in Adobe DNG-format. Photographs of Smithsonian USNM specimens are in the public domain with a Creative Commons license CC0 and can be downloaded in full resolution from the USNM data portal (http://collections.nmnh.si.edu/search/ento/) or the Smithsonian Open Access Portal (https://www.si.edu/openaccess).

Table 1. Summary of mystax setation extent, colouration, and sexual dimorphism in species of *Anypodetus*.

Species	♀ mystax	♂ mystax
A. arachnoides	long black circular macrosetae in ventral ⅓ of face, Fig. 14	long black circular macrosetae in ventral ½ of face; short white dorso-ventrally flattened setae in dorsal ½ of face, Fig. 15
A. fasciatus	sparsely arranged long yellowish circular macrosetae (few black) on entire face; short yellowish setae interspersed, Fig. 20	sparsely arranged long black circular macrosetae on entire face; short white setae interspersed, Fig. 21
A. fascipennis	long yellowish (medially) and black (laterally) circular macrosetae in ventral ½ of face; short yellowish circular setae in dorsal ½ of face, Fig. 26	long yellowish circular macrosetae in ventral ½ of face; long yellowish circular setae in dorsal ½ of face, Fig. 27
A. leucothrix	densely arranged long white circular setae in ventral ¼ of face; few long yellowish circular macrosetae in ventral ½, of face; sparsely arranged shorter white circular setae in dorsal ⅔ of face, Fig. 32	densely arranged long white circular setae in ventral ⅓ of face; sparely arranged long black circular setae in dorsal ⅔ of face, Fig. 33
A. londti sp. nov.	unknown	densely arranged long white dorso-ventrally flattened setae on entire face; long black circular macrosetae in ventral ¼ of face, Fig. 38
A. macroceros	unknown	long black circular macrosetae on entire face; short white circular setae interspersed, Fig. 41
A. nigrifacies	long black circular macrosetae in ventral ¼ of face; short black circular setae in dorsal ¾ of face, Fig. 44	
A. phalaros	long black circular macrosetae medially on entire face; shorter white dorso-ventrally flattened setae laterally on entire face, Fig. 48	
A. unicolor	long yellowish or black circular macrosetae on entire face; shorter white setae laterally on entire face, Fig. 49	

Keys

The online, interactive dichotomous key has been built with Lucid Builder (version 4.0.10) and can be accessed on Lucidcentral and the senior author's research web-site. It has also been archived in the Structure of Descriptive Data (SDD) standard at Zenodo.

Institutions providing specimens

Institutions providing specimens are listed below, together with the abbreviations used in the text when citing depositories (institutionCode), a link to the record in the Global Registry of Scientific Collections (GRSciColl), and the people who kindly assisted: **MFN** – Museum für Naturkunde, Berlin, Germany (J. Pohl, S. Marotzke); **NHMUK** – The Natural History Museum, London, UK (E. McAlister); **NMBZ** – Natural History Museum of Zimbabwe, Bulawayo, Bulawayo, Zimbabwe (D. Madamba); **NMSA** – KwaZulu-Natal Museum, Pietermaritzburg, KwaZulu-Natal, South Africa (K. Williams); **SAMC** – Iziko South African Museum, Cape Town, Western Cape, South Africa; **SANC** – South African National Collection of Insects, Pretoria, Gauteng, South Africa; **SMNS** – Staatliches Museum für Naturkunde, Stuttgart, Germany (D. Whitmore); **SNSB-ZSM** – Zoologische Staatssammlung, München, Bayern, Germany (D. Doczkal); **USNM** – United States National Museum, Smithsonian Institution, Washington, DC, USA.

Data resources

Lucid Builder: illustrated, dichotomous, pathway identification key – https://keys.lucidcentral.org/keys/v4/anypodetus_dichotomous (archived in SDD format at Zenodo – https://doi.org/10.5281/zenodo.7829624).

Plazi TreatmentBank taxon treatments:
Londt 2000 – http://tb.plazi.org/GgServer/summary/FF8AE557F04F9D4CFFC8FFC4DA5E4277.

SimpleMappr: distribution maps – https://www.simplemappr.net/map/20262?width=1000&height=750&legend=true (as in Fig. 3; Google Earth KML file http://www.simplemappr.net/map/20262.kml); https://www.simplemappr.net/map/20266?width=1000&height=750&legend=true (as in Fig. 51; Google Earth KML file http://www.simplemappr.net/map/20266.kml); https://www.simplemappr.net/map/20267?width=1000&height=750&legend=true (as in Fig. 52; Google Earth KML file http://www.simplemappr.net/map/20267.kml).

Zenodo: natural-language species description from Lucid Builder 4.0 in SDD format – https://doi.org/10.5281/zenodo.7829642.

ZooBank new nomenclatorial acts: https://zoobank.org/23832803-9A79-416E-BF0D-7462CEC2A862.

Taxonomy

Anypodetus Hermann, 1907

Anypodetus Hermann, 1907: 69. Type-species: *Anypodetus fasciatus* Hermann, 1907, by original designation.

Taxon depository. ZooBank: http://zoobank.org/63102CAB-9379-42CA-98CF-4F00619DFB70;
Original description online: https://www.biodiversitylibrary.org/page/12637581;
GBIF: https://www.gbif.org/species/1664898;
Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F04B-9D48-FE18-FF29D9E046D5;
iNaturalist: https://www.inaturalist.org/taxa/641011-Anypodetus.

Diagnosis. The genus can be delineated by the absence of pulvilli, very long macrosetae on the scape that often reach the tip of the antennae, the sexual dimorphism in mystax setae coloration and arrangement in some species, the absence of macrosetae on the supero-posterior anepisternum, the wing cell r_5 open and cell m_3 closed, the small size with a wing length of 4.8–8.5 mm, and the restricted distribution to southern Africa (single record from southern Zambia).

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known from throughout southern Africa with a single locality in southern Zambia

Table 2. Collecting event summary for *Anypodetus* species.

Species	# Specimens	#♀/#♂	# Collecting events	Earliest collection	Most recent collection	Most recent iNaturalist observation
A. arachnoides	67	33/33	23	1913	2005	2022
A. fasciatus	85	44/41	35	1919	2018	2012
A. fascipennis	121	67/54	31	1907	2015	2020
A. leucothrix	33	18/15	10	1925	2019	2022
A. londti sp. nov.	2	0/2	2	1938	1964	–
A. macroceros	1	0/1	1	1974	1974	–
A. nigrifacies	22	12/10	11	1906	1988	–
A. phalaros	3	2/1	3	1972	1975	2015
A. unicolor	44	24/20	15	1913	1990	–
summary total	378	200/177	131	1906	2019	2022

Table 3. Seasonal imago flight activity of *Anypodetus* species through number of specimens collected and unique collecting events in each month (data given as # specimens/# collecting events). Months abbreviated starting with July. * = additional iNaturalist observation.

Species	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
A. arachnoides	–	1/1	–	5/2	9/8*	11/6*	3/2	31/7	8/6	–	–	–
A. fasciatus	–	–	–	4/1	12/6	10/5	17/8	28/7*	11/10	–	–	–
A. fascipennis	–	–	–	20/8	24/5*	21/8*	38/6	13/8	3/2	–	–	–
A. leucothrix	–	–	10/3	1/1*	20/5	–	–	2/1	–	–	–	–
A. londti sp. nov.	–	–	–	–	–	1/1	–	1/1	–	–	–	–
A. macroceros	–	–	–	–	–	–	–	1/1	–	–	–	–
A. nigrifacies	–	–	–	2/1	2/2	4/2	1/1	11/3	2/2	–	–	–
A. phalaros	–	–	–	–	–	–	2/1*	–	1/1	–	–	–
A. unicolor	–	–	1/1	1/1	31/7	6/2	1/1	2/2	1/1	–	–	–
total	–	1/1	11/4	33/14	98/33	53/24	62/19	89/30	26/22	–	–	–

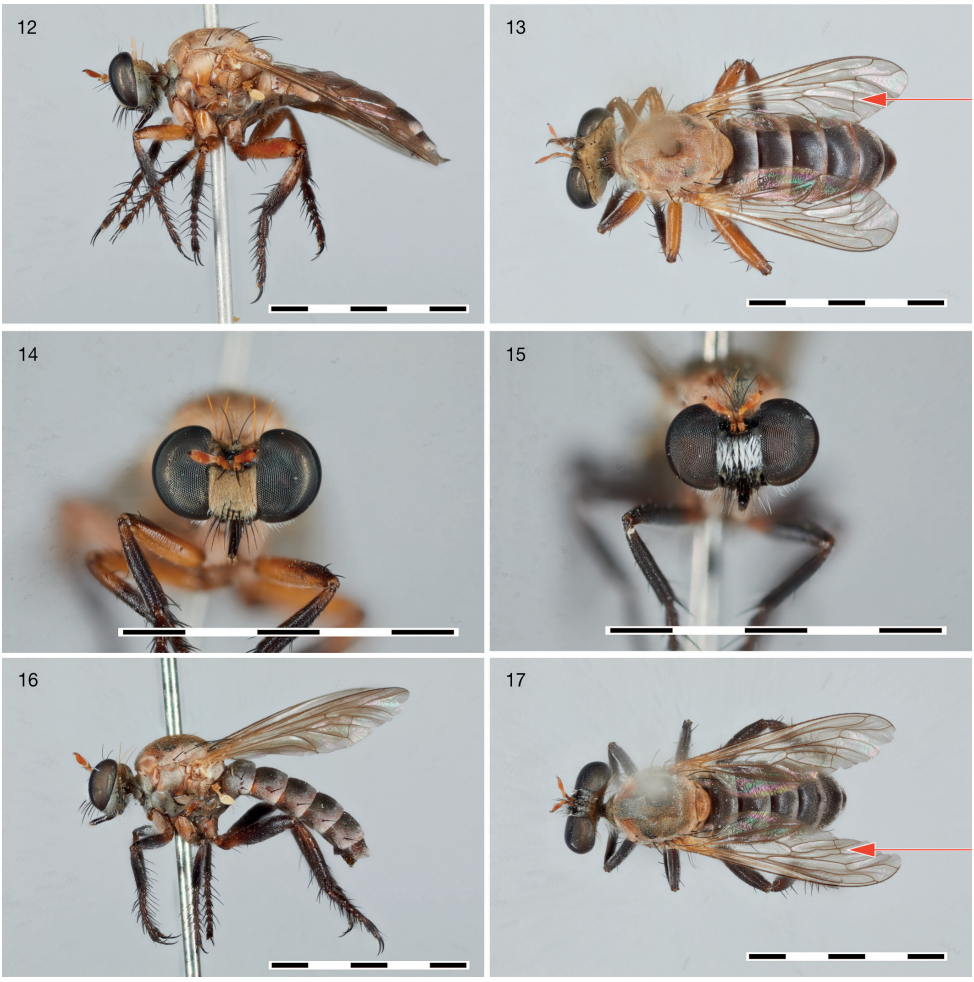
(Figs 11, 51, 52). A relatively commonly observed and collected genus known from 378 specimens in museum collections from 131 collecting events between 1906–2019 and nine observations at iNaturalist (Table 2). Three species of *Anypodetus* occur in the Maputaland-Pondoland-Albany biodiversity hotspot, but none are endemic to this hotspot. Adult flies are active from spring to late summer (September–March) with a single record for August (Table 3). With the exception of a few isolated prey records nothing is known of the biology.

Anypodetus arachnoides Oldroyd, 1974

Figs 12–17, 51

Taxon depository. ZooBank: https://zoobank.org/E98A1482-DA4A-40B9-8A1D-CFD12C02885A;

GBIF: https://www.gbif.org/species/1664899



Figures 12–17. *A. arachnoides* **12** ♀ (USNMENT00870120), lateral **13** same, dorsal **14** same, head anterior **15** ♂ (USNMENT00870117), head anterior **16** same, lateral **17** same, dorsal. Scale bars: 5 mm, red arrow = vein M_2 and M_3 alignment.

Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F045-9D41-FF58-FBE3D93A44FD.

Diagnosis. The species is distinguished from congeners by the entirely orange post-pedicel, the short white, tightly packed, dorso-ventrally flattened macrosetae in the male mystax, and the entirely black mystax in females restricted to the lower facial half.

Type locality. Zimbabwe: Matabeleland North: Sawmills (19°35'00"S, 028°02'23"E, -19.58333, 28.03972).

Material examined. Botswana – Central • 1♀ Farmer's Brigade, 5 km SE Serowe; 22°25'00"S, 026°44'00"E; 21 Dec. 1982; Forchhammer, P. leg.; NMSA-DIP-024272, NMSA • 1♀ same locality; 22 Dec. 1982; Forchhammer, P. leg.; NMSA-DIP-008925,

NMSA • 1♀ same locality; 15 Feb. 1983; Forchhammer, P. leg.; NMSA-DIP-008921, NMSA • 1♂ same locality; 25 Nov. 1983; Forchhammer, P. leg.; NMSA-DIP-008923, NMSA • 1♂ same locality; 30 Mar. 1985; Forchhammer, P. leg.; NMSA-DIP-008933, NMSA • 1♂ same locality; 21 Nov. 1985; Forchhammer, P. leg.; NMSA-DIP-008919, NMSA • 1♂ same locality; Dec. 1985; Forchhammer, P. leg.; NMSA-DIP-008916, NMSA • 1♂ same locality; Mar. 1986; Forchhammer, P. leg.; NMSA-DIP-008920, NMSA • 1♂ Farmer's Brigade, Serowe; 22°25'00"S, 026°44'00"E; Mar. 1986; Forchhammer, P. leg.; Malaise trap; USNMENT01819604, USNM • 1♂ same locality; Dec. 1987; Forchhammer, P. leg.; Malaise trap; USNMENT01819599, USNM.

Botswana – Ngamiland • 1♂ Maxwee; 19°28'00"S, 023°40'00"E; Nov. 1975; Russel-Smith, A. leg.; grassland; NAMS-DIP-082947, NMSA • 1♀ same locality; 19 Dec. 1975; Russel-Smith, A. leg.; flood plain; NMSA-DIP-008944, NMSA • 1♀ same data; NMSA-DIP-082947, NMSA.

Namibia – Zambezi • 1♀ Katima Mulilo; 17°30'00"S, 024°16'00"E; 20–28 Oct. 1970; Strydom, A. leg.; NMSA-DIP-008918, NMSA • 1♂ same data; NMSA-DIP-082945, NMSA • 1♂ same data; NMSA-DIP-082946, NMSA.

Namibia – Kunene • 1♂ Kaross; 19°30'00"S, 014°20'00"E; Feb. 1925; SAM Museum Staff leg.; SAM-DIP-A008768, SAMC • 1♀ same data; SAM-DIP-A008768, SAMC • 1? same data; SAM-DIP-A008768, SAMC.

Namibia – Otjozondjupa • 1♂ Grootfontein; 19°33'48"S, 018°06'26"E; Dec. 1963; von Teichm. leg.; NMSA-DIP-008946, NMSA.

