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The sawflies of Namibia and western South Africa (Symphyta, Hymenoptera)

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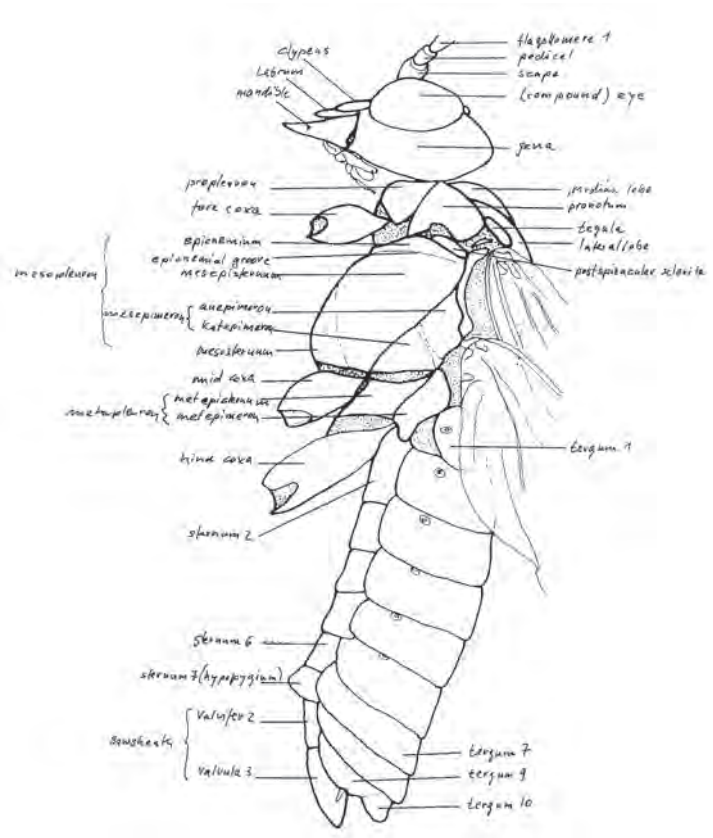

by

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Preface

Living organisms detected, observed and/or collected in the field deserve to be identified as soon as possible in order to advance scientific research. This underlines the crucial importance of taxonomy for fundamental as well as applied research, in particular when it comes to the understanding of the functioning of biodiversity and its conservation and sustainable use. However, even in the 21st century biologists and other stakeholders are still confronted with barriers that obstruct their work. One of the most persistent barriers encountered is the availability of updated identification tools, ideally for all parts of the world. In this context, the knowledge and know-how made available through the capacity building series *Abc Taxa* comes as highly appreciated. Volumes in this series aim to deliver not only identification keys of a taxon, but also high quality colour illustrations, biological data, and useful technical advices (for instance on collection methodology and collection management) related to the species group. Moreover, each volume is devoted to the group living in a specific geographic area, with preference for those areas that are generally underrepresented in other works, and these areas often correspond to developing countries. The latter observation explains why the Belgian Development Cooperation funds this series.

In the field, sawflies are less often encountered than other hymenopteran insects such as bees, ants and wasps. They nevertheless play a significant ecological role in many terrestrial ecosystems, because the (caterpillar-like) larvae of virtually all sawfly species are plant-feeders, their overall host range including a large range of gymnosperms, angiosperms (dicots and monocots), and ferns. Several species are significant pests of crops, in orchards, forests, etc. Sawflies are much better known in the Northern than the Southern Hemisphere, the biology and ecology of many species particularly from sub-Saharan Africa remaining simply unknown. Thus, the present, well-illustrated volume contributes to fill a gap in the study of this taxon, and will help researchers such as taxonomists studying the entomological fauna of South-Western Africa, and people involved in conservation biology to draw up biodiversity management plans.

Although ‘biodiversity’ is a buzzword and a keystone notion often mentioned in the frame of public, political, and economic discussions, its study continuously needs reference books such as those delivered worldwide by the series of *Abc Taxa*.

Jean-Luc Boevé
Brussels, January 2015

Abstract

This monograph includes a history of the study of the sawflies of the Afrotropical Region; recommended collecting methods; a general description of the life cycle of sawflies; and extensive references to Afrotropical sawflies. A total of 55 species of Symphyta have been reported from the study area, which comprises Namibia and the western parts of South Africa. Previously, 26 species were known from Namibia and 29 species, including four introduced species, from the South African part of this region. Only one species was recorded from both countries. Identification keys for all families, genera and species are provided. As a result of current taxonomic revisions, five new junior synonyms are proposed: *Athalia limpopo* Benson, 1962 **syn. n.** for *A. brevicornis* Benson, 1962; *A. xantha* Benson, 1962 **syn. n.** for *A. incomta* Konow, 1908*; A. elisabethae* Muche, 1979 **syn. n.** for *A. ustipennis* Mocsáry 1909; *Distega braunsi* Enslin, 1911 **syn. n.** and *D. brunniventris* Enslin, 1913 **syn. n.** for *D. montium* Konow, 1907*.* Finally, *Distega nigeriae* Forsius, 1927 **sp. rev.** is a valid species and is removed from synonymy with *D. mocsaryi* Enslin, 1913. Colour images of all species are included, together with line drawings of further morphological characters, and maps displaying their known distribution.

Front cover. *Arge deckerti* on flower of *Chyphostemma congestum*. (Photo by J. Deckert).

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1. Introduction

More than 30 excursions to southern Africa have been made since 1992, with the objective of collecting sawflies (Fig.1), a group which has been scientifically neglected in Africa for more than thirty years. Of major importance in this context was the field work of the Biodiversity Monitoring Transect Analysis in Africa (BIOTA) from 2000 to 2010, especially phase III from 2007 to 2010. The BIOTA-Africa Project comprised over 30 subprojects in a number of countries in eastern, western and southern Africa. The research sites of the BIOTA-Southern Africa Project follow rainfall gradients from dry forest habitats through arid savanna to the winter rainfall zones in Namibia and South Africa (**Chapter 2: The study area**). The central theme of this project was to document biodiversity in space and time.

Fig. 1. *Xenapates gaullei* (Konow, 1896). Its larvae feed on different species of Poaceae in western Africa. (Photo by G. Goergen)

Parallel to this, numerous unidentified specimens in South African and Namibian collections were also examined. It became clear that satisfactory identification could not be achieved through use of the existing literature and that these problems could only be solved by revision of the affected genera. Furthermore, during initial attempts at field work, experience gained from the collection of these genera in central Europe failed to lead to comparably good results in southern Africa. Even for practised entomologists, sawflies are difficult to find, especially in the arid and semi-arid parts of southern Namibia and the Northern Cape and Western Cape provinces of South Africa. To optimise collecting results, it was judged necessary to obtain more precise data on the habitats and climatic conditions that best suit Symphyta in these regions (**Chapter 5: Material and methods**).

Comprehensive taxonomic results and ecological information acquired over the last 20 plus years on the Symphyta fauna of southern Africa, which now comprises 14 genera and 55 species for the study area, constitute the main component of this monograph. This work provides a baseline for further research on Symphyta of the Afrotropical Region.

This publication was first envisaged as a “Field guide of the Symphyta of Namibia and the western parts of South Africa”, comparable with numerous available books on the butterflies, dragonflies and conspicuous groups of beetles of this region.

However, during development of the manuscript doubts arose as to whether the Symphyta could ever attract the interest of such a wide audience.

The sawfly fauna of this region seems to be very poor in number of species. Especially the dry biomes, Succulent Karoo and Nama Karoo, appear to offer rather unsuitable conditions for the successful completion of the life cycle of these phytophagous insects, whose larvae feed externally on plant foliage. Among other factors, the poor knowledge of sawflies from this region can be explained by the fact that thorough field collections specifically targeting this group have not been undertaken in these arid and semiarid habitats.

By comparison, sawflies are far more abundant in the humid areas of northern Namibia as well as the montane areas (Afromontane Region) of the South African provinces of KwaZulu-Natal, Mpumalanga, Limpopo and North-West (Koch 2005a, b). Specimens are mainly represented by the black/yellow coloured species that are more visible in this habitat and hence easier to collect because they stand out with their relatively quiet flight against the green or dark background of lusher vegetation.

The question was raised as to whether a careful observer of nature would be interested in these relatively inconspicuous fly-like insects. And if so, the feasibility of achieving an identification in the field without capturing and examining the specimen under a microscope.

Therefore it was decided to create a stable taxonomic base to facilitate further research on Symphyta in southern Africa. This resource will make it possible to accurately determine the species present in the study region (**Chapter 2: The study area**) enabling the discovery of new species.

It is clear from the relevant literature (Prinsloo 1985, Scholtz & Holm 1985, Picker *et al*. 2004) that sawflies have been largely neglected from the perspective of their diversity, as well as ecology and biology in southern Africa. Only the genera *Arge* and *Athalia* are somewhat well represented in the region. The indigenous fauna is supplemented by four introduced species from Europe: *Caliroa cerasi* (Linnaeus, 1758) (Pear-slug), is a pest on fruit crops, the other, *Fenusa dohrnii* (Tischbein, 1846), lives on alder (*Alnus*), *Nematus oligospilus* Förster, 1854, has been reported on cultivated willows (*Salix*) and finally *Sirex noctilio* Fabricius, 1793 (European woodwasp, Sirex woodwasp), a pest in pine plantations. This deficit in the knowledge of the region's sawfly richness is even more remarkable when one considers that in southern Africa an estimated excess of 100 valid species is expected. The existing fragmented literature only enables inaccurate and partial determination of the species

This book fills this gap in our knowledge by providing a resource to initially identify all genera of southern Africa and with the use of additional current literature to

identify the species. The treatment also highlights the genera in the Afrotropical Region requiring taxonomic revision.

A synopsis of sawfly diversity in each of the region's biomes is presented including data on the species' habitat preferences. In addition, information on their flight seasonality and distribution throughout the Afrotropical Region as well as a compilation of the available information on host plants and other biological data are provided.

The remaining chapters deal with the ecological function of Symphyta in ecosystems and their importance as plant pests. Based on examination of historical material preserved in museum collections and experience gained during field research over the last 20 years, an assessment of potential extinction threats to species and the requirements for their future conservation are discussed.

1.1 Sawflies as part of the ecosystems

Sawflies are very rarely observed in the biomes of the study area, especially in the arid regions of the winter rainfall zone. Even in the other more mesic biomes (Thornbush Savanna and Woodland Savanna) the population density of Symphyta appears to be low and therefore we can only speculate about their function in these ecosystems.

Adult sawflies are occasionally found in abundance on flowers, with a preference for Asteraceae, where they feed on pollen and possibly also nectar (**Chapters 6: Life cycle; 7: Host plants**). We know very little about relationships of adults to certain plant species based on limited observations in the field. Very rarely larvae have been observed, however, no females have been observed laying eggs. In **Chapter 7: Host plants** as well as in the species treatments, recorded observations are presented for the various species providing a base for further ecological studies.

The relatively low abundance of Symphyta in southern Africa in combination with high predation pressure from ants, spiders, birds, small mammals and parasitoids on larvae and adults means that they may not play a significant role in food webs. Further ecological studies are still required to determine the exact role that they play in ecosystem functioning.