South Africa – Limpopo • 1♀ Burgersfort, 1 km E; 24°40'53"S, 030°20'06"E; 01 Feb. 1974; Gurney, A. leg.; USNMENT01140570, USNM • 1♂ Messina Nature Reserve; 22°22'00"S, 030°02'00"E; 554 m a.s.l.; 11–12 Feb. 1985; Mansell, M. leg.; SANC • 1♀ Messina Nature Reserve, Mopane dry woodland, Sand River; 22°24'54"S, 030°05'12"E; 487 m a.s.l.; 14 Feb. 2005; Londt, Jason, Dikow, Torsten leg.; USNMENT00870119, USNM • 1♀ same data; USNMENT00870120, USNM • 1♂ Nylsvley Nature Reserve, Naboomspruit; 24°39'00"S, 028°42'00"E; 13 Oct. 1976; Ferrar, P. leg.; NMSA-DIP-008947, NMSA • 1♂ same data; NMSA-DIP-082924, NMSA • 1♂ same locality; 28 Nov. 1978; Ferrar, P. leg.; NMSA-DIP-008950, NMSA • 1♀ Priska, 45 km NE; 29°33'00"S, 023°07'00"E; 1050 m a.s.l.; 19 Mar. 1991; Londt, Jason, Whittington, A. leg.; NMSA-DIP-008936, NMSA • 1♀ Soutpan (= Zoutpan), Soutpansberge; 22°58'00"S, 029°20'00"E; 23–24 Feb. 1980; Londt, Jason, Schoeman, L. leg.; NMSA-DIP-082925, NMSA • 1♀ same data; NMSA-DIP-082926, NMSA • 1♀ same data; NMSA-DIP-082927, NMSA • 1♀ same data; NMSA-DIP-082928, NMSA • 1♀ same data; NMSA-DIP-082929, NMSA • 1♀ same data; NMSA-DIP-082930, NMSA • 1♂ same data; NMSA-DIP-082931, NMSA • 1♂ same data; NMSA-DIP-082932, NMSA • 1♂ same data; NMSA-DIP-082933, NMSA • 1♂ same data; NMSA-DIP-082934, NMSA • 1♂ same data; NMSA-DIP-008940, NMSA • 1♀ Vivo, 6 km N; 22°59'29"S, 029°15'27"E; 23–24 Feb. 1980; Londt, Jason, Schoeman, L. leg.; bushveld vegetation and old lands; NMSA-DIP-008939, NMSA • 1♀ same data; NMSA-DIP-082935, NMSA • 1♀ same data; NMSA-DIP-082936, NMSA • 1♀ same data; NMSA-DIP-082937, NMSA • 1♀ same data; NMSA-DIP-082938, NMSA • 1♀ same data; NMSA-DIP-082940, NMSA • 1♀

same data; SANC • 1♂ same data; NMSA-DIP-082941 NMSA • 1♂ same data; NMSA-DIP-082942, NMSA • 1♂ same data; NMSA-DIP-082943, NMSA • 1♂ same data; NMSA-DIP-082944, NMSA • 1♂same data; NMSA-DIP-082939, NMSA • 1♀ Zoutpan, Zoutpansberg Mountains; 23°10'00"S, 028°25'00"E; 15–30 Nov. 1932; van Son, G. leg.; NMSA-DIP-008941, NMSA.

South Africa – Northern Cape • 1♀ Hotazel, Ga-Mogara River bed; 27°19'00"S, 022°54'00"E; 1050 m a.s.l.; 14 Mar. 1991; Londt, Jason, Whittington, A. leg.; NMSA-DIP-008945, NMSA • 1♂ same data; NMSA-DIP-082923, NMSA • 1♂ Olifantshoek, 5 km W; 27°57'00"S, 022°42'00"E; 1350 m a.s.l.; 15 Mar. 1991; Londt, Jason, Whittington, A. leg.; *Acacia Ziziphus* veld; NMSA-DIP-008937, NMSA • 1♀ Olifantshoek, 8 km W; 27°56'00"S, 022°40'00"E; 1550 m a.s.l.; 15 Mar. 1991; Londt, Jason, Whittington, A. leg.; flat grassy plain; NMSA-DIP-008938, NMSA • 1♀ Vaalbos National Park, Riverside Picnic site; 28°27'28"S, 024°19'59"E; 1055 m a.s.l.; 28–29 Jan. 2004; Londt, Jason, Dikow, Torsten leg.; Acacia savannah; USNMENT00870117, USNM • 1♀ same data; USNMENT00870118, USNM.

Zambia – Lusaka • 1♂ Chilanga; 15°34'13"S, 028°16'23"E; 16 Aug. 1913; Wood, R. leg.; on path, NHMUK013445830, ***Paratype***, NHMUK.

Zimbabwe – Bulawayo • 1♀ Bulawayo; 20°09'00"S, 028°35'00"E; Dec. 1922; Arnold leg.; NMSA-DIP-008931, NMSA • 1♂ same locality; 04 Nov. 1923; Stevenson, R. leg.; SAM-DIP-A008772, SAMC • 1♀ same locality; 11 Dec. 1923; Stevenson, R. leg.; SAM-DIP-A008770, SAMC • 1♀ same locality; 03 Jan. 1924; Stevenson, R. leg.; SAM-DIP-A008771, SAMC.

Zimbabwe – Harare • 1♂ Hillside; 17°50'00"S, 031°05'00"E; 24 Nov. 1922; Swinburne, Stevenson, R. leg.; NMSA-DIP-008924, NMSA.

Zimbabwe – Masvingo • 1♂ Sabi Valley; 20°25'00"S, 032°05'00"E; 18 Nov. 1971; NMSA-DIP-008935, ***Paratype***, NMSA.

Zimbabwe – Matabeleland North • 1♂ Sawmills; 19°35'00"S, 028°02'23"E; 11 Nov. 1920; Rhodesia Museum leg.; NHMUK013445829, **Holotype**, NHMUK • 1♀ same locality; 26 Dec. 1923; Stevenson, R. leg.; SAM-DIP-A008769, SAMC.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known from throughout southern Africa with a single locality in southern Zambia but not recorded from Mozambique to date (Fig. 51). A commonly observed and collected species known from 67 specimens from 23 collecting events between 1913–2005 and three observations at iNaturalist (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active from spring to late summer (September–March) with a single record for August (Table 3). Londt (2000) reports two prey records: Diptera: Platystomatidae and an alate Formicidae.

Anypodetus fasciatus **Hermann, 1907**
Figs 1, 2, 18–23, 52

Anypodetus rigidis Oldroyd, 1974 – synonymy *sensu* Londt 2000: 132.
Anypodetus unicolor Oldroyd, 1974 – all paratypes from Namibia misidentified.

Taxon depository for *Anypodetus fasciatus*. ZooBank: https://zoobank.org/53FF2374-1FC7-468A-9DC1-46D9F367606E;

Original description online: https://www.biodiversitylibrary.org/page/12637582;

GBIF: https://www.gbif.org/species/1664906;

Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F047-9D42-FF58-FC4BD98E4127;

iNaturalist: https://www.inaturalist.org/taxa/650534-Anypodetus-fasciatus.

Taxon depository for *Anypodetus rigidis*. ZooBank: https://zoobank.org/19EF6F46-00B2-402E-B493-5DD836414974;

GBIF: https://www.gbif.org/species/1664905.

Diagnosis. The species is distinguished from congeners by the mystax with long, loosely arranged black (male) or yellow (female) macrosetae and shorter white to yellowish interspersed setae and the unstained wing that is densely covered by microtrichia.

Type locality. South Africa: North-West: Lichtenburg (26°08'50"S, 026°09'37"E, -26.14722, 26.16028).

Material examined. Botswana • 1♀ Kalahari; Schultze, L. leg.; Paralectotype, MFN.

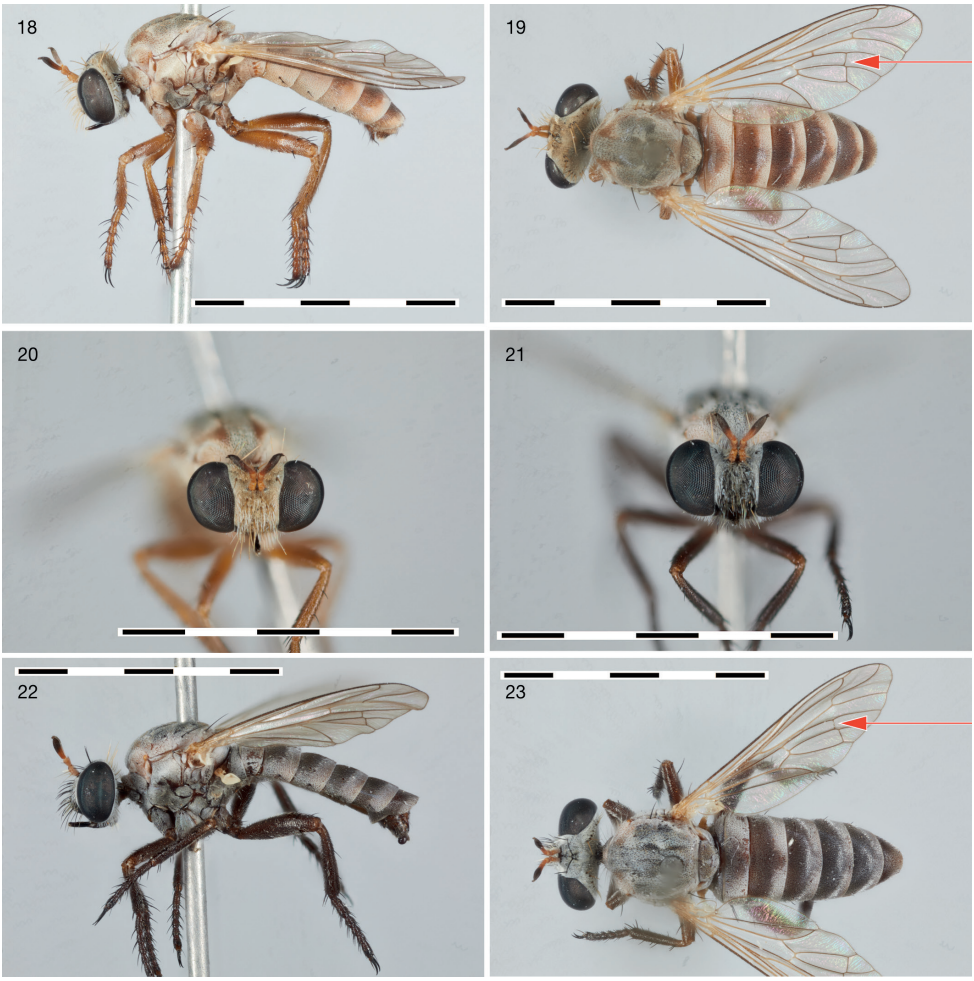
Botswana – Central • 1♀ Serowe; 22°25'00"S, 026°44'00"E; 24 Dec. 1982; Forchhammer, P. leg.; Malaise trap; NMSA-DIP-008948, NMSA • 1♂ same data; NMSA-DIP-097008, NMSA • 1♀ same locality; 07 Jan. 1983; Forchhammer, P. leg.; Malaise trap; NMSA-DIP-008949, NMSA.

Botswana – Kweneng • 1♂ Matokwe (= Motokwe); 24°03'30"S, 023°18'07"E; 07 Mar. 1963; Oatley, T. leg.; NMSA-DIP-008943, NMSA.

Botswana – Ngamiland • 1♀ Xugana Island; 19°04'00"S, 023°03'00"E; 22–26 Nov. 1979; Lamoral leg.; Malaise trap; NMSA-DIP-008942, NMSA • 1♂ same data; NMSA-DIP-097009, NMSA • 1♂ same data; NMSA-DIP-097010, NMSA.

Namibia – Erongo • 1♂ Namib-Naukluft National Park, off C14; 23°34'25"S, 015°48'39"E; 917 m a.s.l.; 20 Nov. 2018; collected a.m. (9:00–noon); Dikow, Torsten leg.; base of sparsely vegetated sand dune, perching on sand; USNMENT01518048, USNM • 1♂ same data; USNMENT01518049, USNM • 1♂ Namib-Skeleton Coast National Park, off C14; 23°34'05"S, 015°48'16"E; 892 m a.s.l.; 08 Feb. 2012; Dikow, Torsten leg.; sand dune and adjacent sandy area, perching on sand or vertically on low vegetation; USNMENT00832250, USNM • 1♂same data; USNMENT00832251, USNM • 1♂same data; USNMENT00832253, USNM • 1♀ same data; USNMENT00832254, USNM • 1♂ same data; USNMENT00832255, USNM • 1♂same data; USNMENT00832256, USNM • 1♀same data; USNMENT00832257, USNM • 1♀ same data; USNMENT00832258, USNM • 1♂same data; USNMENT00832259, USNM • 1♂same data; USNMENT00832260, USNM • 1♀ same data; USNMENT00832261, USNM • 1♀same data; USNMENT00832262, USNM • 1♀ same data; USNMENT00832264, USNM • 1♀ same data; USNMENT00832265, USNM • 1♀ same data; USNMENT00832267, USNM • 1♀ same data; USNMENT00832268, USNM.

Namibia – Khomas • 1♀ Rooisand Desert Ranch; 23°16'27"S, 016°06'51"E; 1206 m a.s.l.; 19 Nov. 2018; collected p.m. (noon–15:00); Dikow, Torsten leg.; partly vegetated sand dune, perching on sand; USNMENT01518045, USNM • 1♂



Figures 18–23. *A. fasciatus* **18** ♀ (USNMENT01518045), lateral **19** same, dorsal **20** same, head anterior **21** ♂ (USNMENT01518051), head anterior **22** same, lateral **23** same, dorsal. Scale bars: 5 mm, red arrow = vein M_2 and M_3 alignment.

same data; USNMENT01518051, USNM • 1♂ same data; USNMENT01518052, USNM • 1♀ same data; USNMENT01518053, USNM.

Namibia – Kunene • 1♀ Kamanyab (= Kamanjab); 19°37'43"S, 014°50'33"E; Jan. 1925; Museum Staff leg.; SAM-DIP-A008765, SAMC • 1♀ same data; SAM-DIP-A008766, SAMC • 1♀ Otjitambi Farm, 43 km ESE Kamanjab; 19°44'47"S, 015°11'15"E; 13–15 Feb. 1972; BMNH Southern Africa Expedition leg.; NHMUK013445838, ***Paratype*** *Anypodetus unicolor*, NHMUK • 1♀ same data; NHMUK013445841, ***Paratype*** *Anypodetus unicolor*, NHMUK • 1♀ Outjo; 20°06'21"S, 016°08'59"E; Jan. 1925; Museum Staff leg.; SAM-DIP-A008764, SAMC.