1.2 Importance of sawflies as pests of agricultural crops

Little is known about endemic sawfly species as pests of crop plants in southern Africa (Visser 2009). A few larvae of *Athalia* species have been recorded to feed on cabbage and turnips (Brassicaceae) and some introduced pests of decidious fruit are known such as the Pear-slug (*Caliroa cerasi*) (Visser 2009). Since even the *Athalia* species imaged by Visser (2009) were unidentified, this once again demonstrates the importance of this book for the identification of species

allowing for implementation of effective measures to protect crops. *Arge taeniata* (Klug, 1834), known as the Pelargonium sawfly, occurs as a pest in *Pelargonium* plantations in the winter rainfall area of Western Cape Province (Prinsloo 1985).

Sirex noctilio, an introduction from Europe, is an increasingly important pest in the timber industry (Fig. 183) (van Noort & Picker 2011). *Nematus oligospilus* Förster, 1854, has been recorded as feeding on willows (Urban & Eardley 1995, 1997).

In equatorial Africa, the importance of endemic Symphyta as pests on crop plants is more significant. This applies particularly to several *Athalia* species on Brassicaceae (Benson 1962) and *Xenapates* species (Fig. 1) on Poaceae and Commelinaceae (**Chapter 7: Host plants**). The identification keys presented here, especially to the genera, are very useful for the rest of Africa. Most African genera are identifiable using these keys, and recommendations to additional specific literature are provided.

1.3 Destruction and conservation of natural habitats

The spectrum of species, covered in this treatment includes numerous recently described species, especially from the winter rainfall area. Some of these species were discovered in small numbers in very old collections in different South African

Fig. 2. Destruction of the coastal vegetation by urban land use expansion across the Cape flats near Muizenberg adjacent to False Bay south of Cape Town (Western Cape Province). (Photo by S.van Noort)

museums and were described as part of the preparation of this monograph (Koch 2006a, Koch & Goergen 2010, Koch & Eardley 2011).

Despite intensive field work over several years, very few new records of these species were assimilated. The same is true for species described last century, many of which have never been recollected since their original description. The documentation of all species, however, is indispensable for assessment of species richness and diversity prior to habitat transformation and climate change.

The disappearance of sawfly species from the study area and other areas of South Africa is probably a result of changes in space and time relating to shifts due to changes in ecological conditions, including the destruction of the original habitats over the past 100 years. This is especially true for the metropolitan area of Cape Town that has expanded northwards and eastwards towards Paarl, Stellenbosch and Somerset West (Fig. 2).

Destruction of natural habitats has also occurred as a result of extensive crop farming and stock farming (Figs 3, 4), as well as wine and citrus cultivation (Fig. 5), particularly in the Fynbos Biome. Agricultural land use has strongly reduced and split up the original primary vegetation, especially in the Coastal Fynbos (Fig. 6). The same phenomenon is caused by the increasing expansion of the timber industry in

Fig. 3. Destruction of natural habitats by extensive agricultural land use. View from the Gydo Pass near Ceres towards the Grootwinterhoek Nature Reserve (Western Cape Province). (Photo by F. Koch)

Fig. 4. Extensive crop farming south of Swellendam (Western Cape Province). (Photo by F. Koch)

Fig. 5. Extensive cultivation of citrus and wine near Citrusdal (Western Cape Province) (Photo by F. Koch)

Fig. 6. View from the border of De Hoop Nature Reserve (Western Cape Province). Agricultural land use dominates the landscape. The primary vegetation of the Coastal Fynbos vegetation type only persists in island patches (these archipelago-like remnants are visible in the background). (Photo by F. Koch)

areas of Mountain Fynbos (**Chapter 2: The study area**). In many areas, extensive afforestation has destroyed most of the natural vegetation, and large tracts of land have been severely invaded by alien plants (*Pinus* and *Eucalyptus*). The primary vegetation remaining is in only poorly accessible habitats or in protected areas.

With this unbridled growth of urban and rural land use, the natural habitat of many sawfly species is being destroyed, and they can only survive in the protected areas. This is especially true for species with small distribution areas, and it seems probable that some of these species are now extinct (**Chapter 9: Systematic presentation**). From a conservation point of view, it is critical to document the sawfly fauna in the remaining original habitats.

In this respect, the data presented here has value in supporting the creation of large conservation areas in the unique Fynbos Biome.

2. The study area

The study area (Fig. 7) includes the entire territory of Namibia including the Caprivi Strip. In the South it extends over Northern Cape Province and Western Cape Province to the Indian Ocean. The South African part of the study area is delimited in the east by the 21st longitude.

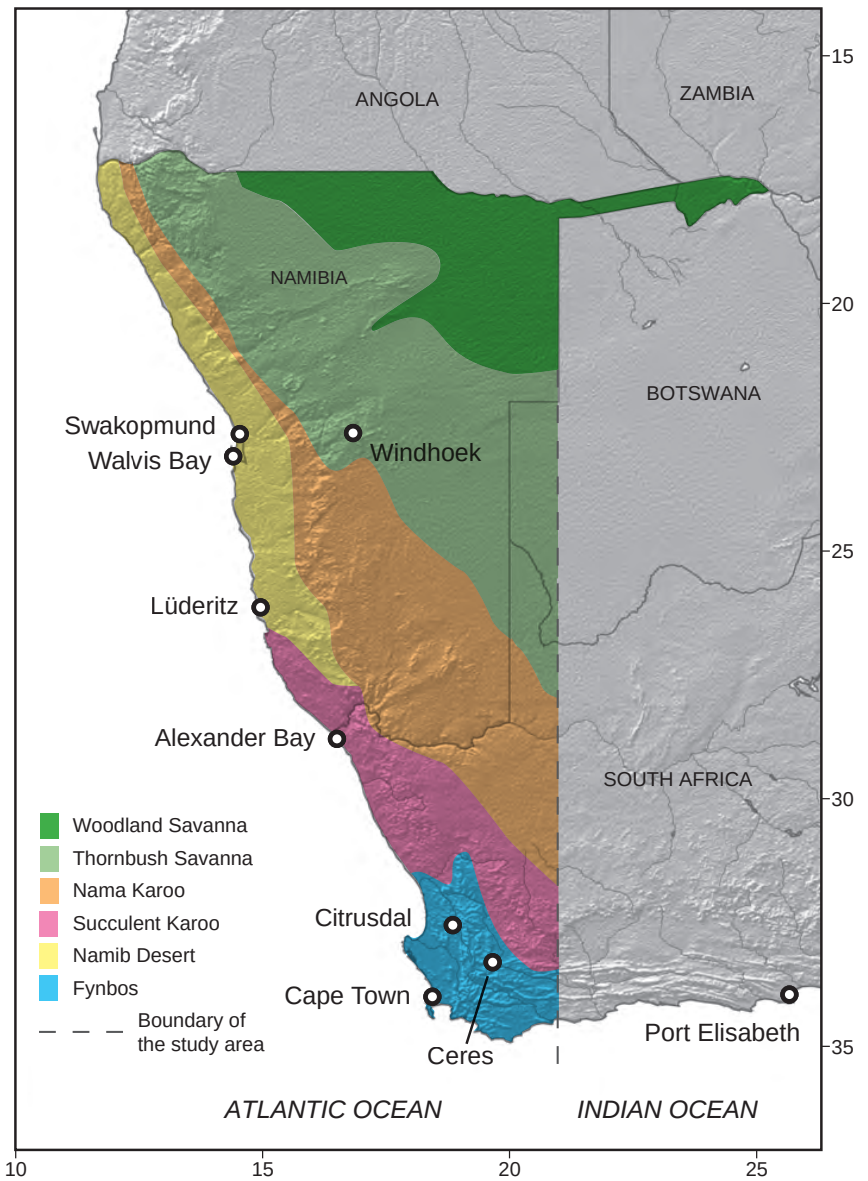

Fig. 7. The study area with its biomes, modified after Jäschke & Langner (2010).

This area includes nearly the whole winter rainfall area of southern Africa (Fig. 8). The region of the winter rainfall encompasses an area approximately positioned west of a line extending from Swakopmund on the Atlantic coast of Namibia to Mosselbaai on the Western Cape coast of South Africa. The northern part of this line is characterized by the Succulent Karoo Biome and the southern part is dominated by the Fynbos Biome.

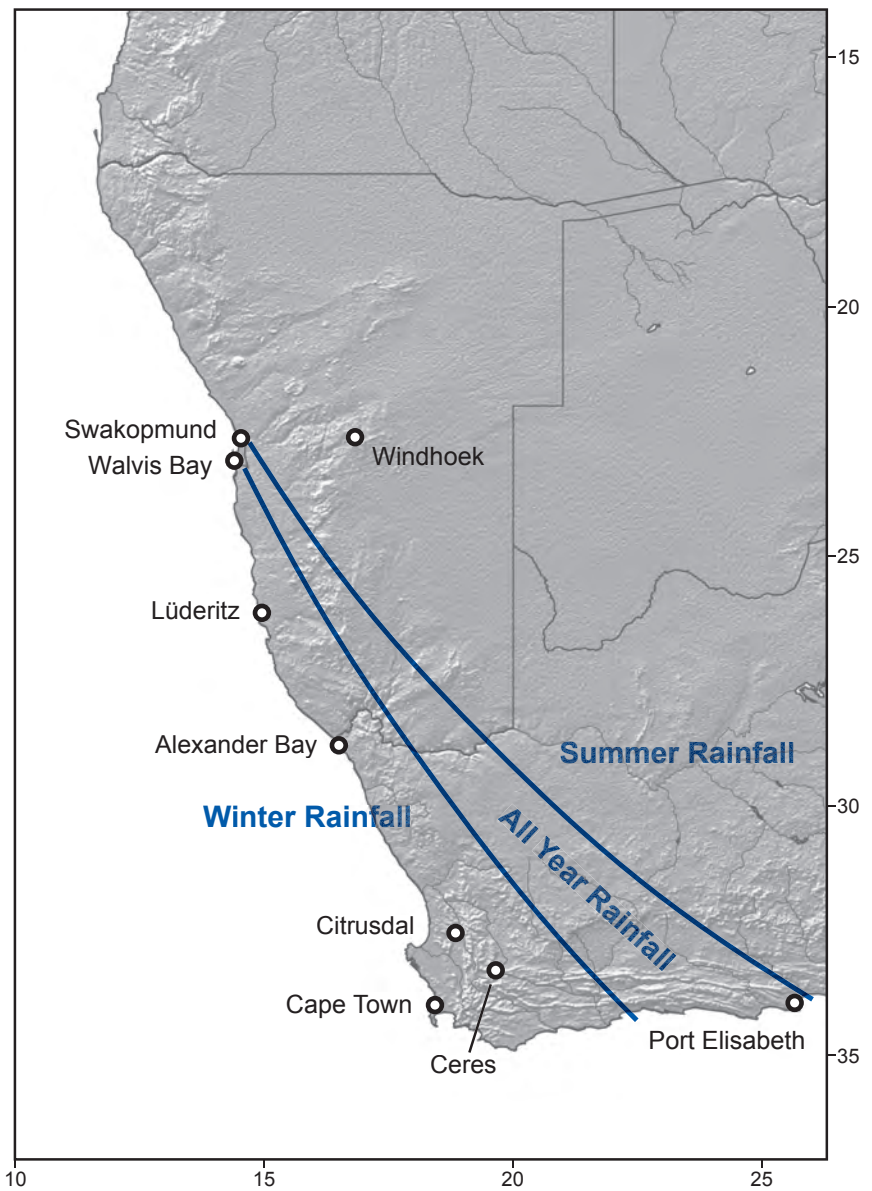

Fig. 8. The rainfall zones of the study area.

2.1 Biomes of the study region

Woodland Savanna Biome

The Woodland Savanna Biome (Fig. 7) is characterised by dry woodlands dominated by tall trees and relatively sparse understory vegetation. This biome covers large parts of the African continent. In Namibia it is situated in the north-east area bordering Angola and Botswana and receives much higher annual rainfall than the rest of the country. There is a typical summer rainfall climate, with an average annual rainfall of about 500 mm. This higher rainfall allows for the typical, mainly non-commercial land use structure in the area, which consists of rain-driven subsistence crop activities during high rainfall years (Jürgens *et al*. 2010).

The centre of the Woodland Savanna Biome is characterised by the extensive sand plateau of the Northern Kalahari, and possesses linear east-west orientated structures which are remnants of a prehistoric dune field. These dunes have since been eroded, sometimes to a level lower than the more loamy remnants in the adjacent inter-dune valleys. The deep sands of the Kalahari Plateau are stabilised by an open broad-leaved woodland (Figs 9, 10).

The so called Caprivi Strip in the Northeast of Namibia in the Woodland Savanna Biome is characterised by the large streams Okavango River in West Caprivi and

Fig. 9. The Woodland Savanna Biome in northern Namibia (Mahango Game Reserve). (Photo by F. Koch)

Fig. 10. An impression of the Woodland Savanna Biome of the Northern Kalahari (Kalahari Basin, north-eastern Namibia). (Photo by J. Deckert)

Fig. 11. The wetlands of the Woodland Savanna Biome near Schuckmannsburg on the Zambezi River in the Eastern Caprivi (north-eastern Namibia). (Photo by F. Koch)

the Zambezi River and Kwando River in the East Caprivi with their riverine forest. Additionally, the Kwando River, the Linyanti River and the Chobe River in the East Caprivi area are adjoined by extensive wetlands (Fig. 11).

Furthermore, numerous ephemeral waters (dry rivers and pans), which are dependent on unpredictable rainfall are located in this biome. Pans are natural depressions that fill with water after periods of heavy rain.

Thornbush Savanna Biome

These savannas, which are characterised by an extensive cover of grasses, with scattered trees (Fig. 12), cover almost one-third of the land surface of the earth and 40% of Africa. In southern Africa, savannas are home to growing human populations and most people depend on the ecological resources these systems offer. The main landuse practices in the Thornbush Savanna Biome (Fig. 13) are farming with cattle and – increasingly so – game for trophy hunting (Jürgens *et al*. 2010).

The Thornbush Savanna Biome (Fig. 7) belongs to the summer rainfall area. It involves numerous ephemeral waters, which are filled with water after periods of heavy rain. This applies for example to the famous Etosha Pan in the North of Namibia and large rivers that rise here and flow into the Atlantic Ocean.

Fig. 12. A game hunting farm north of Windhoek, near Okahandja in the Thornbush Savanna Biome (Namibia). (Photo by J. Deckert)

Fig. 13. Cattle farm “Erichsfelde” in the Thornbush Savanna Biome near Okahandja (Namibia). (Photo by J. Deckert)

Fig. 14. The Kaokoveld in the Thornbush Savanna Biome in north-western Namibia. (Photo by J. Deckert)

The average altitude is about 1200 m a.s.l. (Fig. 14), and ranges from 1800 m to 2479 m in the mountainous highlands west of Windhoek commonly known as “Khomas Hochland”.

Biogeographically, the Waterberg area in Namibia is a mix of both Woodland Savanna Biome and Thornbush Savanna Biome. In the map of biomes (Fig. 7), the Woodland Savanna Biome overlaps with a very narrow tip the Waterberg Plateau Park. The geobotanical elements of the Woodland Savanna Biome are particularly located on the plateau, and the area around the mountain is characterized by typical plants of the Thornbush Savanna Biome. The material mentioned from the Waterberg in this book was collected somewhat above or directly at the foot of the mountain and therefore most of these habitats belong to the Thornbush Savanna Biome.

Nama Karoo Biome

The Nama Karoo Biome (Fig. 7) is characterised by sparse vegetation composed of shrubs and grasses, which is comparatively species-poor and does not comprise many local endemics. This semi-desert shrubland with extensive areas of rocky outcrops and limited grass cover belongs to the summer rainfall area, however the annual rainfall is less than 400 millimetres (Fig. 15).

Fig. 15. The Gondwana Canyon Park (southern Namibia) in the Nama Karoo Biome with endemic quiver tree (*Aloe dichotoma* Masson). (Photo by J. Deckert)

Fig. 16. The Brandberg Massif in the northern Nama Karoo Biome (western Namibia). (Photo by W. Mey)

Due to much lower annual rainfall than the adjacent Thornbush Savanna Biome, taller trees are scarce and largely restricted to mostly dry riverbeds. There is little natural permanent surface water to be found in the Nama Karoo.

The only permanent water-bearing stream is the Gariep [Oranje] River on the border to South Africa. The Brandberg Massif, the highest mountain range in Namibia, is located in the North of the biome (Fig. 16). Farming with sheep and goats is the typical landuse in this biome.

Succulent Karoo Biome

The Succulent Karoo Biome (Fig. 7) is located near the west coast in the winter rainfall area. This biome is renowned as a world centre of endemism and biodiversity. More than 600 plant species are endemic to the Succulent Karoo Biome (Figs 17, 18), but local plant endemism is far less. For example a total of 184 plant species was recorded in the area south-east of Lüderitz (Burke 2004).

The biodiversity of the Succulent Karoo Biome is primarily driven by mild climatic conditions. These conditions are characterized by winter rainfall with mild temperatures during the growing season, and additional water supply from fog

Fig. 17. The Koeroegapvlakte of the Richtersveld National Park in the Succulent Karoo Biome, Northern Cape Province. (Photo by J. Deckert)

Fig. 18. The Succulent Karoo Biome west of Kamieskroon. (Photo by J. Deckert)

and dew. Further factors such as soil type, and bioturbation by termites and small mammals, results in typically patchy habitat conditions and related small-scale patterns of vegetation and phytodiversity. Due to the low annual rainfall, the carrying capacity of the rangelands is very low and the rich biodiversity is threatened by habitat transformation and subsequent species loss due to unsustainable landuse (overgrazing, ploughing, and mining) as well as projected climate change (Jürgens *et al*. 2010).

Fynbos Biome

The Fynbos Biome (Fig. 7) belongs also to the winter rainfall area with a comparatively high rainfall season extending from end of May to end of August. This biome is floristically characterized by an extremely dense vegetation dominated by hard-leaved shrubs, small trees, and grass-like growth forms. The biome is part of the Cape Floristic Region, a global biodiversity hotspot confined to the south-western part of South Africa. A combination of topographic, edaphic, and climatic gradients and the frequent occurrence of fire have been suggest as the main driving forces of speciation in the Fynbos Biome, resulting in a great variety of vegetation types (Jürgens *et al*. 2010).

Fig. 19. The Mountain Fynbos in the Bokkeveld Mountains (Western Cape Province). (Photo by M. Uhlig)

Fig. 20. The Dune and Coastal Fynbos vegetation type in De Hoop Nature Reserve (Western Cape Province). (Photo by F. Koch)

The low lying areas in particular have been extensively transformed due to agriculture, urbanisation, and invasion, and once continuous habitats have been reduced to small, fragmented islands surrounded by transformed land (Fig. 6) (**Chapter 1.3: Destruction and conservation of natural habitats**).

The Fynbos Biome is subdivided into the Mountain Fynbos (Fig. 19) extending north and south of Citrusdal and in the area of Ceres, and the Coastal Fynbos (Fig. 20) situated parallel to the southern and western coastlines of the Cape of Good Hope.

Additionally, different major vegetation types are defined, for example West Coast Strandveld vegetation type “Cape Flats Dune Strandveld” (Mucina & Rutherford 2006) (Figs 49, 56), Sandplains Fynbos, Sandstone Fynbos (Fig. 120) and Renosterveld. All vegetation types are highly endangered by fragmentation, transformation, and invasive alien plant species (Veste & Jürgens 2004, Jürgens *et al*. 2010) (**Chapter 1.3: Destruction and conservation of natural habitats)**.

Namib Desert Biome

The Namib Desert Biome (Fig. 7) covers a large area of Namibia and stretches along the western seaboard into South Africa. It is characterized by extremely low rainfall (less than 50 millimetres per annum) and an extremely sparse cover of vascular plants. Therefore, it is not surprising that no sawfly species are known from this biome (Figs 21, 22).

Fig. 21. The Namib Desert Biome in the vicinity of the Gobabeb Research Station (eastern Namibia). (Photo by J. Deckert)

Fig. 22. The Namib Desert Biome, north of Swakopmund (Namibia). (Photo by F. Koch)

3. Habitats of Sawflies

Profound statements on habitat preference are really only possible where the abundance of species is also relatively high, such as in many ecosystems of the Palaearctic Region.

In comparison, however, the abundance of Symphyta in southern Africa is significantly lower, so it is much more difficult to reach corresponding conclusions. Based on previous field experiences, observations on habitat preference were most readily obtainable in the Afromontane region in north-eastern South Africa, the Drakensberg Mountains (Koch 2005a, b).

Within the area treated here, appropriate investigations were only possible in the Woodland Savanna Biome, especially in the riverine vegetation associated with the Kunene and Okavango rivers (Fig. 23). In the Thornbush Savanna Biome it was possible to make appropriate observations in the Waterberg area in Namibia. Very good habitats favoured by sawflies are located at the foot of the Waterberg, where the humidity is at an optimum, resulting in the presence of luscious tree

Fig. 23. Riverine vegetation at the Okavango River in the vicinity of Popa Falls (West Caprivi, northern Namibia) (Photo by M. Uhlig)

Fig. 24. Dense vegetation of herbaceaous plants in the semi-shade at the foot of the Waterberg in Namibia. *Athalia incomta*, *A. marginipennis*, *A. ustipennis*, *Xenapates similis* and *Distega montium* occur in this habitat. (Photo by F. Koch)

and herbaceous vegetation. Sawflies were observed to have a high preference for partially shaded areas in this habitat (Fig. 24).

Based on these experiences from the Waterberg we propose that in the other biomes where sawflies are inconspicuous and difficult to find (Nama Karoo Biome, Succulent Karoo Biome and Fynbos Biome), that Malaise traps are erected in the semi-shade to maximise returns.

4. The history of the study of the sawflies of the Afrotropical Region

The study of the Symphyta of the Afrotropical Region commenced about 200 years ago. The first species, *Arge capensis* (Klug, 1814) was described as *Hylotoma capensis* and collected at the Cape of Good Hope. Twenty years passed before the description of five other *Hylotoma* species from the former Cape Province (South Africa) and three species from West Africa (Klug 1834) (Fig. 25A). In the same year the description of *Athalia himantopus* Klug, 1834 from the Cape Province was published, the first record of an Afrotropical tenthredinid.