Namibia – Ohangwena • 1♂ Mafa; 17°37'30"S, 016°07'30"E; Feb. 1923; Mus. Exped. leg.; SAM-DIP-A008762, SAMC • 1♀ same data; NHMUK013445843,

Paratype *Anypodetus unicolor*, NHMUK • 1♀ same data; NHMUK013445844, ***Paratype*** *Anypodetus unicolor*, NHMUK.

Namibia – Omusati • 1♀ Ongandjera; 17°55'00"S, 015°05'34"E; Mar. 1923; NHMUK013445845, ***Paratype*** *Anypodetus unicolor*, NHMUK.

Namibia – Oshana • 1♂ Ondongoa (= Ondangwa); 17°54'26"S, 015°58'33"E; Feb. 1921; Barnard, H. leg.; SAM-DIP-A008763, SAMC.

Namibia – Oshikoto • 1♂ Tsumeb, 5 km SW, road 1/9; 19°19'00"S, 017°39'00"E; 22 Mar. 1984; Londt, Jason, Stuckenberg, Brian leg.; mixed woodland with sandy soil; NMSA.

Namibia – Otjozondjupa • 1♀ Farm Marburg, Otjiwarongo; 20°04'24"S, 016°44'58"E; 25 Dec. 1954; Werner, G. leg.; AAM-010182, SMNS • 1♀ same data; AAM-010183, SMNS • 1♀ same data; AAM-010184, SMNS • 1♂ same data; AAM-010185, SMNS • 1♀ Okahandja; 21°58'19"S, 016°54'23"E; 17 Jan. 1970; Lindner, E. leg.; AAM-010178, SMNS • 1♀ same data; AAM-010179, SMNS • 1♂ same data; AAM-010180, SMNS • 1♂ same data; AAM-010181, SMNS • 1♀ same data; AAM-010178, SMNS • 1♂ same data; AAM-010179, SMNS • 1♀ same data; AAM-010180, SMNS • 1♂ same data; AAM-010181, SMNS • 1♀ Otjituo (= Otjituuo); 19°38'25"S, 018°35'43"E; Jan. 1920; Tucker, R. leg.; SAM-DIP-A008761, SAMC • 1♂ Otjituo (= Otjituuo); 19°38'25"S, 018°35'43"E; Jan. 1920; Tucker, R. leg.; SAM-DIP-A008761, SAMC • 1♀ Waterberg National Park entrance, Road 251; 20°32'00"S, 017°20'00"E; 22 Mar. 1984; Stuckenberg, Brian, Londt, Jason leg.; Acacia thornveld; NMSA-DIP-008959, NMSA • 1♂ same data; NMSA-DIP-097011, NMSA.

South Africa – Gauteng • 1♂ Boekenhoutskloof; 24°27'00"S, 028°10'00"E; 05 Nov. 1977; Bernon, G. leg.; NMSA-DIP-008964, NMSA.

South Africa – Limpopo • 1♂ Blouberg Nature Reserve; 23°02'00"S, 029°04'00"E; 884 m a.s.l.; 22 Nov. 1997; Barraclough, D., James, A. leg.; bushveld; NAMS-DIP-008965, NMSA • 1♀ Nylsvley, Naboomspruit; 24°39'00"S, 028°40'00"E; 1000 m a.s.l.; 12 Dec. 1975; Holm, E., Kirsten, P., Scholtz, C., Savanna Ecosystem Research Project leg.; NMSA-DIP-008958, NMSA.

South Africa – North-West • 1♂ Lichtenburg; 26°08'50"S, 026°09'37"E; Brauns, J. leg.; **Lectotype**, SNSB-ZSM • 1♀ Lichtenburg; 26°08'50"S, 026°09'37"E; Brauns, J. leg.;, Paralectotype, SNSB-ZSM • 1♀ Molopo Game Reserve, Motopi camp area; 25°50'55"S, 022°55'45"E; 14 Mar. 2003; Londt, Jason leg.; dry Acacia savanna; NAMS-DIP-8970, NMSA • 1♀ Vryburg; 26°57'00"S, 024°44'00"E; Oct. 1939; Museum Staff leg.; SAM-DIP-A007906, SAMC • 1♀ same data; SAM-DIP-A007906, SAMC • 1♂ same data; SAM-DIP-A007906, SAMC • 1♂ same data; SAM-DIP-A007906, SAMC.

South Africa – Northern Cape • 1♀ Bloubos farm, 10 km W; 28°07'00"S, 020°45'00"E; 900 m a.s.l.; 17 Mar. 1991; Londt, Jason, Whittington, A. leg.; red dunes; NAMS-DIP-008960, NMSA • 1♂ Groblershoop, 4 km SE; 28°57'00"S, 022°01'00"E; 900 m a.s.l.; 18 Mar. 1991; Londt, Jason, Whittington, A. leg.; red dune grassland; NAMS-DIP-008967, NMSA • 1♀ Hotazel, 20 km N; 27°01'15"S, 022°49'00"E; 1050 m a.s.l.; 14 Mar. 1999; Whittington, A., Londt, Jason leg.; Kuruman river banks; NAMS-DIP-008963, NMSA • 1♂ Narugas; 28°22'30"S,

020°07'30"E; Jan. 1919; SAM Museum Staff leg.; SAM-DIP-A007907, SAMC • 1♂ Newcastle Farm; 27°46'00"S, 023°21'00"E; 29–30 Jan. 1979; Lamoral, B. leg.; NMSA-DIP-008956, NMSA • 1♂ Olivier; 26°36'00"S, 022°41'00"E; 01 Mar. 1980; Whitehead, V. leg.; SAM-DIP-A008767, SAMC • 1♀ Witsand Farm; 28°32'00"S, 022°30'00"E; 02–04 Feb. 1974; Lamoral, B., Bampton, I., Barnley, J. leg.; Malaise trap; NAMS-DIP-008957, NMSA • 1♂ Witsand Nature Reserve; 28°34'49"S, 022°28'43"E; 06 Mar. 2001; Londt, Jason leg.; white sand, low vegetation, few trees; NAMS-DIP-008951, NMSA • 1♀ Witsand Nature Reserve; 28°33'40"S, 022°29'39"E; 1200 m a.s.l.; 30 Jan.–02 Feb. 2004; Londt, Jason, Dikow, Torsten leg.; Acacia savanna, red sandy ridge; USNMENT00870115, USNM • 1♂ same data; USNMENT00870116, USNM • 1♂ Witsand Nature Reserve; 28°33'37"S, 022°29'06"E; 1160 m a.s.l.; 31 Jan.–01 Feb. 2004; Londt, Jason, Dikow, Torsten leg.; Acacia savanna + white sand dune area; USNMENT00870112, USNM • 1♂ same data; USNMENT00870113, USNM • 1♀ same data; USNMENT00870114, USNM • 1♂ Witsand Nature Reserve; 28°33'51"S, 022°29'11"E; 11 Nov. 2011; Londt, Jason, Londt, A. leg.; white sand, low vegetation, few trees; NAMS-DIP-188711, NMSA.

Zimbabwe – Matabeleland North • 1♂ Lupani (= Lupane); 18°55'50"S, 027°45'34"E; Dec. 1938; National Museum Southern Rhodesia leg.; NMZ2725, NMBZ • 1♀ same data; NMZ2747, NMBZ • 1♂ Sawmills; 19°35'00"S, 028°02'23"E; 31 Dec. 1921; Rhodesia Museum leg.; NHMUK013445831, ***Holotype*** *Anypodetus rigidis* Oldroyd, 1974, NHMUK • 1♀ Victoria Falls; 17°55'00"S, 025°50'00"E; 17 Feb. 1920; Rhodesia Museum leg.; NMZ2726, NMBZ.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known from throughout southern Africa except Mozambique to date (Fig. 52). A commonly observed and collected species known from 85 specimens from 35 collecting events between 1919–2018 and a single observation at iNaturalist (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active from late spring to late summer (October–March) (Table 3). Engel and Cuthbertson (1934) report grasshoppers as prey but no predator or prey specimens were studied by them. Specimens collected by the senior author have been recorded on or near sand dunes perching on sand or vertically on low vegetation (see Figs 1, 2).

Anypodetus fascipennis **Engel, 1924**

Figs 3, 4, 24–29, 52

Anypodetus semirufus Engel, 1924 – synonymy *sensu* Oldroyd 1974: 90.

Anypodetus maculipennis Ricardo, 1925 – synonymy *sensu* Engel and Cuthbertson 1934: 43.

Taxon depository for *Anypodetus fascipennis*. ZooBank: https://zoobank.org/BB-65F2F8-7A94-4F30-9683-A1F286B3E141;
GBIF: https://www.gbif.org/species/1664903;

Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F04B-9D42-FF58-FA0BDE1941E7;

iNaturalist: https://www.inaturalist.org/taxa/650535-Anypodetus-fascipennis.

Taxon depository for *Anypodetus semirufus*. ZooBank: https://zoobank.org/F6EF960F-426E-4015-BF13-509B3EACF10D;

GBIF: https://www.gbif.org/species/1664901.

Taxon depository for *Anypodetus maculipennis*. ZooBank: https://zoobank.org/FD892EEF-11B9-470F-BF09-CA49E10C92E0;

GBIF: https://www.gbif.org/species/1664902.

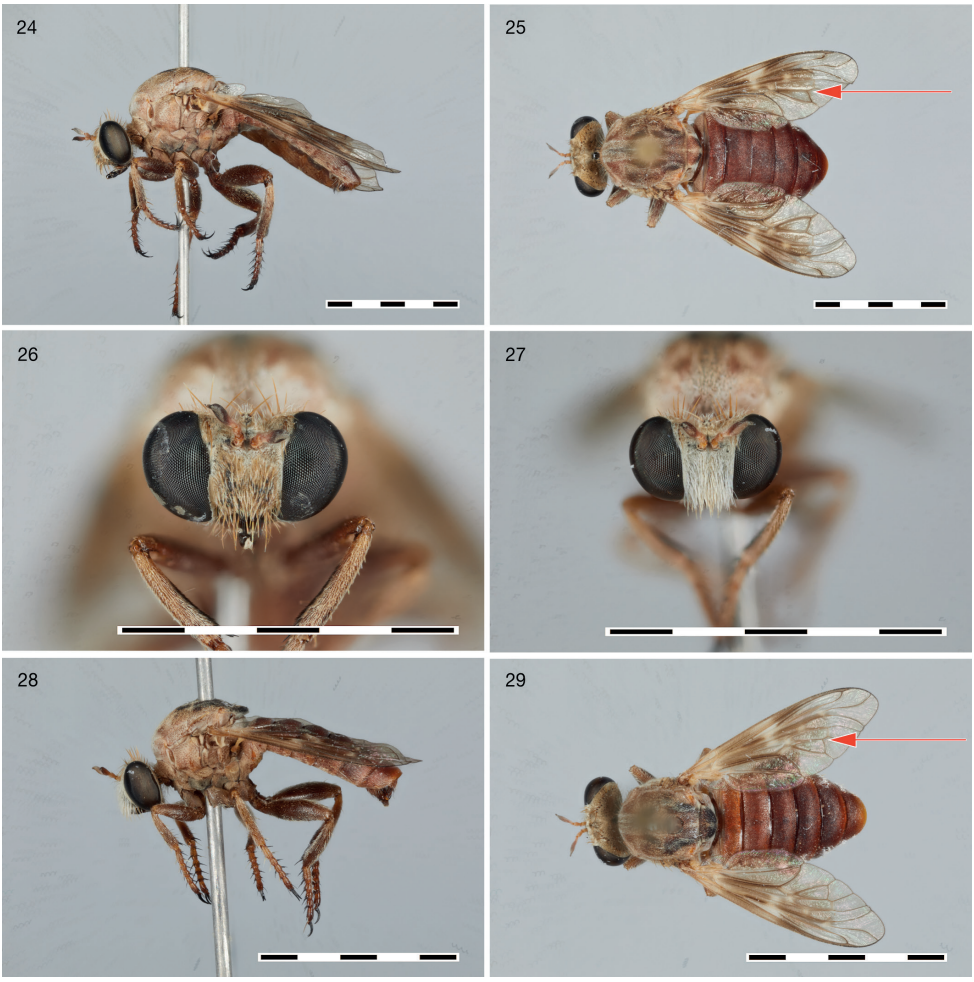
Diagnosis. The species is distinguished from congeners by the brown-stained anterior half of the wings with white transverse bands, the lateral frons being strongly developed with 3–4 short, yellow proclinate macrosetae, the circular macrosetae (female yellowish and black, male white) in the mystax, and the proximal portion of vein M_2 and the distal portion of vein M_3 not aligned.

Type locality. South Africa: Eastern Cape: Willowmore (33°17'00"S, 023°29'00"E, -33.28333, 23.48333).

Material examined. Botswana – Central • 1♀ Palapye; 22°33'00"S, 027°08'00"E; 18 Oct. 1923; Stevenson, R. leg.; SAM-DIP-A007912, SAMC • 1♂ Serowe; 22°25'00"S, 026°44'00"E; 1000 m a.s.l.; 28 Nov. 1980; Forchhammer, P. leg.; Malaise trap; NMSA-DIP-008961, NMSA • 1♂ same data; NMSA-DIP-097062, NMSA • 1♂ same data; NMSA-DIP-008963, NMSA • 1♂ same locality; 23 Oct. 1982; Forchhammer, P. leg.; NMSA-DIP-008992, NMSA • 1♀ same locality; 26 Nov. 1982; Forchhammer, P. leg.; NMSA-DIP-008984, NMSA • 1♂ same data; NMSA-DIP-097017, NMSA • 1♂ same locality; 21 Dec. 1982; Forchhammer, P. leg.; NMSA-DIP-008981, NMSA • 1♀ same locality; Oct. 1985; Forchhammer, P. leg.; NMSA-DIP-008968, NMSA • 1♀ same data; NMSA-DIP-097076, NMSA • 1♂ same data; NMSA-DIP-097074, NMSA • 1♀ same locality; Dec. 1985; Forchhammer, P. leg.; NMSA-DIP-008994, NMSA • 1♀ same locality; 08 Nov. 1988; Forchhammer, P. leg.; NMSA-DIP-008979, NMSA • 1♀ same locality; 09 Nov. 1988; Forchhammer, P. leg.; NMSA-DIP-008974, NMSA • 1♂ same data; NMSA-DIP-097018, NMSA • 1♀ same locality; Oct. 1989; Forchhammer, P. leg.; NMSA-DIP-097064, NMSA • 1♀ same data; NMSA-DIP-097065, NMSA • 1♀ same data; NMSA-DIP-097066, NMSA • 1♀same data; NMSA-DIP-097067, NMSA • 1♀ same locality; Nov. 1989; NMSA-DIP-008966, NMSA • 1♀ same data; NMSA-DIP-008968, NMSA • 1♀ same data; NMSA-DIP-097069, NMSA • 1♀ same data; NMSA-DIP-097070, NMSA • 1♀ same data; NMSA-DIP-097071, NMSA • 1♀ same data; NMSA-DIP-097072.

Namibia • 1♀ Namibia; Mar. 1923; Mus. Exped. leg.; NMSA-DIP-008972, NMSA • 1♀ Südwest-Afrika (= Namibia), F 274; Werner, G. leg.; AAM-010186, SMNS • 1♀ Südwest-Afrika (= Namibia), F 292; 04 Dec. 1955; Werner, G. leg.; AAM-010187, SMNS.

Namibia – Erongo • 1♀ Portsmut Farm 33, Hakos Mts.; 23°06'00"S, 016°25'00"E; 07 Feb. 1969; Lamoral, B. leg.; NMSA-DIP-008973, NMSA.



Figures 24–29. *A. fascipennis* **24** ♀ (USNMENT01115204), lateral **25** same, dorsal **26** same, head anterior **27** ♂ (USNMENT01115113), head anterior **28** same, lateral **29** same, dorsal. Scale bars: 5 mm, red arrow = vein M_2 and M_3 alignment.

Namibia – Karas • 1♂ Warmbad; 28°27'00"S, 018°44'00"E; Feb. 1925; S.W. Africa Museum Expedition leg.; SAM-DIP-A008755, SAMC.

Namibia – Khomas • 1♀ Fort Francois, along C28 W Windhoek; 22°40'08"S, 016°37'15"E; 1633 m a.s.l.; 31 Jan. 2012; Dikow, Torsten leg.; bushland, perching on ground; USNMENT00832179, USNM.

Namibia – Kunene • 1♀ Epupa Falls; 17°00'00"S, 013°15'00"E; 19–21 Feb. 1994; Koch, F. leg.;, MFN • 1♀ same data; MFN • 1♀ same locality; 20–22 Feb. 1994; Koch, F. leg.; MFN • 1♀ Kaross; 19°30'00"S, 014°20'00"E; Feb. 1925; S.W. Africa Museum Expedition leg.; SAM-DIP-A008760, SAMC • 1♀ Outjo; 20°06'21"S,

016°08'59"E; Jan. 1925; Museum Staff leg.; SAM-DIP-A008758, SAMC • 1♀ Ruacana Falls; 17°24'05"S, 014°12'54"E; 23–24 Feb. 1994; Koch, F. leg.; MFN • 1♀ same data; MFN • 1♀ same data; MFN.

Namibia – Omaheke • 1♀ Gobabis, 130 km S; 23°33'34"S, 019°06'52"E; 30 Dec. 1960; Haacke, W. leg.; NMSA-DIP-008976, NMSA • 1♂ same data; NMSA-DIP-097016, NMSA.

Namibia – Oshikoto • 1♂ Tsumeb, 45 km S; 19°27'09"S, 017°35'24"E; 10 Dec. 1956; NMSA-DIP-008978, NMSA.

South Africa – Eastern Cape • 1♀ Aberdeen Nature Reserve; 32°28'18"S, 024°02'22"E; 762 m a.s.l.; 04 Dec. 2015; collected a.m. (9:00–noon); Dikow, Torsten leg.; Acacia bushveld and dry pan, perching on low vegetation; USNMENT01115181, USNM • 1♂ same data; USNMENT01115034, USNM • 1♂ same data; USNMENT01115113, USNM • 1♀same data; USNMENT01115114, USNM • 1♂ same data; USNMENT01115164, USNM • 1♀same data; USNMENT01115172, USNM • 1♀ same data; USNMENT01115204, USNM • 1♂ Aberdeen Nature Reserve; 32°28'11"S, 024°01'23"E; 760 m a.s.l.; 05 Dec. 2015; collected a.m. (9:00–noon); Dikow, Torsten leg.; Acacia bushveld and dry pan, perching on low vegetation; USNMENT01115258, USNM • 1♀ 1♂ same data; in copula; USNMENT01115269, USNM • 1♂ Graaf-Reinet, 22 km SE, on Pearston Rd; 32°27'00"S, 024°38'00"E; 750 m a.s.l.; 07 Dec. 1989; Londt, Jason, Londt, A. leg.; open Karoo scrub/flowers; NAMS-DIP-008999, NMSA • 1♀ Willowmore; 33°17'00"S, 023°29'00"E; Feb. 1907; Brauns, J. leg.; NMSA-DIP-008980, NMSA • 1♀ same locality; 20 Jan. 1908; Brauns, J. leg.; NMSA-DIP-008977, NMSA • 1♂ same locality; 01 Jan. 1909; Brauns, J. leg.; NMSA-DIP-008995, NMSA • 1♀ same locality; 10 Feb. 1909; Brauns, J. leg.; NMSA-DIP-008988, NMSA • 1♂ same locality; Dec. 1912; Brauns, J. leg.; NMSA-DIP-008997, NMSA • 1♀ same locality; 01 Jan. 1913; Brauns, J. leg.; NMSA-DIP-008982, NMSA • 1♀ same data; NMSA-DIP-097037, NMSA • 1♂ same locality; 02 Jan. 1913; Brauns, J. leg.; SAM-DIP-A007908, SAMC • 1♂ same locality; 01 Jan. 1915; Brauns, J. leg.; USNMENT01141005, USNM • 1♀same locality; 01 Jan. 1919; Brauns, J. leg.; USNMENT01141005, USNM • 1♀ same locality; Dec. 1920; Brauns, J. leg.; NMSA-DIP-008986, NMSA • 1♂ same locality; 05 Jan. 1922; Brauns, J. leg.; NMSA-DIP-008983, NMSA • 1♂ same locality; 10 Dec. 1922; Brauns, J. leg.; NMSA-DIP-008985, NMSA • 1♂ same locality; 03 Jan. 1926; Brauns, J. leg.; USNMENT01141004, USNM.

South Africa – Free State • 1♀ Bloemfontein district; 29°10'00"S, 026°00'00"E; 12 Dec. 1920; Munro, H. leg.; NMSA-DIP-008991, NMSA.

South Africa – Gauteng • 1♀ Pretoria; 25°44'00"S, 028°11'00"E; Jan. 1919; Brauns, J. leg.; NMSA-DIP-097035, NMSA • 1♂ same data; NMSA-DIP-097036, NMSA • 1♀ same data; USNMENT01831271, USNM • 1♀ same locality; Jan. 1920; Brauns, J. leg.; NMSA-DIP-024273, NMSA.

South Africa – Limpopo • 1♀ Beacon Ranch, 20 km NW Gravelotte; 23°52'42"S, 030°27'25"E; 17 Nov. 1978; Brothers, D., Guillarmond, J. leg.; NMSA-DIP-008990, NMSA • 1♂ same data; NMSA-DIP-097014, NMSA • 1♂ Moorddrift; 24°17'00"S, 028°57'00"E; 07–19 Oct. 1907; Swierstra, C. leg.; NMSA-DIP-008975, NMSA • 1♂same data; NMSA-DIP-097015, NMSA.

South Africa – Mpumalanga • 1♂ Kaapmuiden; 25°32'00"S, 031°19'00"E; 30 Oct. 1918; Tucker, R. leg.; SAM-DIP-A007910, SAMC.

South Africa – North-West • 1♀ Delarey (= Delareyville); 26°41'08"S, 25°27'41"E; Jan. 1917; Brauns, J. leg.; NMSA-DIP-097021, NMSA • 1♀ same data; NMSA-DIP-097022, NMSA • 1♀ same data; NMSA-DIP-008987, NMSA • 1♂ same locality; Jan. 1919; Brauns, J. leg.; NMSA-DIP-008998, NMSA • 1♀ same locality; Jan. 1919; Brauns, J. leg.; NMSA-DIP-097023, NMSA • 1♀ same data; NMSA-DIP-097024, NMSA • 1♂ same data; NMSA-DIP-097025, NMSA • 1♂ same data; NMSA-DIP-097026, NMSA • 1♂ same data; NMSA-DIP-097027, NMSA • 1♂ same data; NMSA-DIP-097028, NMSA • 1♂ same data; NMSA-DIP-097029, NMSA • 1♂ same data; NMSA-DIP-097030, NMSA • 1♂ same data; NMSA-DIP-097031, NMSA • 1♂ same data; NMSA-DIP-097032, NMSA • 1♂ same data; NMSA-DIP-097033, NMSA • 1♂ same data; NMSA-DIP-097034, NMSA • 1♂ same data; NMSA-DIP-097196, NMSA • 1♂same data; USNMENT01141006, USNM • 1♀same data; USNMENT01141007, USNM • 1♂ same data; USNMENT01141006, USNM • 1♀ Vryburg; 26°57'00"S, 024°44'00"E; Oct. 1939; Museum Staff leg.; SAM-DIP-A007909, SAMC.

South Africa – Northern Cape • 1♀ Hopetown, 16 km W; 29°36'46"S, 023°54'32"E; 27 Jan. 1930; Munro, H. leg.; SANC • 1♂ same data; SANC • 1♀ Upington, 35 km WNW; 28°21'23"S, 020°54'46"E; 20 Mar. 1980; Londt, Jason, Schoeman, L. leg.; roadside vegetation; NAMS-DIP-008996, NMSA • 1♂ same data; NMSA-DIP-097013, NMSA.

South Africa – Western Cape • 1♀ Merweville; 32°40'00"S, 021°31'00"E; Feb. 1941; Zinn, H. leg.; SAM-DIP-A007911, SAMC.

Zimbabwe – Bulawayo • 1♀ Bulawayo; 20°09'00"S, 028°35'00"E; 19 Oct. 1919; Rhodesia Museum leg.; NHMUK013445833, Paralectotype *Anypodetus maculipennis* Ricardo, 1925, NHMUK • 1♀ same locality; 14 Oct. 1922; Rhodesia Museum leg.; NHMUK013445834, Paralectotype *Anypodetus maculipennis* Ricardo, 1925, NHMUK • 1♂ same locality; Nov. 1922; Stevenson, R. leg.; NMSA-DIP-009000, NMSA • 1♀ same locality; 12 Oct. 1923; Stevenson, R. leg.; SAM-DIP-A007914, SAMC • 1♂ same data; SAM-DIP-A007914, SAMC • 1♂ same locality; 04 Nov. 1923; Stevenson, R. leg.; SAM-DIP-A007913, SAMC • 1♀ Bulawayo; 20°09'00"S, 028°35'00"E; 1924; Stevenson, R. leg.; NMSA-DIP-009001, NMSA.

Zimbabwe – Harare • 1♂ Hillside; 17°50'00"S, 031°05'00"E; Nov. 1922; Swinburne, Stevenson, R. leg.; NMSA-DIP-009007, NMSA • 1♀ same locality; 05 Nov. 1922; Swinburne, Stevenson, R. leg.; NMSA-DIP-009003, NMSA • 1♂ same data; USNMENT01831270, USNM • 1♀ same locality; 04 Feb. 1923; Swinburne, Stevenson, R. leg.; NMSA-DIP-009002, NMSA.

Zimbabwe – Matabeleland North • 1♀ Khami; 20°09'30"S, 028°22'36"E; 01 Oct. 1938; National Museum Southern Rhodesia leg.; NMZ2733, NMBZ • 1♂ Sawmills; 19°35'00"S, 028°02'23"E; 12 Nov. 1920; Rhodesia Museum leg.; NHMUK013445832, ***Lectotype*** *Anypodetus maculipennis* Ricardo, 1925, NHMUK • 1♀ same locality; 12 Oct. 1923; Rhodesia Museum leg.; NMZ2728, NMBZ • 1♂ same locality; 14 Nov. 1924; Stevenson, R. leg.; NMSA-DIP-008993, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known from throughout southern Africa except Mozambique to date (Fig. 52). A commonly observed and collected species known from 121 specimens from 31 collecting events between 1907–2015 and three observations at iNaturalist (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active from late spring to late summer (October–March) (Table 3). Specimens collected by the senior author have been recorded perching on ground or on low vegetation (see Figs 3, 4).

Remarks. Ricardo (1925: 242) described *A. maculipennis* on 'Type (male) from Saw Mills, S. Rhodesia. Type (female) from Bulawayo, and other males and females from the same locality (Rhodesia Museum).' In doing so she did not designate a holotype so all her listed specimens must be considered syntypes. The NHMUK specimens of *A. maculipennis* were labeled as Syntypes by J. Chainey in 1984. Londt (2000: 134) designated 'the male as lectotype and the female as paralectotype' but none of the specimens are labeled as such and there are more than two specimens. We hereby designate the male from Sawmills as Lectotype (NHMUK013445832) in order to stabilize the species concept and the other two female specimens from Bulawayo in the NHMUK as Paralectotypes (NHMUK013445833 and NHMUK013445834).

Londt (1998) reported on a specimen from Willowmore that was identified by F. Hermann as '*A. varipennis*', which represents an unpublished name. The specimen in the NMSA (NMSA-DIP-008988) has been studied and verified to represent *A. fascipennis*.

Anypodetus leucothrix Londt, 2000

Figs 30–35, 51

Taxon depository. ZooBank: https://zoobank.org/53216348-9B29-4704-8DD6-22AB60B0B84B;

GBIF: https://www.gbif.org/species/1664904;

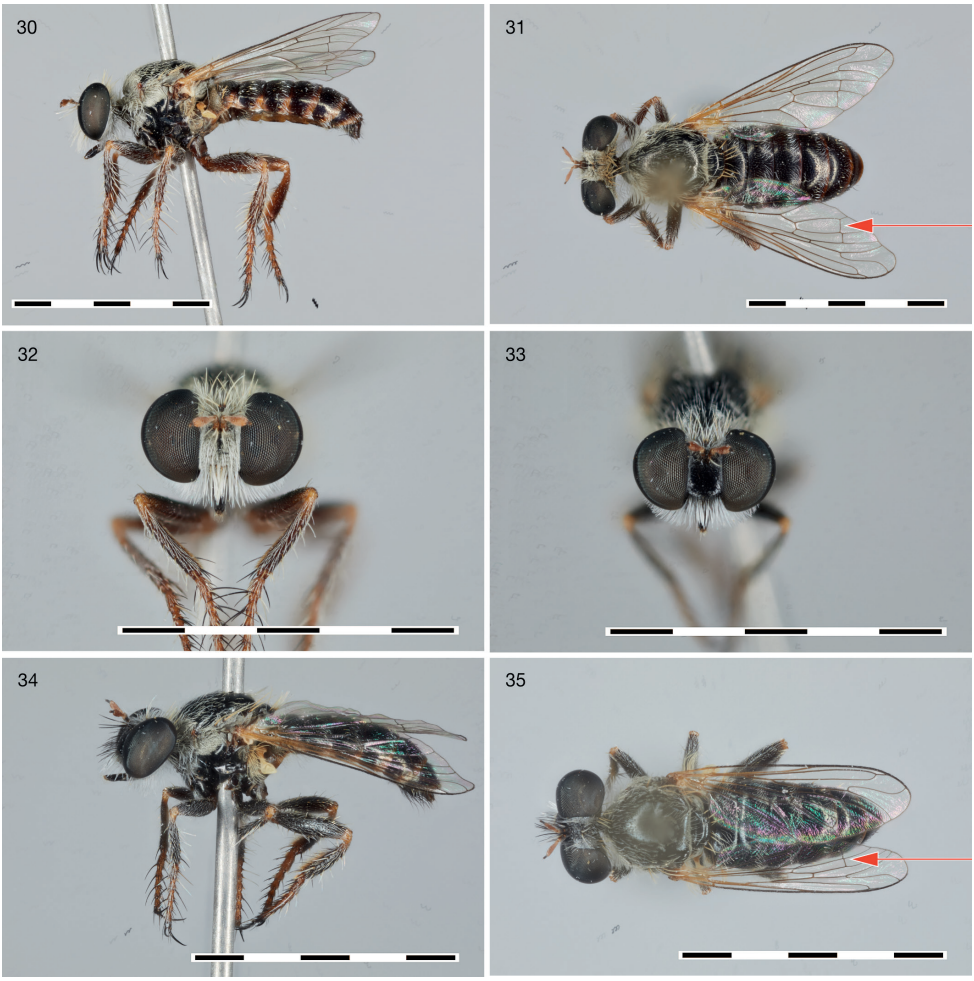
Plazi TreatmentBank: https://treatment.plazi.org/id/03B39D2F-F048-9D42-FF7D-FD2EDB6A4187;

iNaturalist: https://www.inaturalist.org/taxa/650536-Anypodetus-leucothrix.