Almost 50 years later, additional species were described by Gribodo (1879) (Fig. 25B), W.F. Kirby (1882) (Fig. 25C) and Buysson (1898) (Fig. 25D). With the steady

increase of extensive research trips to Africa and the establishment of mission stations at the beginning of the 20th century, the number of new taxa increased significantly (Konow 1904, 1907a, b, c, d, 1908, Mocsáry 1909, Enslin 1911, 1912, 1913a, b, Enderlein 1919, 1920) (Figs 25E-H).

This increase in the number of newly described genera and species led to confusion that needed to be resolved in first taxonomic revisions. In this respect, the identification keys by Konow (1908) for the genus *Athalia* Leach and Enslin (1913a)

Fig. 25. A-K. A selection of important entomologists who contributed considerably to the knowledge of Afrotropical sawflies. **A**. J.C.F. Klug (1775-1856). **B**. G. Gribodo (1846-1924). **C**. W.F. Kirby (1844-1912). **D**. H. du Buysson (1856-1927). **E**. F.W. Konow (1842-1908). **F**. A. Mocsáry (1841-1915). **G**. E. Enslin (1879-1970). **H**. G. Enderlein (1872-1968). **I**. R. Forsius (1884-1935). **J**. J.-J. Pasteels (= J. Pasteels) (1906-1991). **K**. R.B. Benson (1904-1967). (Portrait collection of the SDEI)

for the genera *Xenapates* Kirby, *Neacidiophora* Enslin and *Dulophanes* Konow, *Trisodontophyes* Enslin and *Distega* Konow were of particular value. Besides a few descriptions in the following 15 years, the knowledge of the Afrotropical Symphyta only received a new input by Forsius (1927a, b, c, 1928a, b, c, 1930a, b, 1931) (Fig. 25I), however, he did not revise the existing identification keys.

Finally, Pasteels (1949, 1950, 1951, 1952, 1953a, b, c, 1954a, b, 1955a, b, c, 1963) (Fig. 25J) who dealt mainly with the fauna of the Belgian Congo [Democratic Republic of the Congo] and the neighboring eastern provinces, described several new species, and provided urgently needed determination keys. Particularly noteworthy in this context are the revisions of the genera of the families Argidae (Pasteels1953a, 1955b, 1963) and Tenthredinidae (Pasteels 1949, 1955c) with the exception of the genus *Athalia*.

Since Konow (1908) the species-rich genus *Athalia* was scarcely worked on and was revised only by Benson (1962) (Fig. 25K) within the framework of the revision of the world Athaliini. Over the next 30 years, only a few *Athalia* species were sporadically described (Viitasaari & Kontuniemi 1976, Muche 1981).

In 1992, with the beginning of the Entomological Expeditions of the MFN, studies on sawflies in the Afrotropical Region, especially in southern Africa, received new scientific interest. This era saw the commencement of targeted searching for sawflies in all biomes. Resultant data demonstrated that the Afromontane region is particularly rich both in species and abundance. In addition the large reference

Fig. 26. An impression of the entomological collection of the Agricultural Research Council, Plant Protection Research Institute, Pretoria, South Africa with its curator Dr. Connal Eardley. (Photo by C. Eardley)

Fig. 27. An impression of the entomological collection of the Iziko South African Museum, Cape Town, South Africa with its curator Dr. Simon van Noort. (Photo by Aisha Mayekiso)

Fig. 28. An impression of the entomological collection of the IITA, Cotonou, Benin. (Photo by F. Koch)

collections in southern Africa (AMGS, NMNW, PPRI (Fig. 26), SAMC (Fig. 27), TMSA) and the collection of IITAC (Fig. 28) in Benin (West Africa) were evaluated. Unfortunately, the entomological collections in Kenya (ICIPE, NMKE) are not readily available for examination.

In Europe the evaluated material from Africa is scattered over various institutions including the larger (BMNH, RBINS, MNHN, MRAC,) and smaller collections (MFN, SDEI, UZMT, MCSN, ZSM). Large museums in the United States are becoming increasingly important for African studies (CASC, LACM, SEMC, USNM).

In the wake of this taxonomic research, revisions of several large genera and species groups were published: *Xenapates* (Koch 1995), *Neacidiophora* (Koch 1998a, b), *Trisodontophyes* (2001), *Triarge* (Koch 2006b), *Durbadnus* (Koch & Liston 2012c), *Athalia vollenhoveni* species group (Koch 2006), *Athalia himantopus* species group (Koch 2007), *Arge mirabilipes* species group (Koch & Eardley 2011), *Arge capensis* species group (Koch & Liston, 2012a) and *Xenapates variator* species group (Koch 2012b).

As a result of these taxonomic-systematic studies, the known number of species was increased considerably. For example Pasteels' (1949) revision of *Xenapates* treated 17 species, while currently 46 valid species are recognised. In *Neacidiophora* the number of species has correspondingly increased from 10 to 15, in *Trisodontophyes* from 7 to 20 and in *Triarge* from only one species (Pasteels 1953a) to 9 species.

The situation is similar in the *Athalia vollenhoveni* species group for which Benson (1962) mentioned 6 species or for the *A. himantopus* species group for which Benson (1962) recorded only one species with two other subspecies. The revisions of these species groups by Koch (2006c, 2007) documented 10 and 8 valid species respectively.

Reassessment of species distribution has demonstrated that the ranges of several species are smaller than described by Benson (1962). According to Benson (1962) for instance *A. vollenhoveni* is known from Ethiopia, Kenya, Uganda and Tanzania [Tanganyika]. However, this species is distributed only in Ethiopia and in the Arabian Peninsula (Yemen). The artificially large range was a result of misidentifications of specimens attributed to this species.

These taxonomic studies and associated intensive field work, especially in Namibia and South Africa, significantly expanded the species lists for these countries. For example in 1887, A.W. Eriksson collected the first Namibian specimens from the Okavango River (Koch 2001). Since then the Namibian Symphyta have been poorly studied, with only two species being recorded prior to the commencement of this survey in 1992, namely: *Athalia turneri* Forsius (Tenthredinidae) and *Arge stuhlmanni* (Kohl) (Argidae) (Pasteels 1953a). Possibly, the low abundance and poor diversity may be due to the arid environment with xerophytic associated

vegetation, but is probably also a result of a general lack of scientific interest in the group.

Based on the experience gained during field work and after evaluation of various reference collections Koch (2000) listed 16 species for Namibia. In this monograph 26 species are recorded from Namibia.

South Africa is biogeographically more diverse than Namibia, especially the Afromontane Region in the east, and with its high diversity of plant species a more species rich sawfly fauna is to be expected. Following intensive field work in the Drakensberg mountain system a total of 51 species for South Africa were recorded (Koch, 2005b). Further research focused on the South African fauna elevated the recorded total to 82 species.

Hitherto, 11 species were known from the South African part of the study area, including three introduced species. As a result of further intensive investigations in this area, a total of 29 species are now documented.

5. Material and methods

5.1 Collecting methods

In southern Africa three collecting methods have proven to be successful for sawfly collecting. Assessment of field data illustrated that the best returns are gained by combining all three collecting methods.

Malaise trap

This trap is named after the Swedish entomologist René Malaise (1892-1978) (Fig. 29), who developed this trap for insect collecting in South East Asia. He designed the trap based on his experiences of observing the behavior of insects in a normal living tent. He modified the tent design to exclude the side walls, but with a middle

Fig. 29. René Malaise (1892-1978), a Swedish entomologist. He was one of the most important specialists of Symphyta of the world, and developed the insect trap which is named after him.

wall and one higher middle corner which is connected to a killing bottle. The fore and back sides as well as the roof are made of white netting, whereas the middle wall is made of black netting, but other combinations of colour are possible (Fig. 30). The insects fly into the middle wall and then make their way to the highest corner of the trap which opens into a collecting bottle, containing an insecticide to kill the insects and keep them dry. Additionally, the bottle contains loosely crumbled soft paper to separate the dying insects. This has the advantage that the insects do not destroy each other. A commonly used alternative is to charge the collecting head with 80-96% ethanol which kills and preserves the specimens making them suitable for DNA extraction.

The collecting bottle should be serviced daily for dry collections and, if possible, in the early morning to verify whether no new insects have just been trapped in it. If serviced later, a few drops of ethyl acetate must be added to speed up the killing of insects. If ethanol is used in the collecting head, the traps can be serviced at longer intervals, two weeks or more. The Malaise trap should be positioned in a flight path between dense vegetation present on at least the front side or preferably on both sides to facilitate the channelling of insects into the trap. Also best results it the trap head is pointed to the morning sun.

Fig. 30. Malaise trap in the Marloth Nature Reserve (Western Cape Province) with yellow pan trap in the foreground. (Photo by F. Koch)

Since 1992 the number of Malaise traps has continuously been increased so that from 1997 on field work has regularly been conducted with 25 traps. The field work was carried out each time over a period of approximately six to eight weeks, mostly during or after the rainy season, from November to March in the summer rainfall zone, and from August to November in the winter rainfall zone. Several National Parks in Namibia and South Africa were visited, each for a period of approximately 5 to 8 days. Advantages of Malaise traps are that they are up continuously, 24 hr/day, and trap many insects from low lying and dense vegetation that are difficult to get by hand collecting.

In private areas, especially in South Africa, it was possible, with the consent of the landowners, to leave the traps running over a longer period (almost two months). The landowner assisted with servicing the traps on a weekly basis.

Coloured pan traps (yellow pan traps)

Pan traps are easy to use and transport, but they produce wet sawflies. A pan trap is a shallow dish filled with soapy water. Usually only several drops of soap are necessary to reduce surface tension. The soap reduces the surface tension of the water and prevents the sawflies from escaping when they drift to the side. Foam on the water surface should be avoided.

Yellow coloured pans are most common (Fig. 30), but white and blue pans are used as well since they attract different species. For sawflies, especially *Athalia* species, yellow pan traps are most effective in northern Germany and southern Britain (Ritzau 1988, Barker *et al.* 1997).

Between 1981 and 1983 in Burundi more than 4000 sawfly specimens (95 % *Athalia*) of about 20 species were collected by means of yellow pan traps (Chevin 1985). These results have been confirmed in southern Africa, and additionally yellow pans have been shown to be highly effective for collecting *Xenapates similis*.

We observed that the use of different yellow tones attracts sawflies in different ways. An intense yellow colour is most effective to trap sawflies.

Since there is no preservative in the soapy water, traps used in hot regions need to be checked within four-hour intervals, so that the muscle tissue of the sawflies does not decompose. Sawflies collected in this way should be subsequently preserved in 70-96% ethanol after having been thoroughly rinsed to remove any soap residue.

An alternative is to use propylene glycol as the preservative in the pans. This allows for a longer interval between servicing since this inert chemical is highly viscous and does not evaporate. It is also a hydrophilic chemical rapidly dehydrating specimens and thereby preserving DNA for molecular analyses. Specimens can be transferred directly from the collecting fluid (propylene glycol) and preserved in 96% ethanol. Propylene glycol is environmentally safe and non-toxic to vertebrates,

which sometimes drink the contents of pan traps. The very similar monoethylene glycol (used as antifreeze in vehicle radiators) is highly toxic to vertebrates and should not be used.