Diagnosis. The species is distinguished from congeners by the predominantly apubescent pleura and scutum, the whitish to yellowish setation on the entire body, and the hyaline wings.

Type locality. South Africa: Western Cape: Gamka River, 40 km N Prince Albert (32°54'18"S, 021°58'40"E, -32.905, 21.97778).

Material examined. Namibia – Erongo • 1♂ Namib-Skeleton Coast National Park, off C14; 23°34'22"S, 015°48'37"E; 922 m a.s.l.; 26 Sep. 2017; collected a.m. (9:00–noon); Dikow, Torsten leg.; sparsely vegetated sand dune, perching on sand; USNMENT01384022, USNM • 1♀ same data; USNMENT01384040, USNM • 1♂ Namib-Naukluft National Park, off C14; 23°34'25"S, 015°48'39"E; 917 m a.s.l.; 20 Nov. 2018; collected a.m. (9:00–noon); Dikow, Torsten leg.; sparsely vegetated sand dune, perching on sand; USNMENT01518038, USNM • 1♂ same



Figures 30–35. *A. leucothrix* **30** ♀ (USNMENT01384040), lateral **31** same, dorsal **32** same, head anterior **33** ♂ (USNMENT01519504), head anterior **34** same, lateral **35** same, dorsal. Scale bars: 5 mm, red arrow = vein M_2 and M_3 alignment.

data; USNMENT01518039, USNM • 1♀ Namib-Naukluft National Park, off C14; 23°34'26"S, 015°48'38"E; 912 m a.s.l.; 27 Sep. 2019; collected a.m. (9:00–noon); Dikow, Torsten, Cabrero, A. leg.; margin of partly vegetated dune, perching on sand; USNMENT01519503, USNM • 1♂ same data; USNMENT01519504, USNM.

Namibia – Karas • 1♀ Ai-Ais Fish River Canyon; 27°55'00"S, 017°29'00"E; 07–08 Oct. 1993; Koch, F. leg.;, ***Paratype***, MFN • 1♂ Great Karas Mountains; 27°20'00"S, 018°45'00"E; Nov. 1936; SAM Museum Staff leg.; SAM-DIP-A008774, ***Paratype***, SAMC.

Namibia – Khomas • 1♂ Hakos Mountains, 191 km E Walvis Bay; 23°14'43"S, 016°17'22"E; 12 Nov. 1963; Moore, A. leg.; USNMENT01140564, USNM • 1♀ same data; USNMENT01140565, USNM • 1♀ same data; USNMENT01140566,

USNM • 1♂ same data; USNMENT01140567, USNM • 1♂ same data; USNMENT01140554, USNM • 1♀ same data; USNMENT01140555, USNM • 1♀ same data; USNMENT01140556, USNM • 1♀ same data; USNMENT01140557, USNM • 1♀ same data; USNMENT01140558, USNM • 1♀ same data; USNMENT01140559, USNM • 1♀ same data; USNMENT01140560, USNM • 1♀ same data; USNMENT01140561, USNM • 1♂ same data; USNMENT01140562, USNM • 1♂ same data; USNMENT01140563, USNM.

Namibia – Otjozondjupa • 1♂ Otjiwarongo, Omarassa; 20°08'57"S, 016°53'35"E; 25 Sep. 1954; Werner, G. leg.; AAM-010172, SMNS • 1♂ same data; AAM-010173, SMNS • 1♀ same data; AAM-010174, SMNS • 1♀ same data; AAM-010175, SMNS • 1♀ same data; AAM-010176, SMNS • 1♀ same data; AAM-010177, SMNS.

South Africa – Northern Cape • 2♀ Nieuveld Escarpment, Rietvlei; 32°20'00"S, 021°30'00"E; Feb. 1925; SAM Museum Staff leg.; SAM-DIP-A008773, ***Paratype***, SAMC.

South Africa – Western Cape • 1♂ Gamka River, 40 km N Prince Albert; 32°54'18"S, 021°58'40"E; 500 m a.s.l.; 11 Nov. 1986; Londt, Jason, Quickelberge, C. leg.; sandy areas / acacias; NAMS-DIP-09022, ***Holotype***, NMSA • 1♀ Laingsburg, 70 km E, dry Dwyka River area; 33°06'00"S, 021°35'00"E; 500 m a.s.l.; 24 Nov. 1990; Whittington, A., Londt, Jason leg.; NMSA-DIP-009011, ***Paratype***, NMSA • 1♂ same data; NMSA-DIP-082948, ***Paratype***, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from south-western South Africa and Namibia (Fig. 51). A rarely observed and collected species known from 33 specimens from 10 collecting events between 1925–2019 and a single observation at iNaturalist (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in spring (September–November) and late summer (February) (Table 3). Specimens collected by the senior author have been recorded on or near vegetated dunes perching on sand.

Remarks. The collection of this species by the senior author in the Namib Desert initiated interest in reviewing this genus. At first, the specimens collected could not be readily identified using the key in Londt (2000). In that key, *A. leucothrix* is keyed primarily through the wing venation being similar to *A. fascipennis* in which the proximal portion of vein M_2 and the distal portion of vein M_3 are not aligned (see Figs 25, 29). The collected specimens, however, showed a complete (or near complete) alignment of M_2 and M_3 (Figs 31, 35). Because of the considerable distance of the Namib Desert locality to the localities of the two paratypes in southern Namibia and the type locality in south-western South Africa (Fig. 51), it was postulated that the collected specimens represent a species new to science. Only a detailed study of the male terminalia comparing them to the illustrations by Londt (2000) and photographs of the holotype in the NMSA supported the conclusion that the Namibian specimens belong to *A. leucothrix*. Additional specimens collected in 1954 (in SMNS) and 1963 (in USNM) further north in Namibia added to the understanding that there is wing venation variation within *A. leucothrix*.

Londt (2000) stated that this species is somewhat different from all other *Anypodetus* species in that the thorax is primarily apubescent (all other known species have a pubescent thorax) and the scutellum has long apical scutellar setae (apical scutellar setae ab-

sent in other species). In contrast, the basic morphology of the male terminalia is identical to all other known species of *Anypodetus* (see figures in Londt 2000). Furthermore, the lack of pulvilli, the absence of a macroseta on the supero-posterior anepisternum, and the sexual dimorphism in the mystax coloration and development are features shared among all *Anypodetus* species recognized here including *A. leucothrix*.

***Anypodetus londti* sp. nov.**
https://zoobank.org/6347D6F5-A3C1-4857-81C4-2B2E60A060D9
Figs 36–38, 51

Diagnosis. The species is distinguished from congeners by the male mystax with very long white, tightly packed, dorso-ventrally flattened macrosetae, and the long black medial macrosetae on abdominal tergites 2–6.

Etymology. The species is named after Jason G.H. Londt in celebrating his career with the present *Festschrift* in the year of his 80th birthday. Jason is, without doubt, the most knowledgeable Afrotropical Asilidae taxonomist, present and past.

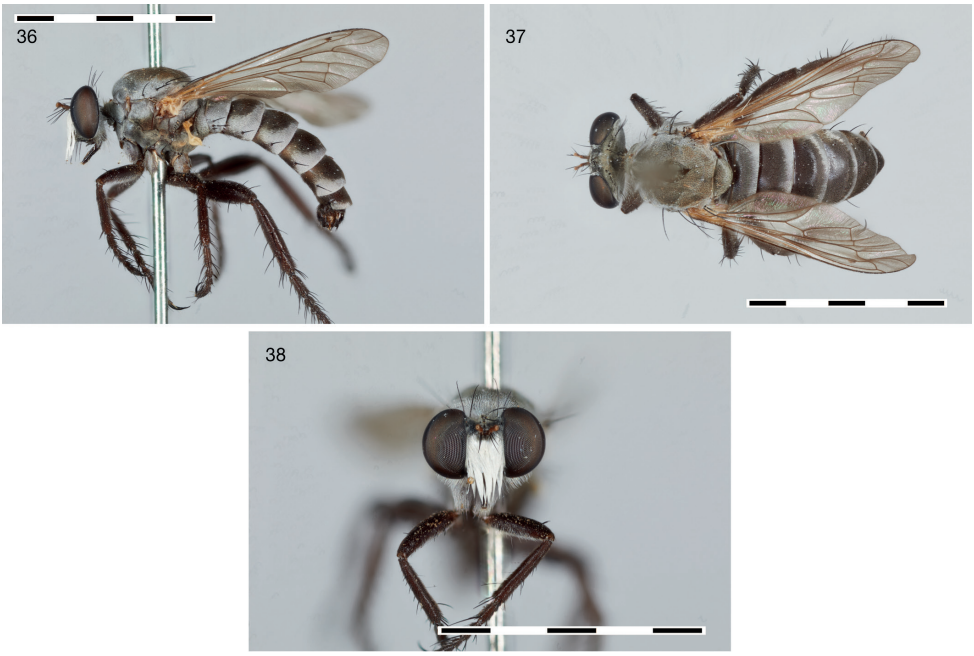
Description. Female. Unknown.

Male. ***Head*:** wider than high, black; vertex sharply depressed (90° angle on lateral margin of compound eyes); facial swelling indistinct, only ventral margin slightly developed, silver pubescent; mystax white, long dorso-ventrally flattened setae, only epistomal margin with long, black, circular macrosetae, extending over entire face, short, reaching tip of proboscis; ommatidia of different size, at least some median ommatidia distinctly larger; postgena posterior margin simple, smooth; frons (at level of antennal insertion) more or less parallel-sided, gray pubescent, laterally short white setose with single long black macroseta; ocellar tubercle gray pubescent, white setose, 2 long black macrosetae; vertex gray pubescent, white setose; median occipital sclerite (m ocp scl) long white setose; postocular (pocl) setae straight, long black macrosetae; occiput predominantly gray pubescent, white setose; compound eye posterior margin (in lateral view) straight or slightly curved throughout.

***Proboscis and maxillary palpus*:** proboscis straight, dark brown; postmentum plate-like, straight, ventral margin entirely smooth, white setose ventrally; prementum circular, with dorso-median flange, asetose; labella reduced, fused to prementum only ventrally, only forming distal tip of proboscis, apically rounded, yellowish setose; maxillary palpus brown, two-segmented, white setose, cylindrical; stipites fused entirely medially, apubescent, long white setose.

***Antenna*:** light brown to brown, lightly gray pubescent; scape approximately as long as pedicel, short black setose dorsally and long black macrosetose ventrally, macrosetae very long, reaching tip of postpedicel; pedicel short black setose ventrally, long black setose laterally; postpedicel medially broadest, long, approximately 2× as long as scape and pedicel combined, asetose; stylus comprised of 1 element, 0.25× as long as postpedicel, asetose; apical seta-like sensory element situated apically in cavity on stylus.

***Thorax*:** dark brown; prosternum gray pubescent, fused to proepisternum, broad prosternum; proepisternum gray pubescent, long white setose; cervical sclerite long



Figures 36–38. *A. londti* sp. nov. **36** ♂ holotype (USNMENT01140568), lateral **37** same, dorsal **38** same, head anterior. Scale bars: 5 mm.

yellowish setose; antepronotum gray pubescent, long yellowish setose with long yellowish macrosetose medially; postpronotum gray pubescent, long white setose; postpronotal lobe gray pubescent, short white setose, single black macroseta; pleuron gray pubescent; proepimeron gray pubescent, long white setose anteriorly; anepisternum gray pubescent in dorsal ½, brown pubescent in ventral ½, long white setose dorsally, supero-posteriorly white setose (not macrosetose); anterior basalare asetose, posterior basalare asetose; anepimeron predominantly brown pubescent, asetose; katepisternum gray pubescent, asetose; katepimeron gray pubescent, asetose; katatergite gray pubescent, long black macrosetose; meron + metanepisternum gray pubescent, predominantly asetose, long brown setose posteriorly; metakatepisternum gray pubescent, asetose; metepimeron gray pubescent, asetose; anatergite gray pubescent, asetose; scutum anteriorly narrowly gray pubescent, laterally broadly gray pubescent, medially predominantly brown pubescent, scutum setation: anteriorly and laterally short white setose, remainder short brown setose, setae with small sockets, 1 npl seta, 2 spa setae, 2 pal setae, dc setae absent, acr setae absent, median posterior scutum (between dc setae) short brown setose, setae directed posteriorly; scutellum gray pubescent, ds sctl setae present, short brown setae, ap sctl setae absent; postmetacoxal area entirely membranous.

***Leg*:** brown to dark brown, apubescent, all setae circular in cross section; pro coxa dark brown, gray pubescent, long white setose, long black macrosetose distally; pro femur dark brown, short brown setose dorsally, short white setose ventrally, black macrosetose: 3–4 in 1 antero-proximal row, 1 macroseta dorso-distally; pro tibia dark

brown, short brown setose, black macrosetose: 3 in 1 dorsal row, 4 in 1 posterior row, 4 long in 1 postero-ventral row, 1 macroseta and 3 long setae in antero-ventral row, distal tip with 5 long black macrosetae; mes coxa dark brown, gray pubescent, white setose, black macrosetose distally; mes femur dark brown, short brown setose dorsally, short white setose ventrally, black macrosetose: 2–3 in 1 antero-proximal row, 1 macroseta antero-distally, 1 macroseta dorso-distally, 1 macroseta postero-distally; mes tibia dark brown, short brown setose, black macrosetose: 3 long in 1 antero-dorsal row, 3–4 long in dorsal row, 3 long in 1 antero-ventral row, 3–4 long in 1 ventral row, distal tip with 7 long black macrosetae; met coxa dark brown, gray pubescent, white setose, anteriorly without any protuberance; met trochanter white setose, 1 black macroseta, cylindrical, medially without any protuberance; met femur dark brown, short brown setose, black macrosetose: 4–5 long in 1 antero-ventral row, 5 long in 1 dorsal row distally, 2 long 1 ventral row proximally; met tibia dark brown, straight, short brown setose, black macrosetose: 3 long in 1 dorsal row, 4 long in anterior row, distal tip with 8 long black macrosetae; proximal pro, mes, and met tarsomeres as long as following 2 tarsomeres combined, proximal met tarsomere as wide as following tarsomeres; pro tarsomeres short brown setose, long black macrosetose laterally and dorso-laterally; mes tarsomeres short brown setose, long black macrosetose laterally and dorso-laterally; met tarsomeres short brown setose, long black macrosetose laterally and dorso-laterally; pulvilli absent; claw fairly straight throughout, pointed; empodium setiform, well-developed (as long as claw).