Hand nets

Hand nets are good tools for sawfly collecting as they allow specimen acquisition without too much damage, and make ecological observation possible (Fig. 31). A hand net consists of a handle and a circular frame supporting a gauze bag at the

Fig. 31. Entomologist in the field, using a hand net and observing insects, in the habitat of *Caliroa blanki*, Lekgalameetse Nature Reserve, Limpopo Province. (Photo by F. Koch)

end. It is an advantage if the handle is constructed from an aluminum telescoping pole allowing for extension to reach further into inaccessible vegetation. The unextended handle should be about one meter long. The circular frame should be constructed from strong, but lightweight flat material, with a diameter of 30 to 35 cm and be firmly attached to the handle, but should still be detachable so that the netting bag can be easily replaced. The netting bag should be about 60 cm long, made of a fine, light, yet strong netting with a mesh width of about 1 mm. White material makes it easier to see the sawfly in the net.

Specimens collected by hand net should subsequently be transferred to a small plastic bottle with some loosely crumpled soft paper and a few drops of ethyl acetate for killing. Specimens collected by hand net destined for further molecular biological analyses should be transferred directly into small tubes containing ethanol (≥96%) to kill and preserve the specimens.

5.2 Transport of dry insects in the field and further preparation

Samples collected using Malaise traps are very rich both in number of specimens and species of various orders of insects mainly Hymenoptera, Diptera, Coleoptera and Lepidoptera. If the specimens are killed in the collecting head with insecticide then this material should first be sorted and cleaned *i.e.*, remove moth wing scales. The selected insects are then placed on thin wadding sheets and enclosed in paper envelopes (Fig. 32). These envelopes can be stacked in a stable cardboard

Fig. 32. Worktable during the field work with cardboard box and the material collected using Malaise traps and selection of insect groups. (Photo by F. Koch)

box (no plastic - risk of mold) and transported safely. If ethanol or propylene glycol is used in the collecting head, the specimens can be transferred to a bottle with the collecting fluid.

In the laboratory, the envelopes should be carefully placed in a humidifying chamber, and after a few hours the insect material will be soft enough for preparation. The collected sawflies should be pinned using stainless steel insect pins, usually of size N°0 and N°1 which should be inserted through the right lateral lobe of the mesoscutum.

Subsequently, the specimens need to be labeled with details of the collecting location: country, detailed locality, geographical coordinates, altitude, date and collector, and including collecting method and habitat details. It is common for material from the Afrotropical Region to be designated using blue labels, but this colour assignment varies across different institutions (Fig. 33).

For further scientific study the sawflies need to be pinned in an insect drawer and as a further measure against potential pest infestation deposited in the freezer for about one week before integration into the main collection (Fig. 34).

Fig. 33. A sawfly (*Distega montium*, female) mounted on a continental pin, specimen positioned high enough to allow attachment of locality, determination and other labels as well as a plastic capsule containing dissected ovipositor.
(Photo by H. Goetz)

Fig. 34. Use of unit trays in a drawer. Curated (pinned and labelled) sawfly material after field work and sorting of samples.
(Photo by H. Goetz)

Fig. 35. Drawer containing representatives of all species studied during preparation of this book, including numerous type specimens (with red labels). (Photo by H. Goetz)

Permanent long term storage and conservation of the specimens depends on the individual and institutional custodial considerations and scientific requirements, but the specimens should be housed in light- and dust-proof drawers contained in a sealed room with environmental control facilities to regulate low humidity and temperature to reduce potential damage by pests. Fumigation and visual inspection of the drawers on a regular basis is essential to identify and contain potential pest infestation (Fig. 35).

5.3 Preparation of genitalia

For reliable identification, it is necessary to study the genitalia of most sawfly species (**Chapter 8.1: Morphology of adults**).

Specimens are softened in a moist chamber, and depending on the age of the material and the body size the softening process takes varying lengths of time. Large and very old material should be soft after about 24 hours. For fresher material

and smaller species a few hours is usually sufficient. However it is preferential to dissect the genitalia of the specimens immediately after pinning while they are still fresh.

The dissected parts of the genitalia including the glued parts of the copulatory organs should be stored in colourless PCR tubes, 0.2 ml, which are mounted on the pin below the specimen (Fig. 33). It is also possible to carefully mount the glued parts of genitalia separately on a card also mounted on the pin.

Genitalia of males

The dissection of the male genitalia is performed in dorsal view under a stereoscopic-microscope. The abdomen of the specimen is held with tweezers and with an insect pin the genital capsule is easily completely extracted and transferred into 80% ethanol. Further dissection of the genitalia is performed (removal of the penis valve and / or of the digitus, cuspis and parapenis as well as harpe) in ethanol. With two sharp insect pins the attached muscle fibers are carefully removed to expose the sclerotized structures. After cleaning, the penis valve is placed in 96% ethanol for a few minutes and then transferred into xylene for a short time for dehydration.

In the meantime, the remaining parts of the genital capsule should be glued on a small plastic card. If necessary the digitus and cuspis can be prepared for scanning electron microscope investigation at this stage. A transparent plastic sheet with a size of 10 mm x 3 mm is cut out and used as a small microscope slide and prepared with a drop of Canada balsam. The penis valve should now be accurately embedded into the Canada balsam. Finally, the drop of balsam containing the penis valve should be carefully covered with a small cover slip (3.0 mm x 3.0 mm). This preparation allows for examination of the genitalia with a transmission-light microscope.

Genitalia of females

The dissection of the lancet is also performed under a stereoscopic-microscope, however this is done in ventral view. The abdomen is held with tweezers and with an insect pin the entire ovipositor is pulled out of the sawsheath. Can also be held between thumb and fore finger and then the ovipositor pulled down with a pin. Attempts should be made to separate the left and right half of the ovipositor. If possible, the lancet is separated from the lance, and then cut with a sharp razor blade at the base, so as to leave as many parts as possible of the genitalia in the specimen. Subsequently the lancet is transferred for cleaning into 80% ethanol. Further treatment is carried out as stipulated above for the penis valve of the male.

The preparation of the hypopygium is carried out with a very sharp pin, which is used to separate the apical sternum basally and laterally. This process is often very difficult for old material. Subsequently the dissected hypopygium is carefully freed from attached muscle fibers and cleaned in 80% ethanol and then smoothed and glued on a small plastic card.

5.4 Barcoding analysis

Barcoding analysis (Blank *et al*. 2013) was conducted for the following species for which suitable material was available: *Athalia incomta* and *A. ustipennis***.**

DNA extraction was attempted for a considerable number of additional specimens and species, but conventionally collected material was often too old or had been treated in an unsuitable way (*e.g.*, specimens re-moistened for mounting subsequent to collection). For DNA extraction the single leg of an imago was removed and submitted to the Canadian Centre for DNA Barcoding (CCDB) in Guelph, Canada, where the DNA sequencing was performed. The DNA extracts are stored at the CCDB, the vouchers at the SDEI.

DNA extraction, PCR amplification, and sequencing were conducted using standardised high-throughput protocols (Ivanova *et al*. 2006, DeWaard *et al*. 2008). The target region has a length of 658 bp, starting from the 5' end of the mitochondrial cytochrome c oxidase I (COI) gene and includes the 648 bp barcode region used as standard in the animal kingdom (Hebert *et al*. 2003). Sequence data can be obtained through BOLD (http://www.barcodinglife.com/) and include LIMS report, primer information, and access to trace files. Sequences were aligned using the BOLD Aligner.

Sequence divergence statistics were calculated using the Kimura 2-parameter model. Genetic distances were calculated using analytical tools in BOLD and are given as maximum pairwise distances for intraspecific variation and as minimum pairwise distances for interspecific variation. Specimens without a Binary Index Number (BIN) were excluded from these calculations but some with shorter sequences were subsequently included to associate imagines. Clusters of similar sequences are denoted by a Globally Unique Identifier (GUID) that is registered in BOLD.

5.5 Abbreviations used in the text

BIOTA : Biodiversity Monitoring Transect Analysis in Africa.
BMBF : Federal Ministry of Education and Research, Germany.
DFG : German Research Foundation, Germany.
NRF : National Research Foundation, South Africa.

Material examined originated from the following institutions:

AMGS : Albany Museum, Grahamstown, South Africa.
BMNH : The Natural History Museum [formerly British Museum (Natural History)], London, UK.
CASC : California Academy of Sciences, San Francisco, USA.
DEUS : Department of Entomology, University of Stellenbosch, South Africa.
DMSA : Natural Science Museum, Durban, South Africa.

HNHM : Hungarian Natural History Museum, Budapest, Hungary.
ICIPE : International Centre of Insect Phylogeny and Ecology, Nairobi, Kenya.
IITAC : International Institute of Tropical Agriculture, Cotonou, Benin.
LACM : Los Angeles County Museum of Natural History, Los Angeles, USA.
MCSN : Museo Civico di Storia Naturale 'Giacomo Doria', Genoa, Italy.
MFN : Museum für Naturkunde Berlin, Germany.
MNHN : Muséum d'Histoire Naturelle, Paris, France.
MRAC : Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
NHMW : Naturhistorisches Museum, Wien, Austria.
NHRS : Naturhistoriska Riksmuseet, Stockholm, Sweden.
NMBZ : Zimbabwe National Museum, Bulawayo, Zimbabwe.
NMKE : National Museum of Kenya, Nairobi, Kenya.
NMSA : Natal Museum, Pietermaritzburg, South Africa.
NNIC : Namibian National Insect Collection, Windhoek, Namibia.
OLML : Oberösterreichisches Landesmuseum, Linz, Austria.
PPRI : ARC-Plant Protection Research Institute, Pretoria, South Africa.
RBINS : Royal Belgian Institute of Natural Sciences Brussels, Belgium.
RMNH : Nationaal Natuurhistorische Museum (Naturalis), Leiden, Netherlands.
SAMC : Iziko South African Museum, Cape Town, South Africa.
SDEI : Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany.
SEMC : Snow Entomological Museum, University of Kansas, Lawrence, Kansas, USA.
SMNS : Staatliches Museum für Naturkunde, Stuttgart, Germany.
TMSA : Ditsong National Museum of Natural History (formerly Transvaal Museum), Pretoria, South Africa.
USNM : National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA.
UZMT : Zoological Museum, University of Turku, Finland.
ZMPA : Museum of the Institute of Zoology, Polish Academy of Science, Warszawa, Poland.
ZMUC : Zoological Museum, University of Copenhagen, Copenhagen, Denmark.
ZMUH : Zoologisches Institut und Zoologisches Museum, Universität Hamburg, Hamburg, Germany.
ZSM : Zoologische Staatssammlung, Munich, Germany.

The following measurements are commonly used (Figs 43B, C)

POL : Postocellar line; the distance between the mesal margins of the two lateral ocelli (Fig. 43C).
OOL : Ocular ocellar line: the distance between a compound eye and a lateral ocellus (Fig. 43C).
MS : Malar space; the shortest distance between the base of the mandible and the edge of the compound eye (Fig. 43B).
IA : Interantennal area; the shortest distance between the inner margins of the toruli (Fig. 43B).

LC : Length of the clypeus; the vertical distance between the epistomal suture and the anterior margin of the clypeus medially (Fig. 43B).