***Wing*:** 4.6–5.6 mm, hyaline, evenly microtrichose; C circumambient (developed around entire wing), anterior wing margin in males straight; R_{2+3} distally relatively straight, r_1 closed, R_1 and R_{2+3} meet apically and form a stalk vein (petiolate); R_4 terminating anterior to wing apex, distinctly arching anteriorly, stump vein (R_3) absent; r_4 open, R_4 and R_5 diverging from each other; R_5 terminating posterior to wing apex; r_5 open; M_1 terminating posterior to wing apex; cell d closed by base of M_2, m-m absent (or at least highly reduced), M_2 and M_3 aligned in a line from anterior to posterior, r-m situated in center; m_3 closed and petiolate; cua closed and petiolate; alula well-developed; microtrichia on posterior wing margin arranged in a single plane.

***Abdomen*:** shape compressed, T2–3 distinctly transversely rectangular (length to width ratio > 1:3), dark brown to black, tergites smooth, setae with small sockets only; T1 white and brown setose, laterally with 2–3 long black macrosetae, laterally and posteriorly gray pubescent, medially brown pubescent, entirely sclerotized medially, dorsal surface smooth, without protuberances; T2–8 entirely sclerotized, dark brown, T2–6 laterally and posteriorly gray pubescent, medially brown pubescent, T7–8 apubescent, T2–6 short white setose laterally and posteriorly, short brown setose medially, T7–8 short brown setose, marginal macrosetae absent on T2–7, medial macrosetae present on T2–6, single long black macroseta; S1–8 dark brown, lightly gray pubescent, short brown setose.

Male: T1–T6 and S1–S6 entire, T7–T8 and S7 reduced to ring of sclerites, S8 well-developed; hypopygium dark brown, rotated by 90°, directed posteriorly; epandrium undivided, comprised of single sclerite fused entirely medially; hypandrium reduced, minute triangular sclerite, posterior margin entire, simple (without projections), distinctly separated from epandrium by gonocoxite, not fused to gonocoxite;

gonocoxite entirely free from epandrium; gonocoxal apodeme not observable; gonostylus present, positioned medially on gonocoxite; subepandrial sclerite asetose, ventrally smooth (without protuberances), laterally straight (without protuberances), distal margin simple, straight margin; cerci fused medially; phallus long, tip at tip of gonocoxite and gonostyli, 3 phallic prongs, tip pointed, without any protuberance.

Type locality. Mozambique: Gaza: Massangena (21°32'50"S, 032°57'03"E, -21.54722, 32.95083).

Material examined. Mozambique – Gaza • 1♂ Massangena; 21°32'50"S, 032°57'03"E; 01–08 Feb. 1964; Moore, A. leg.; USNMENT01140568, ***Holotype***, USNM.

Zimbabwe – Matabeleland North • 1♂ Victoria Falls; 17°55'00"S, 025°50'00"E; Dec. 1938; National Museum Southern Rhodesia leg.; NMZ2742, ***Paratype***, NMBZ.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from two localities in southern Mozambique and north-western Zimbabwe (Fig. 51). A rarely collected species known only from two specimens (both males) from two collecting events in 1938 and 1964 (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in summer (December and February) (Table 3). Nothing is known of the biology.

Remarks. While the male terminalia illustrations by Londt (2000) have been useful in identifying *A. leucothrix*, the species-specific features are difficult to describe sufficiently. Because only two male specimens in less-than-ideal conditions are known for *A. londti* sp. nov., we decided not to dissect a specimen for illustration in order to preserve entire specimens for future study. Photography of these structures was also not possible because of the orientation of the male terminalia and legs etc. to view all angles properly (Fig. 36). The male terminalia described above provide general features useful to distinguish species of this genus from other Afrotropical Laphriinae. The ventral terminalia aspect with the number of strong macrosetae distally on the gonocoxite is relatively easily viewable in non-dissected specimens. In *A. londti* sp. nov. there are 3–5 such strong macrosetae present (see figs 11–33 in Londt 2000).

Anypodetus macroceros Londt, 2000

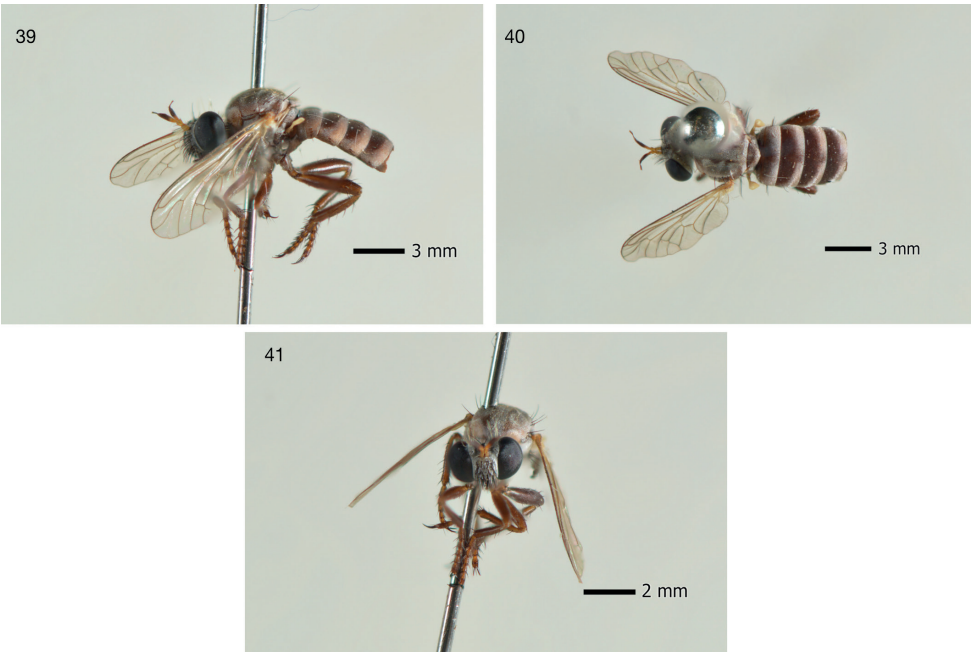
Figs 39–41, 52

Taxon depository. ZooBank: https://zoobank.org/15C1B571-6E8A-4EE6-95FD-F883C73E619D;

GBIF: https://www.gbif.org/species/1664900;

Plazi TreatmentBank: https://treatment.plazi.org/id/03B39D2F-F048-9D42-FF7D-FB43D9F14647.

Diagnosis. The species is distinguished from congeners by the unique postpedicel shape in which the apical part is narrowing and appearing as an elongate stylus, which itself is developed regularly (see fig. 6 in Londt 2000), and the densely arranged microtrichia on the wing.



Figures 39–41. *A. macroceros* **39** ♂ holotype (NMSA-DIP-009021), lateral **40** same, dorsal **41** same, head anterior. Photographs by NMSA staff, copyright KwaZulu-Natal Museum.

Type locality. Namibia: Hardap: Aandster Farm (25°21'34"S, 016°06'04"E, -25.35944, 16.10111).

Material examined. Namibia – Hardap • 1♂ Maltahöhe, Aandster Farm; 25°21'34"S, 016°06'04"E; 1000 m a.s.l.; 16 Feb. 1974; Irwin, M. leg.; vegetated dune and grassland; NMSA-DIP-009021, ***Holotype***, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from the type locality in the central Namib Desert in Namibia (Fig. 52). A rarely collected species known only from a single specimen from one collecting event in 1974 (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in February in summer (Table 3). Nothing is known of the biology.

Anypodetus nigrifacies Ricardo, 1925

Figs 42–45, 52

Taxon depository. ZooBank: https://zoobank.org/AB815003-5E96-4C41-9481-8CB39BF56AE4;

GBIF: https://www.gbif.org/species/1664909;

Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F048-9D42-FF7D-F9E6D9B84607.

Diagnosis. The species is distinguished from congeners by the uniformly brown stained wings with the wings being densely covered by microtrichia, and by the overall brown coloration.

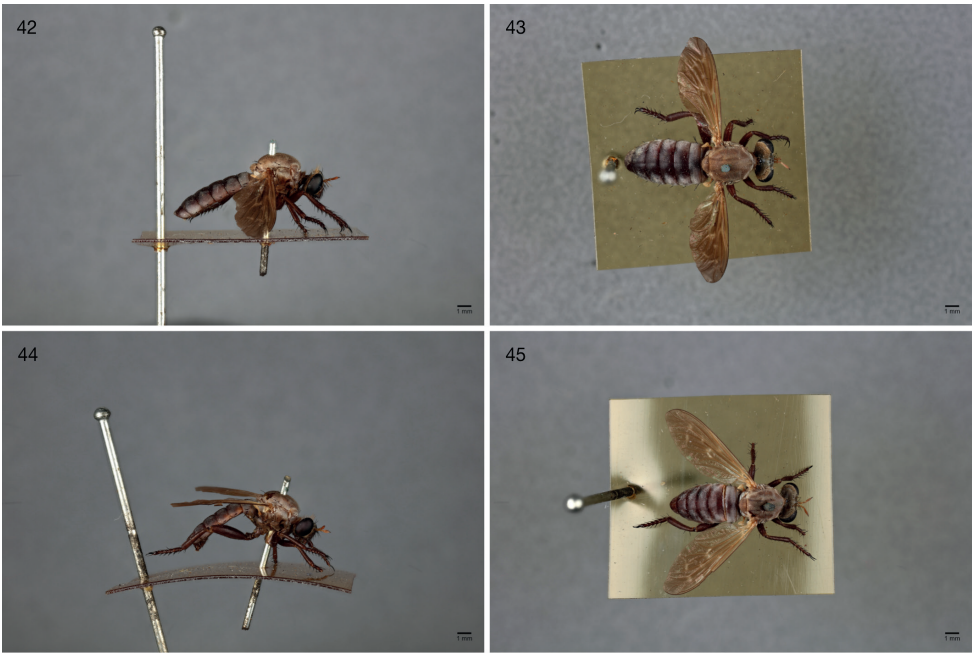
Type locality. Mozambique: Maputo: Lourenço-Marqués (= Maputo) (25°57'00"S, 032°34'00"E, -25.95, 32.56667).

Material examined. Mozambique – Gaza • 1♂ Chigubo; 22°49'55"S, 033°31'10"E; 11 Feb. 1964; Moore, A. leg.; USNMENT01140569, USNM.

Mozambique – Maputo • 1♀ Lourenço-Marqués (= Maputo); 25°57'00"S, 032°34'00"E; 12 Dec. 1906; McMillan, J.D. leg.; NHMUK013445837, Paralectotype, NHMUK • 1♀ same locality 15 Dec. 1906; McMillan, J.D. leg.; NHMUK013445835, Paralectotype, NHMUK • 1♂ same locality 18 Dec. 1906; McMillan, J.D. leg.; NHMUK013445836, ***Lectotype***, NHMUK • 1♀ Maputo; 25°58'00"S, 032°34'00"E; 15 Mar. 1980; Feijen, H. leg.; NMSA-DIP-009024, NMSA • 1♂ Moamba; 25°36'14"S, 032°14'35"E; 09–12 Mar. 1964; Moore, A. leg.; USNMENT01831272, USNM.

South Africa – KwaZulu-Natal • 1♀ Mkuzi Game Reserve; 27°38'20"S, 032°09'30"E; Jan. 1949; Munro, H. leg.;, SANC • 1♀ Mkuzi Game Reserve; 27°35'44"S, 032°13'09"E; 100 m a.s.l.; 01 Feb. 1988; Londt, Jason leg.; main camp + caravan park area; NAMS-DIP-009015, NMSA • 1♀ same data; NMSA-DIP-097038, NMSA • 1♀ same data; NMSA-DIP-097039, NMSA • 1♂ same data; NMSA-DIP-097040, NMSA • 1♂ same data; NMSA-DIP-097041, NMSA • 1♂ same data; NMSA-DIP-097042, NMSA • 1♂ same data; NMSA-DIP-097043, NMSA • 1♂ same data; NMSA-DIP-097044, NMSA • 1♀ Ndumu Game Reserve; 26°52'00"S, 032°15'00"E; 28 Nov. 1961; Oatley, T. leg.; NMSA-DIP-009013, NMSA • 1♀ Ndumu Game Reserve; 26°52'00"S, 032°15'00"E; 26 Oct. 1972; Irwin, M.E. leg.; NMSA-DIP-009008, NMSA • 1♀ same data; NMSA-DIP-097046, NMSA • 1♀ Ndumu Game Reserve; 26°52'00"S, 032°15'00"E; 15 Feb. 1978; Brothers, D., Bampton leg.; Malaise trap; NAMS-DIP-009009, NMSA • 1♀ Ndumu Game Reserve; 26°52'00"S, 032°15'00"E; 15 Feb. 1978; Brothers, D., Bampton leg.; Malaise trap; NAMS-DIP-097045, NMSA • 1♂ Ndumu Game Reserve, rest camp; 26°52'00"S, 032°15'00"E; 95 m a.s.l.; 23–29 Nov. 1977; Brothers, D., Guillarmond, J. leg.; Malaise trap; NAMS-DIP-009005, NMSA • 1♀ Ndumu Reserve; 26°52'00"S, 032°15'00"E; 01–10 Dec. 1963; Stuckenberg, Brian, Stuckenberg, P. leg.; NMSA-DIP-009006, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from eastern-most South Africa and southern Mozambique (Fig. 52). A rarely observed and collected species known from 22 specimens from 11 collecting events between 1906–1988 (Table 2). The species occurs in but is not endemic to the Maputaland-Pondoland-Albany biodiversity hotspot (a single collecting event is outside of the hotspot). Adult flies are active from late spring to late summer (October–March) (Table 3). Nothing is known of the biology.



Figures 42–45. *A. nigrifacies* **42** ♀ paralectotype (NHMUK013445835), lateral **43** same, dorsal **44** ♂ lectotype (NHMUK013445836), lateral **45** same, dorsal. Photographs by NHMUK staff, copyright Natural History Museum London.