The following ratios are applied:

POL : OOL
MS : IA
IA : LC

6. Life cycle

Very few observations exist about mating, oviposition and preimaginal stages of Afrotropical sawflies. Essentially, their life cycle does not differ fundamentally from the partly well-studied cycles of sawflies of other biogeographical regions (Viitassari 2002). Hence the following description of the life cycle of Tenthredinoidea is described in generalized terms but pertaining to Afrotropical species whenever possible.

After mating (Fig. 36) the females use their saw-like ovipositor to cut into the host plant tissue for egg laying (Fig. 37A), usually on the edge of a leaf. Also leaf surface, along midrib or main veins, in twigs, stems, buds. The eggs are mostly laid singly and are visible below the epidermis (Fig. 37B). The incubation period of the eggs is generally rather short and is dependent on ambient temperature and

Fig. 36. *Athalia ustipennis* Mocsáry during copulation. (Photo by J. Deckert)

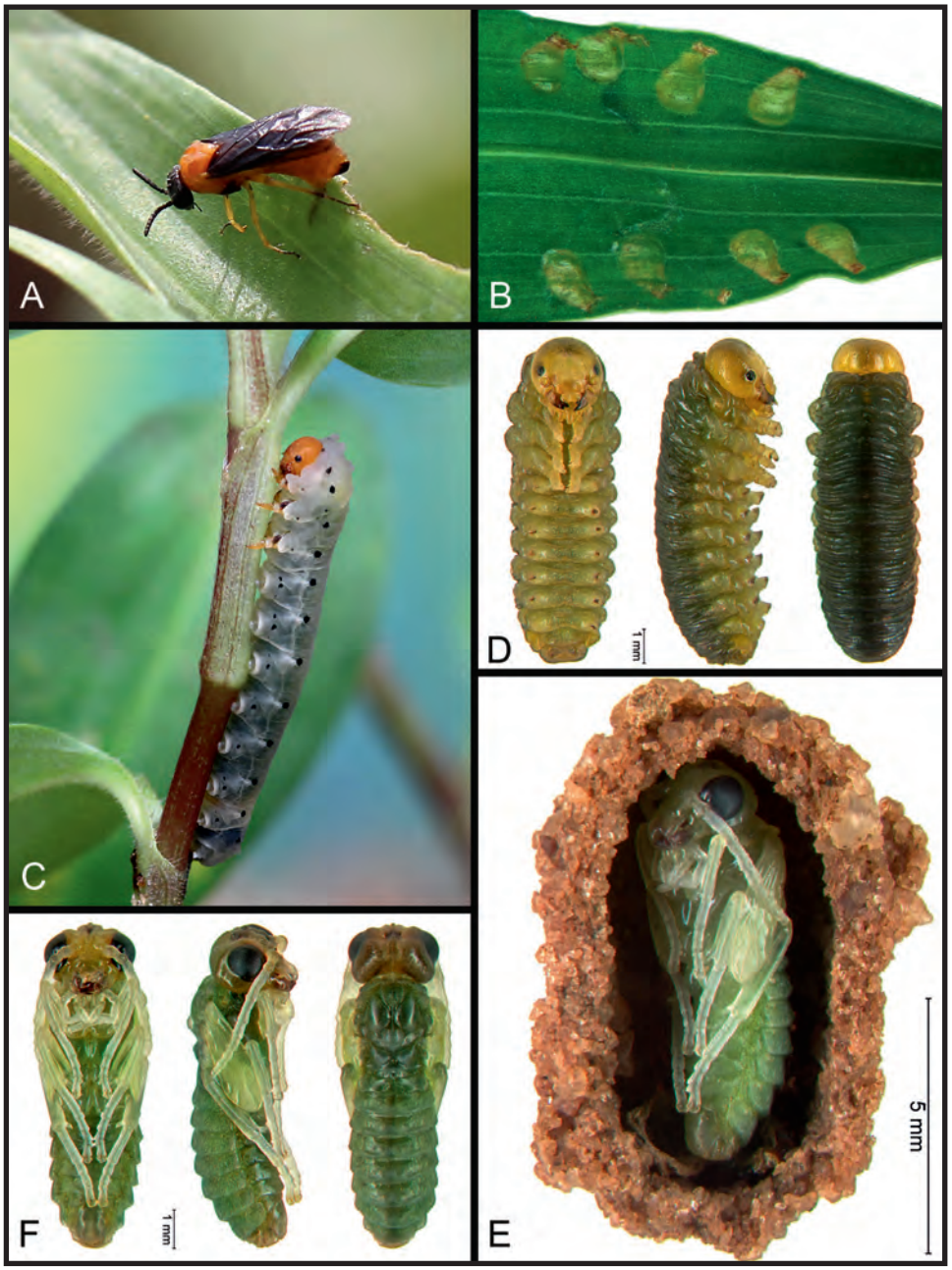

Fig. 37. A-F. **A**. *Distega nigeriae* Forsius during egg laying (ovoposition). The ovipositor is visible in the plant tissue as a darker shadow. **B**. Eggs of *D. nigeriae* in a leaf of *Commelina benghalensis*. **C**. The larva of *D. nigeriae*. **D**. The prepupa of *Xenapates gaullei*, ventral, lateral and dorsal (from left). **E**. The opened cocoon containing pupa of *X. braunsi*. **F**. The pupa of *X. braunsi*, ventral, lateral and dorsal (from left). (Photo by G. Goergen)

humidity. Usually the egg stage encompasses one to four weeks with apparent variability between species.

After hatching the first instar larva immediately begins to feed externally on plant foliage or internally for *Fenusa dohrnii* and *Sirex noctilio*.

As the larvae grow, they molt several times (Fig. 37C). The larval developmental phase includes five or six instars and takes between three and six weeks, depending on environmental conditions.

During this time the larvae are susceptible to predation, especially predatory beetles, flies, bugs, wasps and ants. In addition birds and small mammals eat the larvae.

When the last instar is completed, a non-feeding stage called the prepupa (Fig. 37D), searches for a suitable pupation site. This site can be in the soil, in stems or rotten wood, or among other plant material.

Some prepupae spin cocoons and others form a cell in the soil or other substrate (Fig. 37E). Under temperate climatical conditions the prepupa of most sawflies overwinters, and goes into diapause until the following spring. The species that have overwintered as prepupa pupate during the early spring. The duration of the pupal stage (Fig. 37F) is short and adults generally emerge after two or three weeks. Adult sawflies usually live for only several days up to a week or two.

Little is known of the phenology of the tropical sawfly species (Smith 1995). However, almost all species and individuals occur during the rainy season (Smith & Janzen 2003a, 2003b, Smith & Grisell 2014).

Under subtropical and tropical climatic conditions with dry and rainy seasons it is fairly certain that diapause occurs in the dry season, when the host plants are not present. This is especially true for the winter rainfall zone of the study area. Therefore one generation (monovoltism) of the species of this area seems to be obligatory. Smith (1995) confirmed these observations for the seasonal dry forests of Costa Rica, where the adults of several species of Tenthredinidae and Argidae can be common shortly after the commencement of the wet season, when trees are flush with new growth.

In wetter areas some sawfly species have several generations annually (Smith 1995). This result has been confirmed for *Athalia marginipennis* Enderlein in Burundi (Koch 2007), when the flight season extends over several months. This extended flight season in turn provides evidence for the existence of at least two (bivoltine) or more generations annually (polyvoltine). An obligatory diapause is probably not present or very short between these generations.

This limited knowledge underlines the need to thoroughly research the ecology and phenology of the Afrotropical Symphyta.

7. Host plants

The host plant relationships of Afrotropical sawflies is very poorly known when compared to the Palaearctic Region (**Chapter 1: Introduction**). The few known associations in literature are questionable since the identification of some species has not been unambiguously clarified.

In this respect, the present monograph is of value because the validity of the species treated here has been thoroughly checked. Additionally, for most species data are available based on observations about their habitat or preferences for certain plant species. The included data provide a valuable baseline, especially for local entomologists and ecologists so as to continue further investigations into this still largely unexplored topic of host plant relationships (**Chapter 1: Introduction**).

The following information on host plant relationships for Afrotropical species exists in the literature:
Sorauer (1928): ***Athalia sjoestedti*** Konow, 1907 and ***A. flacca*** Konow, 1907: Turnips in Kenya, Tanzania and Zimbabwe.

Saraiva (1939): ***Athalia flacca*** Konow, 1907 (taxonomic status not verified): Turnips, cabbage and other cruciferous plants (Brassicaceae).

Lepelley (1959): ***Athalia himantopus*** Klug, 1834 (not known from Kenya and Uganda, probably *A. marginipennis* Enderlein, 1920): *Brassica oleracea* Linnaeus in Kenya and on *B. rapa* Linnaeus in Uganda; ***Athalia segregis*** Konow, 1907: Crucifers (Brassicaceae) in Kenya; ***Athalia sjoestedti*** Konow, 1907: *Brassica oleracea* Linnaeus in Tanzania and on *B. rapa* Linnaeus in Kenya and Tanzania, on crucifers (Brassicaceae); *Zea mays* Linnaeus (Poaceae) in Tanzania; ***Athalia vollenhoveni*** Gribodo, 1879 (probably *A. sjoestedti* Konow, 1907): Crucifers (Brassicaceae) in Kenya; ***Neacidiophora athaloides*** (Konow, 1907) on *Cissus adenocaulis* Steudel ex A. Richard (Vitaceae) in Kenya and Uganda.

Nonveiller (1984): ***Athalia schweinfurthi atripennis*** Benson, 1962 [= *A. atripennis* Benson, 1962]: *Brassica napus* Linnaeus and *Raphanus sativus* Linnaeus (Brassicaceae) in Cameroon.

According to Benson (1962) in the revision of the Athaliini: ***Athalia furvipennis*** Konow, 1907 (taxonomic status not verified): larvae on various Brassicaceae, pest on *Brassica rapa* Linnaeus; ***Athalia sjoestedti*** Konow, 1907: larvae on various Brassicaceae, pest on *Brassica rapa* Linnaeus and *B. oleracea* Linnaeus; ***Athalia himantopus*** Klug, 1834: larvae on *B. oleracea* (Brassicaceae); ***Athalia himantopus truncata*** Enslin, 1913 [= *A. truncate* Enslin, 1913]: *Nasturtium* spp. (Brassicaceae); ***Athalia vollenhoveni*** Gribodo, 1879: larvae on various Brassicaceae, pest on *Brassica oleracea* Linnaeus (Brassicaceae). ***Athalia schweinfurthi*** Konow, 1891 [= *A. vollenhoveni* Gribodo, 1879]: *Lepidium sativum*

Linnaeus (Brassicaceae); ***Athalia mellis*** Benson, 1962 [= *A. mashonensis* Enslin, 1911]: *Coeus barbutus* Bentham = *Plectranthus barbatus* Andrews (Lamiaceae); *Salvia* sp. (Lamiaceae).

Based on chemical analyses derived from the substances of host plants that are sequestered in the adults of reliably identified species of *Athalia*, Opitz *et al*. (2012) associated host plants of the order Lamiales and the family Brassicaceae with these species:
Athalia excisa Koch, 2006 (Brassicaceae)
Athalia flavobasalis Koch, 2007 (Brassicaceae)
Athalia guillarmodi Benson, 1956 (Brassicaceae)
Athalia himantopus Klug, 1834 (Brassicaceae)
Athalia incomta Konow, 1908 (Lamiales: Scrophulariaceae)
Athalia marginipennis Enderlein, 1920 (Brassicaceae)
Athalia obsoleta Benson, 1962 (Brassicaceae)
Athalia ustipennis Mocsáry, 1909 (Brassicaceae)
Athalia vollenhoveni Gribodo, 1879 (Brassicaceae)

Previously nothing was known about the host plants of *Xenapates* W.F. Kirby, 1882 species. However, in the context of cooperation between the authors and breeding experiments in the laboratory (IITA, Benin) host plant relationships for four West African species has been established.

Larvae of the widespread *Xenapates braunsi* (Konow, 1896) were found on following Poaceae: *Digitaria horizontalis* Willdenow (Jamaican crabgrass), *Pennisetum purpureum* Schumacher (elephant grass) and *Setaria barbata* (Lamarck) Kunth (bristly foxtail grass) (Poaceae), as well as *Zea mays* Linnaeus (corn, maize) (Poaceae). Larvae of another common species, *Xenapates gaullei* (Konow, 1896), were observed on *Commelina communis* Linnaeus (Asiatic dayflower) and *C. benghalensis* Linnaeus (Bengal dayflower) (Commelinaceae) (Liston *et al*. 2015).

All four of the larval hosts of *X. braunsi* identified in this study are of greater or lesser importance throughout tropical and sub-tropical Africa as cereal or fodder crops. The host plants of *X. gaullei* (*Commelina* spp.) are also of direct interest to man. Leaves of *C. benghalensis* are eaten as a vegetable in Africa and parts of Asia, whereas *C. communis* is better known internationally as a troublesome invasive weed, for example in parts of Europe and North America. Both *Xenapates* species could therefore be regarded as potential crop pests.

Furthermore, the larvae (Fig. 37C) of the West African *Distega nigeriae* Forsius, 1927b were observed feeding on *Commelina benghalensis* and *C. communis* as well as *Digitaria horizontalis* in Benin including recording of the complete metamorphosis (G. Goergen, unpublished). *Distega nigeriae* Forsius, 1927 **sp. rev.** is considered to be a valid species, and not a synonym of the East African *D. mocsaryi* Enslin, 1913b as treated by Pasteels (1955). The holotype of *D. nigeriae* was compared with the lectotype of *D. mocsaryi* (Koch in prep.). *Distega*

nigeriae has a nearly entirely yellow mesonotum, which is predominantly black in *D. mocsaryi*. Furthermore, the serrulae of *D. nigeriae* are more slender than those of *D. mocsaryi*. A more detailed explanation will be presented in a separate revision (Koch in prep.).

Adults commonly visit flowers or leaves of plants other than the larval hosts (Smith 1989). For example Benson (1962) mentioned adults of *Athalia schweinfurthi* Benson, 1962 on flower heads of *Senecio elgonensis* T. Fries (*Dentrosenecio elgonensis* E.B. Knox) (Asteraceae). This observation was confirmed during many hours of field work in southern Africa. For example in the Lekgalameetse Nature Reserve, Limpopo Province, South Africa *Athalia gessi* Koch, 2003 and *A. mashonensis* Enslin, 1911 were sampled in large numbers on the flowers of the Lemon Bush / Fever tea, *Lippia javanica* (Burman f.) Sprengel (Verbenaceae) (Koch 2003).

A further example is *Arge deckerti* Koch, 2005, that is observed in large numbers on flowers of *Cyphostemma congestum* (Baker) B.M. Descoings ex. Wild & R.B. Drumm (Vitaceae) (cover photo, Fig. 60) and *Nidorella resedifolia* A.P. de Candolle (Asteraceae) (Fig. 61). In Ndumu Game Reserve (KwaZulu-Natal, South Africa) males were observed feeding on pollen in the flowers of *Nidorella auriculata* A.P. de Candolle (Asteraceae).

In the eastern provinces of South Africa and Zimbabwe *Athalia incomta* Konow, 1908 is sampled regularly in large numbers on leaves of the widely cultivated ornamental plant Cape Honeysuckle, *Tecomaria capensis* (Thunberg) Spach (Bignoniaceae), which is probably not the host plant. In the mountain regions of the Limpopo and Mpumalanga provinces adults were collected on *Helichrysum krausii* (Schultz Bipontinus) (Asteraceae). In the study area this species was observed on *Selago dinteri* Rolfe (Scrophulariaceae, Lamiales), which could be the host plant (*vide* Opitz *et al*. 2012).

At the foot of the Waterberg (Namibia), adults of *Athalia ustipennis* Mocsáry, 1909 were repeatedly observed on the shrubby tree *Grewia flavescens* Jussieu (Tiliaceae). Adults of *Caliroa blanki* Koch & Smith (2011) were also very numerous on leaves of the shrub *Bauhinia galpinii* N.E. Brown (Fabaceae) in Lekgalameetse Nature Reserve (Limpopo Province, South Africa).

Nothing is known about the host plants of the species of *Xenapates* which occur in the study area, with the exception of *Xenapates beateae* Koch,1996 and *X. damaraensis* Koch, 1995. Adults of these two species were observed on leaves of *Achyranthes aspera* Linnaeus var. *sicula* Linnaeus (Amaranthaceae) in a small isolated moist habitat in the Kaokoveld of Namibia (Fig. 141).

Data on detailed host-plant associations for various species are provided in the special taxonomic section (**Chapter 9: Systematic presentation**) to facilitate future research investigation.

Nothing is known about host-plant relationships of the species in the genera *Pampsilota* Konow, 1899, *Triarge* Forsius, 1931, *Trisodontophyes* Enslin, 1911, *Durbadnus* Pasteels, 1954 and *Dulophanes* Konow, 1907d. The species of *Dulophanes* as Selandriinae, feed possibly on fern or mosses.

7.1 The host plants of the species of the study area

For introduced (aliens) and invasive species:
Nematus oligospilus: Different willows (*Salix babylonica* Linnaeus, *S. fragilis* Linnaeus (Salicaceae) (Urban & Eardley 1995, 1997, Koch & Smith 2000).
Fenusa dohrnii: *Alnus* spp. (alder) (Betulaceae).
Caliroa cerasi: *Prunus persica* (Linnaeus) Batsch (peach) (Rosaceae).
Prunus armeniaca Linnaeus (apricot) (Rosaceae).
Prunus domestica Linnaeus (plum) (Rosaceae).
Cydonia oblonga P. Miller (quince) (Rosaceae).
Sirex noctilio: *Pinus patula* Schlechtendal & Chamisso (patula pine) (Pinaceae).
Pinus radiata David Don (radiata pine) (Pinaceae).

For endemic species:
Athalia incomta: *Selago dinteri* Rolfe (Scrophulariaceae, Lamiales); Opitz *et al.* (2012).
Athalia marginipennis: Brassicaceae; Opitz *et al.* (2012).
Athalia ustipennis: Brassicaceae; Opitz *et al*. (2012).
Arge capensis: *Geranium* sp. (Geraniaceae); Pasteels (1953).
Arge cochraneae: *Geranium* sp. (Geraniaceae); Pasteels (1953).
Arge dirce: *Diospyros lycioides* Desfontaines (bluebush, red star-apple) (Ebenaceae).
Arge taeniata: *Pelargonium* sp. (Geraniaceae); Prinsloo (1985).

8. Morphology of Symphyta

8.1 Morphology of adults

The suborder Symphyta (sawflies and woodwasps) is a paraphyletic assemblage comprising the structurally more “primitive” Hymenoptera (Smith 1995). The adults of Symphyta share a number of plesiomorphic character states. There is no “wasp-like” constriction at the base of the abdomen as in ants, wasps and bees (suborder Apocrita). The abdomen is broadly attached to the thorax, without this marked flexibly joined constriction between the first and second abdominal segments (Figs 38, 39). In Apocrita the first tergum of abdomen is broadly and immovably fused with metanotum and laterally with metapleuron (propodeum).

The trochanters appear to be two-segmented, because the basal ends of the femora resemble a second segment (trochantellus) of trochanter (Fig. 40D). Especially the fore wings have many veins and numerous enclosed cells (Figs 41A-N), in the smaller hind wings the number of enclosed cells is significantly

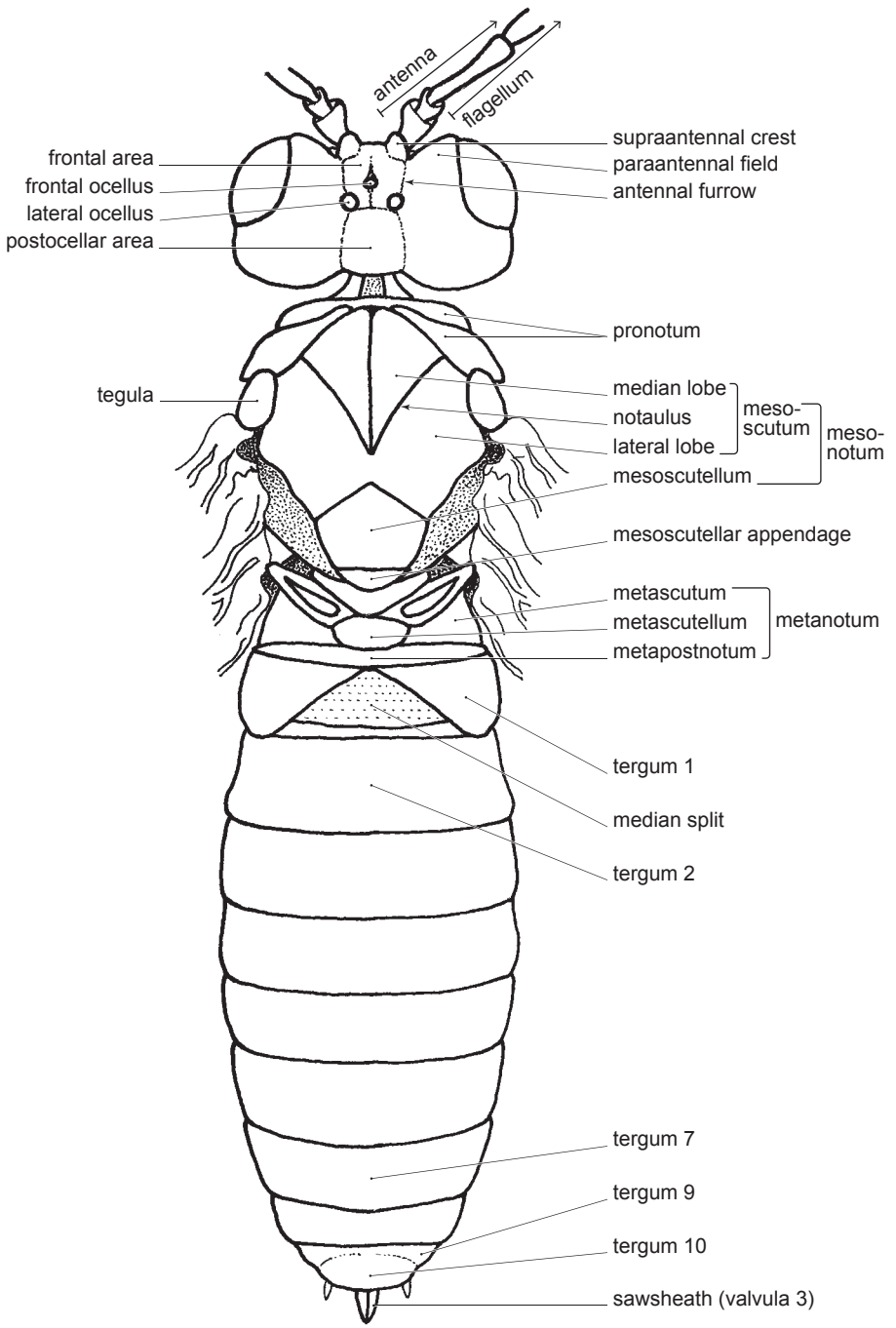

Fig. 38. Schematic depiction of the body of a hypothetical Tenthredinidae species (dorsal aspect), modified after Viitasaari (2002).

reduced. In addition to this, cenchri (Fig. 38) are presented on the metascutum, with the exception of the superfamily Cephoidea (family Cephidae), currently comprising only two species, occurring in Madagascar (Muche 1981).