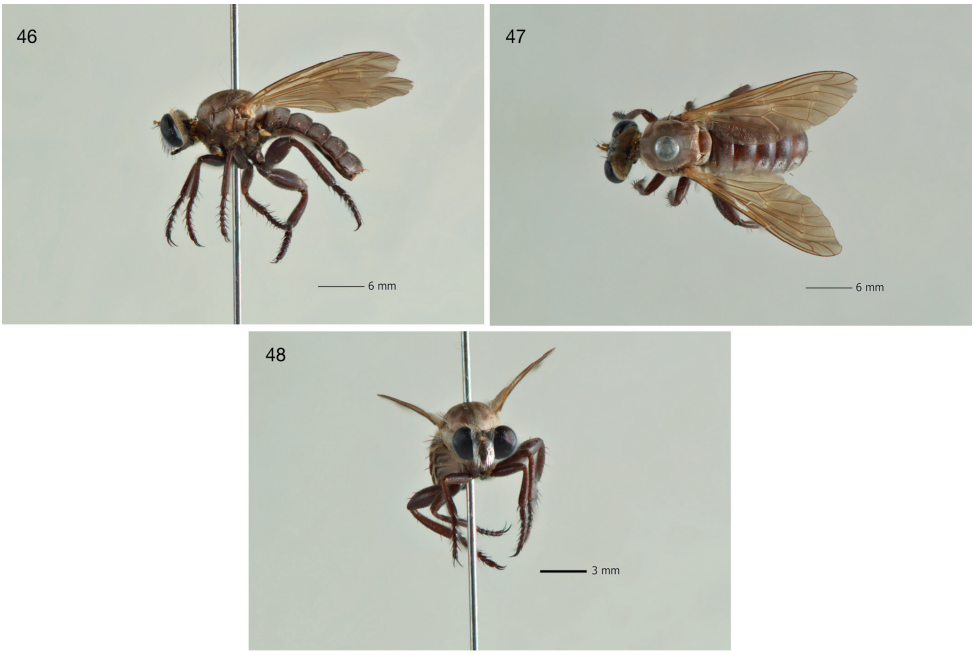
Remarks. Ricardo (1925: 244) described this species on 'Types (male and female) and another male and female, all from Lorenzo Marques, Portuguese E. Africa (F.D. McMillan), in Brit. Mus Coll.' In doing so she did not designate a holotype so all her listed specimens must be considered syntypes. The three NHMUK specimens of *A. nigrifacies* were labeled as Syntypes by J. Chainey in 1984. It is unknown where the 4th specimen is deposited. Londt (2000: 134) designated 'the male as lectotype and the female as paralectotype' but none of the specimens are labeled as such and there are more than two specimens. We hereby designate the male from Lorenzo Marques (= Maputo) as Lectotype (NHMUK013445836) in order to stabilize the species concept and the two female specimens from the same locality as Paralectotypes (NHMUK013445835 and NHMUK013445837).

Anypodetus phalaros Londt, 2000

Figs 46–48, 52

Taxon depository. ZooBank: https://zoobank.org/C3B681A5-8D4C-4B27-8F74-6948971007E7;

GBIF: https://www.gbif.org/species/1664907;



Figures 46–48. *A. phalaros* **46** ♂ holotype (NMSA-DIP-073587), lateral **47** same, dorsal **48** same, head anterior. Photographs by NMSA staff, copyright KwaZulu-Natal Museum.

Plazi TreatmentBank: https://treatment.plazi.org/id/03B39D2F-F047-9D42-FF58-FDC4D9C946C7;

iNaturalist: https://www.inaturalist.org/taxa/650537-Anypodetus-phalaros.

Diagnosis. The species is distinguished from congeners by the unique mystax with regular brown setae medially and white, dorso-ventrally flattened setae laterally in both males and females.

Type locality. South Africa: Limpopo: Louis Trichardt, 37 km N, Limpopo Valley (22°35'31"S, 029°54'24"E, -22.59194, 29.90667).

Material examined. Namibia – Karas • 1♀ Brucharos (= Brukkaros); 25°52'00"S, 017°48'00"E; 06 Mar. 1972; Brown, H., Koster, E., Wessels, D. leg.; ***Paratype***, SANC.

South Africa – Limpopo • 1♂ Louis Trichardt, 37 km N, Limpopo Valley; 22°35'31"S, 029°54'24"E; Jan. 1975; Stuckenberg, Brian leg.; arid bushveld; NAMS-DIP-073587, ***Holotype***, NMSA • 1♀ same data; NMSA-DIP-009034, ***Paratype***, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from north-eastern South Africa, southern Botswana, and south-central Namibia (Fig. 52). A rarely observed and collected species known from three specimens from three collecting events between 1972–1975 and a single observation at iNaturalist in 2015 (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in summer (January and March) (Table 3).

The iNaturalist observation (https://www.inaturalist.org/observations/11107350) indicates that this species perches on the ground. Other than that, nothing is known of the biology.

***Anypodetus unicolor* Oldroyd, 1974**
Figs 49–51

Taxon depository. ZooBank: https://zoobank.org/B5684B4D-55C5-4C70-B695-A8A7BB5FE767;

GBIF: https://www.gbif.org/species/1664908;

Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F045-9D43-FF58-FE06DB8B434D.

Diagnosis. The species is distinguished from congeners by the presence of apical scutellar macrosetae, the entirely gray pubescent scutellum, and two black medial macrosetae laterally on abdominal tergites 2–5.

Type locality. South Africa: KwaZulu-Natal: Ndumu Game Reserve camp, 32 km S (27°08'00"S, 032°15'00"E, -27.13333, 32.25).

Material examined. Mozambique – Maputo • 1♂ Lourenço-Marqués (= Maputo); 25°57'00"S, 032°34'00"E; Sep. 1913; Junod, H. leg.; NHMUK013445839, ***Paratype***, NHMUK • 1♀ same data; NHMUK013445840, ***Paratype***, NHMUK.

South Africa – KwaZulu-Natal • 1♂ Kosi Bay; 26°58'00"S, 032°48'00"E; 10–11 Feb. 1990; Eardley, C. leg.; SANC • 1♀ Kosi Bay Estuary; 26°54'00"S, 032°52'00"E; 16–19 Mar. 1982; Barraclough, D. leg.; indigenous bush area; NMSA-DIP-009038, NMSA • 1♀ Kosi Bay Nature Reserve; 26°54'00"S, 032°52'00"E; 30 Oct.–02 Nov. 1982; Londt, Jason, Barraclough, D., Stuckenberg, Brian leg.; forest + open woodland areas; NMSA-DIP-097048, NMSA • 1♀ same data; NMSA-DIP-097049, NMSA • 1♀ same data; NMSA-DIP-097050, NMSA • 1♀ same data; NMSA-DIP-097052, NMSA • 1♀ same data; NMSA-DIP-097053, NMSA • 1♀ same data; NMSA-DIP-097054, NMSA • 1♂ same data; NMSA-DIP-097055, NMSA • 1♂ same data; NMSA-DIP-097056, NMSA • 1♂ same data; NMSA-DIP-097057, NMSA • 1♂ same data; NMSA-DIP-097058, NMSA • 1♂ same data; NMSA-DIP-009035, NMSA • 1♂ Makaheli Forest, 5 km NE Mangusi; 26°58'00"S, 032°45'00"E; 30–02 Nov. 1982; Barraclough, D., Londt, Jason, Stuckenberg, Brian leg.; forest; NMSA-DIP-097059, NMSA • 1♂ same data; NMSA-DIP-097060, NMSA • 1♂ same data; NMSA-DIP-097061, NMSA • 1♀ Makana, 5 km E, near Ndumu Game Reserve; 03 Dec. 1982; Londt, Jason, Barraclough, D. leg.; roadside; NMSA-DIP-024271, NMSA • 1♂ same data; NMSA-DIP-009039, NMSA • 1♂ Mseleni; 27°22'00"S, 032°31'00"E; 29 Nov. 1982; Stuckenberg, Brian, Barraclough, D., Londt, Jason leg.; woodland, sandy area; NMSA-DIP-024271, NMSA • 1♂ Ndumu Game Reserve; 26°52'00"S, 032°15'00"E; 26 Oct. 1972; Irwin, M.E. leg.; NMSA-DIP-009030, NMSA • 1♂ Ndumu Game Reserve camp, 32 km S; 27°08'00"S, 032°15'00"E; 98 m a.s.l.; 29 Nov. 1971; Irwin, M.E., Irwin, B.J. leg.; dry scrub forest;

Figures 49, 50. *A. unicolor* **49** ♂ paratype (NHMUK013445842), lateral **50** same, dorsal. Photographs by NHMUK staff, copyright Natural History Museum London.

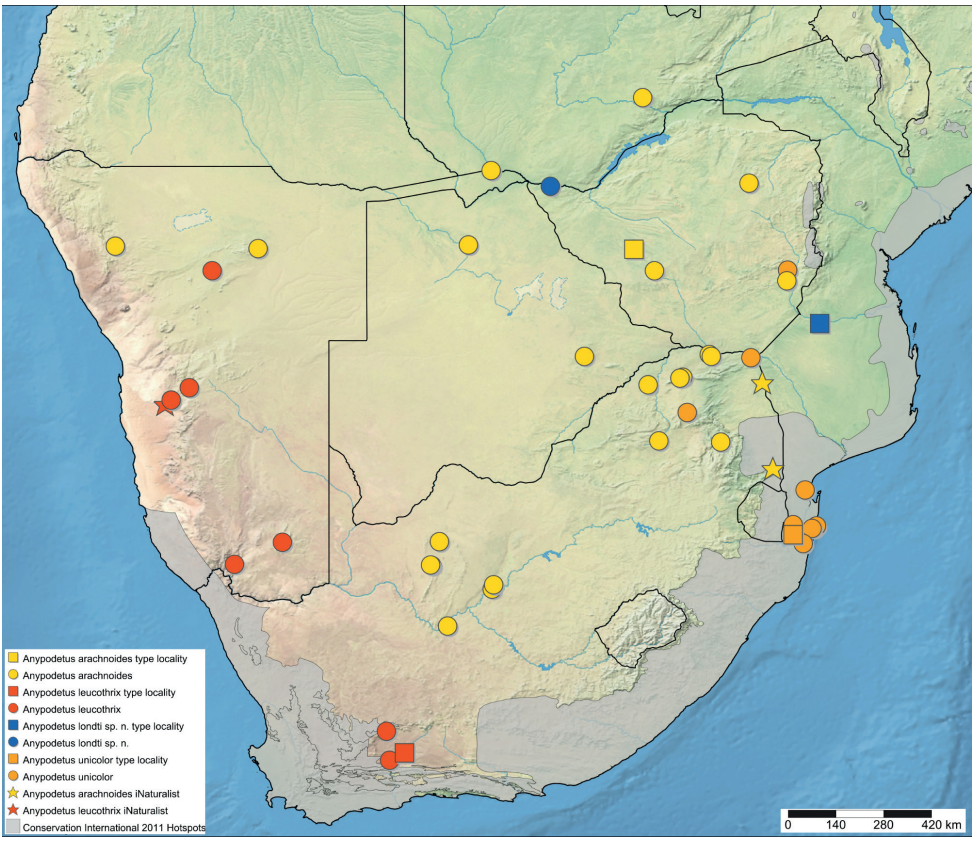


Figure 51. Map of southern Africa with elevational relief and biodiversity hotspots (*sensu* Conservation International in gray) and distribution of *A. arachnoides*, *A. leucothrix*, *A. londti* sp. nov., and *A. unicolor* (SimpleMappr https://www.simplemappr.net/map/20266). Distribution and occurrence data available in Google Earth KML file https://www.simplemappr.net/map/20266.kml.

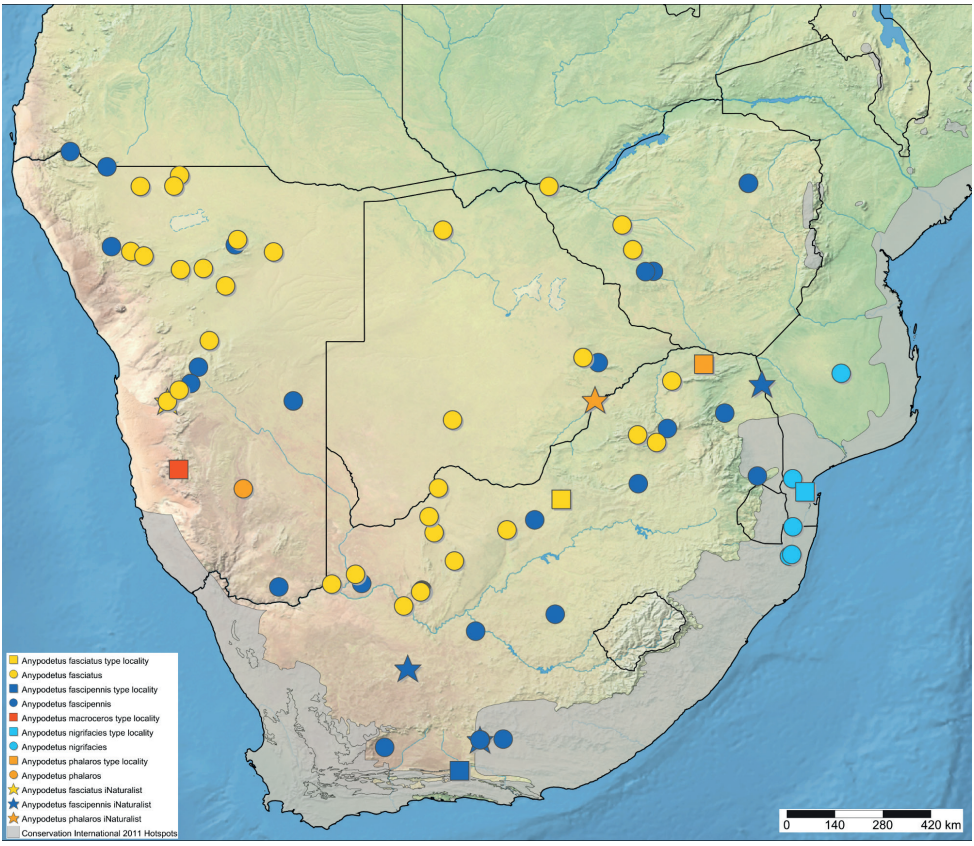


Figure 52. Map of southern Africa with elevational relief and biodiversity hotspots (*sensu* Conservation International in gray) and distribution of *A. fasciatus*, *A. fascipennis*, *A. macroceros*, *A. nigrifacies*, and *A. phalaros* (SimpleMappr https://www.simplemappr.net/map/20267). Distribution and occurrence data available in Google Earth KML file https://www.simplemappr.net/map/20267.kml.

NMSA-DIP-73586, ***Holotype***, NMSA • 1♀ same data; NMSA-DIP-009023, NMSA • 1♀ same data; NMSA-DIP-073586, NMSA • 1♀ same data; NMSA-DIP-097159, NMSA • 1♀ same data; NMSA-DIP-097160, NMSA • 1♀ same data; NMSA-DIP-097161, NMSA • 1♀ same data; NMSA-DIP-097162, NMSA • 1♀ same data; NMSA-DIP-097163, NMSA • 1♂ same data; NMSA-DIP-097164, NMSA • 1♂ same data; NMSA-DIP-097165, NMSA • 1♂ same data; NMSA-DIP-097166, NMSA • 1♂ same data; NMSA-DIP-097167, NMSA • 1♂ same data; NMSA-DIP-097168, NMSA • 1♂ same data; NHMUK013445842, ***Paratype***, NHMUK • 1♀ Ndumu Reserve; 26°52'00"S, 032°15'00"E; 28 Nov. 1961; Oatley, T. leg.; NMSA-DIP-009029, NMSA • 1♀ Ndumu Reserve; 26°52'00"S, 032°15'00"E; 01–10 Dec. 1963; Stuckenberg, Brian, Stuckenberg, P. leg.; NMSA-DIP-097158, NMSA

• 1♀ same data; NMSA-DIP-009018, NMSA • 1♀ same data; NMSA-DIP-097156, NMSA • 1♀ same data; NMSA-DIP-097157, NMSA.

South Africa – Limpopo • 1♀ Kruger National Park, Lanner Gorge; 22°27'00"S, 031°08'00"E; 23 Jan. 1985; Mansell, M. leg.; SANC • 1♀ Pietersburg (= Polokwane), Naawpoort; 23°54'00"S, 029°27'00"E; 27 Nov. 1927; van Son, G. leg.; NMSA-DIP-009031, NMSA.

Zimbabwe – Masvingo • 1♀ Devuli Ranch; 20°08'00"S, 032°06'12"E; 13 Feb. 1971; NMSA-DIP-009017, ***Paratype***, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from eastern South Africa, southern Mozambique, and south-eastern Zimbabwe (Fig. 51). A moderately commonly observed and collected species known from 44 specimens from 15 collecting events between 1913–1990 (Table 2). The species occurs in but is not endemic to the Maputaland-Pondoland-Albany biodiversity hotspot. Adult flies are active from spring to late summer (September–March) (Table 3). Londt (2000) reports one prey record: Diptera: Chironomidae.

Remarks. *A. unicolor* was originally described from eastern-most South Africa, adjacent Mozambique, Zimbabwe, another South African locality (Nauwport interpreted to be 'Pietersburg (= Polokwane), Naawpoort' by Londt (2000)) in north-eastern South Africa, and Namibia. The paratypes from Namibia, deposited in the NHMUK, were studied through photographs and it became clear that they are not representing the same taxon as the holotype from Ndumu Game Reserve, KwaZulu-Natal, South Africa, but belong to the widespread species *A. fasciatus* and are listed under that species. Therefore, this species is restricted to eastern South Africa, southern Mozambique, and south-eastern Zimbabwe.

Key to species of *Anypodetus*

An online, illustrated version of the below dichotomous key is available at https://keys.lucidcentral.org/keys/v4/anypodetus_dichotomous. The male terminalia illustrations included in Londt (2000) can be helpful as well but the identification below does not rely on those structures as other features can be utilized to distinguish all species.

1 set of 2 black medial macrosetae laterally on abdominal T2–5 (Fig. 49) ..... ***A. unicolor***

– only 1 yellow or black medial macroseta laterally on abdominal T2–5 (Fig. 36) **2**

2 scutellum apubescent; long apical scutellar macrosetae present; pleura and scutum predominantly apubescent (Fig. 34) ..... ***A. leucothrix***

– scutellum entirely pubescent; apical scutellar macrosetae absent (setae at distal scutellum tip at most as long as discal scutellar setae); pleura and scutum entirely pubescent (Figs 18) **3**

3 frons with 3–4 short, yellow (sometimes light brown) proclinate macrosetae laterally (Figs 26–27); wings in anterior ½ brown stained with white transverse bands (Figs 25, 29) .....***A. fascipennis***

– frons with only 1 (sometimes 2) long, black or yellow proclinate macroseta laterally (Figs 20–21); wings not patterned (either brown throughout or +/- unstained, Figs 19, 47) **4**

4 mystax (in males and females) medially with regular brown to black macrosetae, laterally with white, tightly packed, dorso-ventrally flattened setae (Fig. 48) ....***A. phalaros***

– mystax (in males and females) without distinct vertical setal coloration pattern (e.g., Figs 14–15, 20–21, 38) **5**

5 mystax (in females and males) with only regular, circular setae (Figs 20–21) **7**

– mystax in males with white, tightly packed, dorso-ventrally flattened setae at least in dorsal ½ of face (Fig. 15), in females with circular setae only and restricted to ventral ½ of face (Fig. 14, female of *A. londti* sp. nov. unknown) **6**

6 mystax in males with very long white, tightly packed, dorso-ventrally flattened macrosetae on entire face, reaching tip of circular long black ventral mystacal macrosetae (Figs 36, 38)..... ***A. londti* sp. nov.**

– mystax in males with short white, tightly packed, dorso-ventrally flattened macrosetae in dorsal ½ of face, circular black mystacal macrosetae in ventral ½ of face much longer than white ones (Figs 15, 17) .....***A. arachnoides***

7 wings uniformly brown stained (additionally, covered with dense microtrichia) (Figs 43, 45); restricted to southern Mozambique and adjacent eastern-most South Africa (Fig. 52) .....***A. nigrifacies***

– wings unstained (Figs 19, 39, microtrichia absent or present); restricted to western parts of southern Africa (Figs 51, 52, western Zimbabwe and northern South Africa westward) **8**

8 postpedicel apically narrowing (appearing as an elongate stylus, Figs 39, 40) ....***A. macroceros***

– postpedicel regular, +/- cylindrical throughout (Figs 12, 16) .....***A. fasciatus***

Discussion

Wing venation intraspecific variation

Londt (2000) used the alignment of veins M_2 and M_3 in the first couplet in his key to species. As highlighted under *A. leucothrix*, the alignment of these veins can be variable within a species and may cause misidentifications. Furthermore, it is somewhat difficult to state whether the veins are fully aligned or not – it is clear when they are such as in the *A. arachnoides* specimen photographed in Fig. 13 but not as straightforward

when there is a slight alignment break as in the *A. fasciatus* specimen photographed in Fig. 23. It is also difficult to discern any particular pattern of this venation variation. It does not appear to be strictly correlated with the distribution as specimens from the same locality may show alignment differences as in the specimens of *A. leucothrix* collected at the same locality in late September 2017 and 2019 (Figs 31, 35, red arrow). The very distinct non-alignment of M_2 and M_3 in *A. fascipennis* is unmistakable (Fig. 29) and unique to this species. The newly developed identification key above does not rely on wing venation to avoid any problems in determining *Anypodetus* specimens.

Mystax development and sexual dimorphism

In Asilidae, the sexes are usually only distinguishable morphologically by examining the tip of the abdomen to locate the female ovipositor or male terminalia. *Anypodetus* is unique in that respect as the development of the facial setation, the mystax, differs between the sexes in several species. To help identify species and to associate females and males, Table 1 provides short, comparative descriptions of the mystax development in females and males. Of the nine *Anypodetus* species, seven are known from both sexes (*A. londti* sp. nov. and *A. macroceros* are only known from males). Of these, the mystax between females and males differs in four species, *i.e.*, *A. arachnoides*, *A. fasciatus*, *A. fascipennis*, and *A. leucothrix*. *Anypodetus arachnoides* females are unique in that the mystax is restricted to the ventral ⅓ of the face (Fig. 14) whereas in all other species, the mystax occupies the entire face. *Anypodetus leucothrix* males are unique in that the face is entirely apubescent (Fig. 33) whereas it is gray, yellowish, or light brown pubescent in all other species. Also more unusual among Asilidae is that the mystax of *Anypodetus* is often composed of different macrosetae such as 'regular' circular setae and dorso-ventrally flattened setae, *i.e.*, in *A. arachnoides* males (Fig. 15), *A. londti* sp. nov. males (Fig. 38), and *A. phalaros* females and males (Fig. 48).

Distribution

Species of *Anypodetus* occur throughout southern Africa but so far the genus has not been recorded from Eswatini or Lesotho (Fig. 11). A notable exception in terms of its distribution is its absence in much of the coastal habitats along the Atlantic and Indian oceans with the exception of eastern-most South Africa and southern-most Mozambique (Fig. 11). Furthermore, *Anypodetus* has not been collected or observed in the otherwise species-rich Succulent Karoo and Cape Floristic Region biodiversity hotspots (Fig. 11). It is likely that the genus also occurs in at least southern Angola and is more widespread in southern Zambia and Mozambique.

Three species, *A. arachnoides*, *A. fasciatus*, and *A. fascipennis*, are more commonly collected (Table 2) and widespread across southern Africa (Figs 51, 52). *A. leucothrix* (Fig. 51) and *A. phalaros* (Fig. 52) are somewhat widespread as well, but with many fewer collecting events to date (Table 2). Interestingly, several species have been collected at the same locality, and sometimes even sympatrically. For example, *A. fasciatus*

and *A. leucothrix* have been collected sympatrically in the Namib-Naukluft NP in Namibia (C14 locality, 23°34'25"S, 015°48'39"E) by the senior author in November 2018 (habitat photos in Figs 7, 8). However, these species may compartmentalize the microhabitats of this eastern-most extent of the Namib Dune Sea as the microhabitat and perching data on the label suggest: *A. fasciatus* perching on sand at base of sparsely vegetated sand dune; *A. leucothrix* perching on sand on sparsely vegetated sand dune. Other localities with more than one species recorded are:

(1) Bulawayo, Zimbabwe with *A. arachnoides* and *A. fascipennis* with 1 collecting event with both species sympatrically on 1923-11-04.
(2) Hillside, Zimbabwe with *A. arachnoides* and *A. fascipennis*.
(3) Maputo, Mozambique with *A. nigrifacies* and *A. phalaros*.
(4) Ndumu Game Reserve, South Africa with *A. nigrifacies* and *A. phalaros* with 2 collecting events with both species sympatrically on 1972-10-26 and on 1963-12-01–10.
(5) Outjo, Namibia with *A. fasciatus* and *A. fascipennis* with 1 collecting event with both species sympatrically on 1925-01.
(6) Sawmills, Zimbabwe with *A. arachnoides*, *A. fasciatus*, and *A. fascipennis*.
(7) Serowe, Botswana with *A. fasciatus* and *A. fascipennis*.
(8) Victoria Falls, Zimbabwe with *A. fasciatus* and *A. londti* sp. nov.
(9) Vryburg, South Africa with *A. fasciatus* and *A. fascipennis* with 1 collecting event with both species sympatrically on 1939-10.

Seasonal imago flight activity

Species of *Anypodetus* have been collected in the Southern Hemisphere spring to late summer – September–March with the Zambian record of *A. arachnoides* (NHMUK013445830) recorded in August (Table 3). The majority of species have an imago flight activity from October–March. *Anypodetus londti* sp. nov. (December, February), *A. macroceros* (February), and *A. phalaros* (January, March) with fewer records available appear to be more restricted. *Anypodetus leucothrix* appears to fly earlier in the season with activity already in September in the Namib Desert.

Biodiversity hotspots

Of the nine species of *Anypodetus*, only three occur within a currently recognized biodiversity hotspot *sensu* Conservation International namely Maputaland-Pondoland-Albany. While *A. fascipennis* occurs in the western-most extent of the hotspot (Fig. 52), *A. nigrifacies* and *A. unicolor* occur in the eastern-most section straddling South Africa and Mozambique (Figs 51, 52). *A. fascipennis* and *A. unicolor* are also widespread outside of this hotspot whereas there is only a single collecting event known for *A. nigrifacies* outside of the hotspot. It is of note that *Anypodetus* species do not occur, based on our current knowledge, within the Cape Floristic Region and Succulent Karoo biodiversity hotspots that are otherwise diverse for Asilidae species (Dikow et al. 2009).

Conclusion

Anypodetus is a unique genus of Afrotropical Asilidae restricted to southern Africa. The now nine recognized species are widely distributed in this region and the number of iNaturalist observations might be an indication that species can easily be observed in natural environments. Namibia holds the largest species diversity with six species recorded.

In the field, the genus can be confounded with species of *Trichardis* Hermann, 1906 (reviewed by Londt (2008), see iNaturalist observations https://www.inaturalist.org/observations/63361137 and https://www.inaturalist.org/observations/11087325) but all species of *Trichardis* have well-developed pulvilli.

Acknowledgements

It is our sincere honor to contribute an article and a new species of assassin flies to the *Festschrift* for Jason Londt in celebrating his career as one of the great South African dipterists and insect collectors. The senior author is delighted to call Jason a mentor, a colleague, and a friend for more than 23 years now. Several specimens included in this study were collected by Jason and the senior author in the Northern Cape and Limpopo provinces of South Africa in 2004–2005 (see, for example, Figs 12–17 and Dikow and Midgley 2023).

We would like to thank the museum curators for making specimens available through loans and for their hospitality when visiting the collections. Steve Marshall (University of Guelph) is thanked for allowing us to use his photograph of *A. fasciatus* in Fig. 1. Staff at the NMSA, especially Kirstin Williams, and NHMUK, especially Erica McAlister, are thanked for sharing photographs of type specimens of *Anypodetus* species reproduced here. We would also like to graciously acknowledge the Smithsonian National Museum of Natural History (NMNH) for funding the Natural History Research Experience (NHRE) program in 2022 in which the junior author participated. We thank Virginia Power, Vanessa Gonzalez, and Ioan Lascu for their constant support during the administration of the NHRE programme. We also acknowledge field-work funding to the senior author from the Smithsonian NMNH, US National Science Foundation REVSYS Grant (DEB 0919333 2009; PI T. Dikow, Co-PI David Yeates; any opinions, findings, and conclusions or recommendations expressed in this manuscript are those of the author and do not necessarily reflect the views of the National Science Foundation), and the Women's Board Field Dreams award at the Field Museum of Natural History (2011, we thank especially Mrs. Janice Beck for supporting the study of flies in the Namib Desert). Furthermore, we thank the Namibian National Commission on Research, Science and Technology (NCRST) and the Ministry of Environment and Tourism (MET) for providing collecting and export permits in support of the field-work in Namibia in 2012 and 2017–2019. Gillian Maggs-Kölling, Leena Kapulwa, and Eugene Marais (Gobabeb Namib Research Institute) are thanked for all the support prior to and during the several visits by the senior author to the institute. Likewise, the permitting authorities in the

Eastern Cape province of South Africa provided collecting permits for a field-trip in 2015. Lastly, we thank Martin Hauser and an anonymous reviewer for their constructive and helpful comments improving the manuscript during peer review.

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