The females of the superfamily Tenthredinoidea possess a saw-like ovipositor (lancet) which facilitates the insertion of eggs into plant tissue, hence the common name sawflies. Furthermore, two apical spines of the fore tibia are present. From the Tenthredionidea in the Afrotropical Region only the families Argidae and

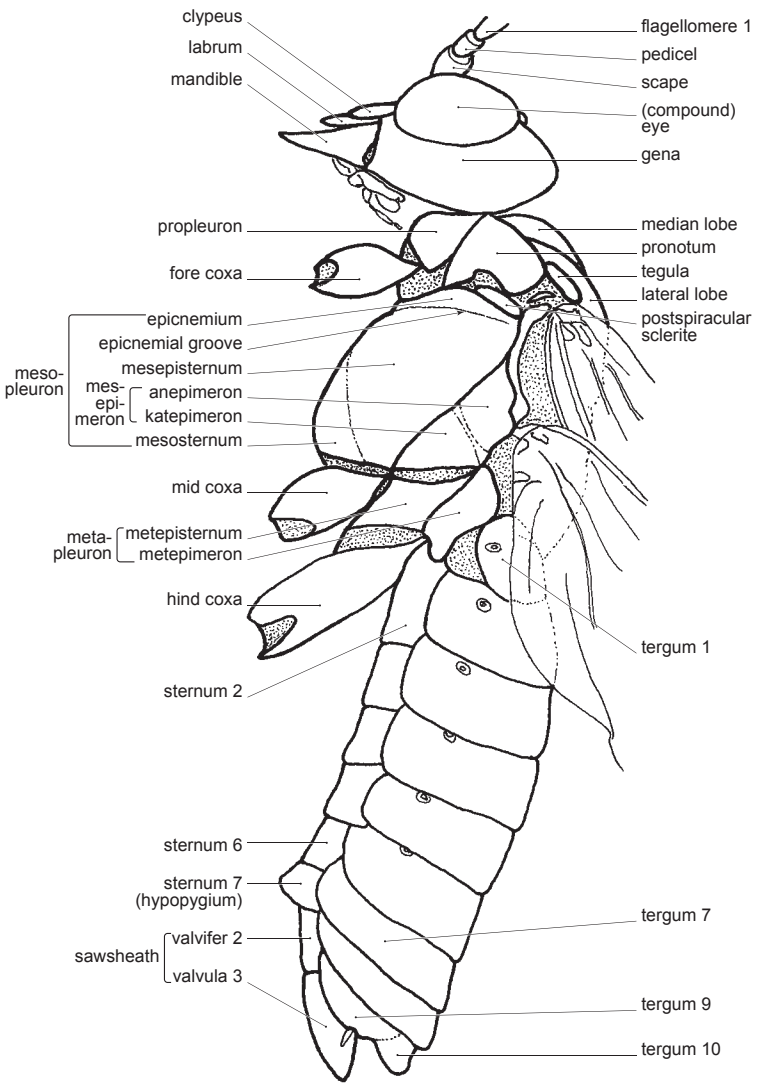

Fig. 39. Schematic depiction of the body of a hypothetical Tenthredinidae species (lateral aspect), modified after Viitasaari (2002).

Tenthedinidae are known. The species of all Afrotropical genera are characterized by the absence of an occipital carina.

The worldwide distributed superfamily Siricoidea contains three families – Xiphydriidae, Siricidae and Anaxyelidae. Only the family Siricidae (common names woodwasps and horn-tails) is known in the Afrotropical Region represented by the endemic genus *Afrotremex* and *Sirex noctilio*, which has been introduced into

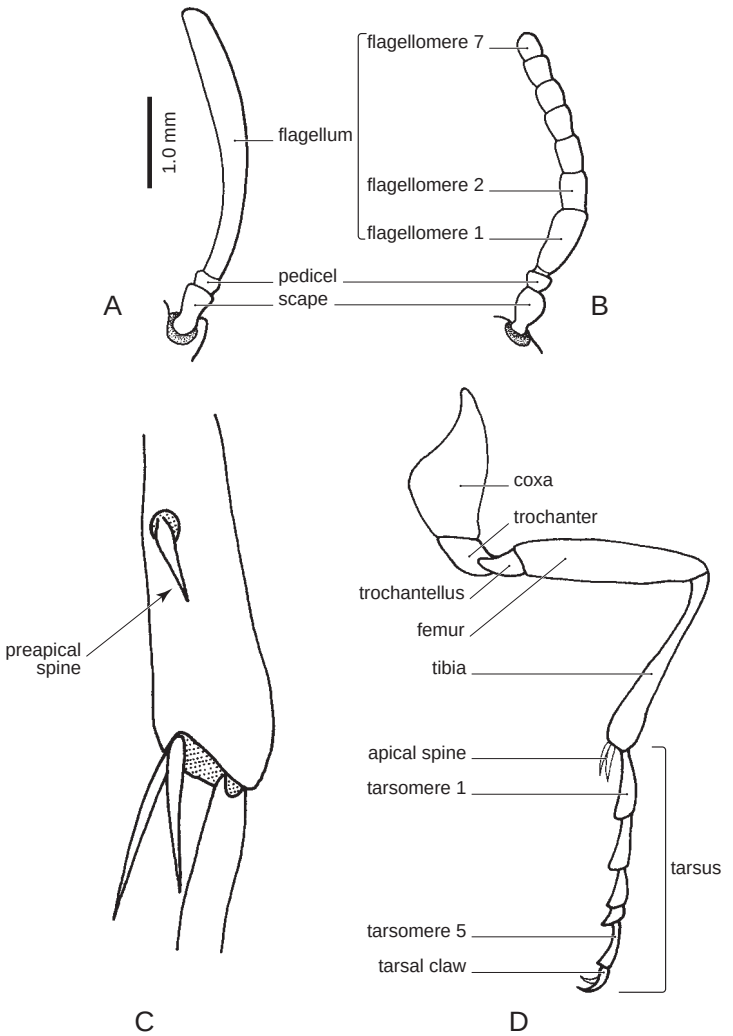

Fig. 40. A-D. Schematized antenna: **A**. Argidae (*Arge* sp.). **B**. Tenthredinidae (*Distega* sp.). **C**. Apical half of hind tibia with preapical spine (arrowed) of *Arge* sp. **D**. Hind leg of a hypothetical Tenthredinidae species.

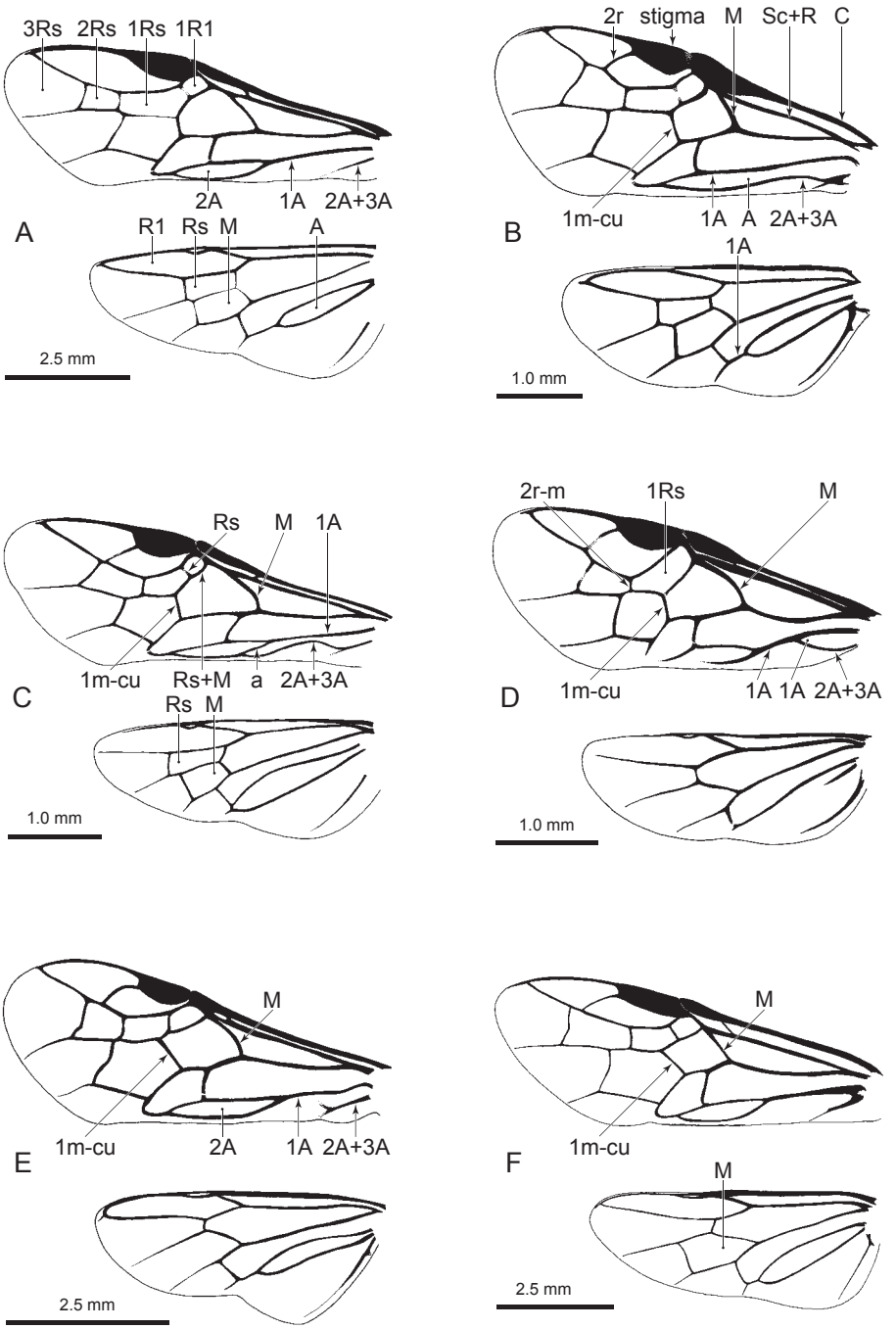

Fig. 41. A-F. Fore and hind wing of: **A**. *Nematus oligospilus*. **B**. *Dulophanes obscurus*. **C**. *Caliroa cerasi*. **D**. *Fenusa dohrnii*. **E**. *Durbadnus taegeri*. **F**. *Trisodontophyes diversa*.

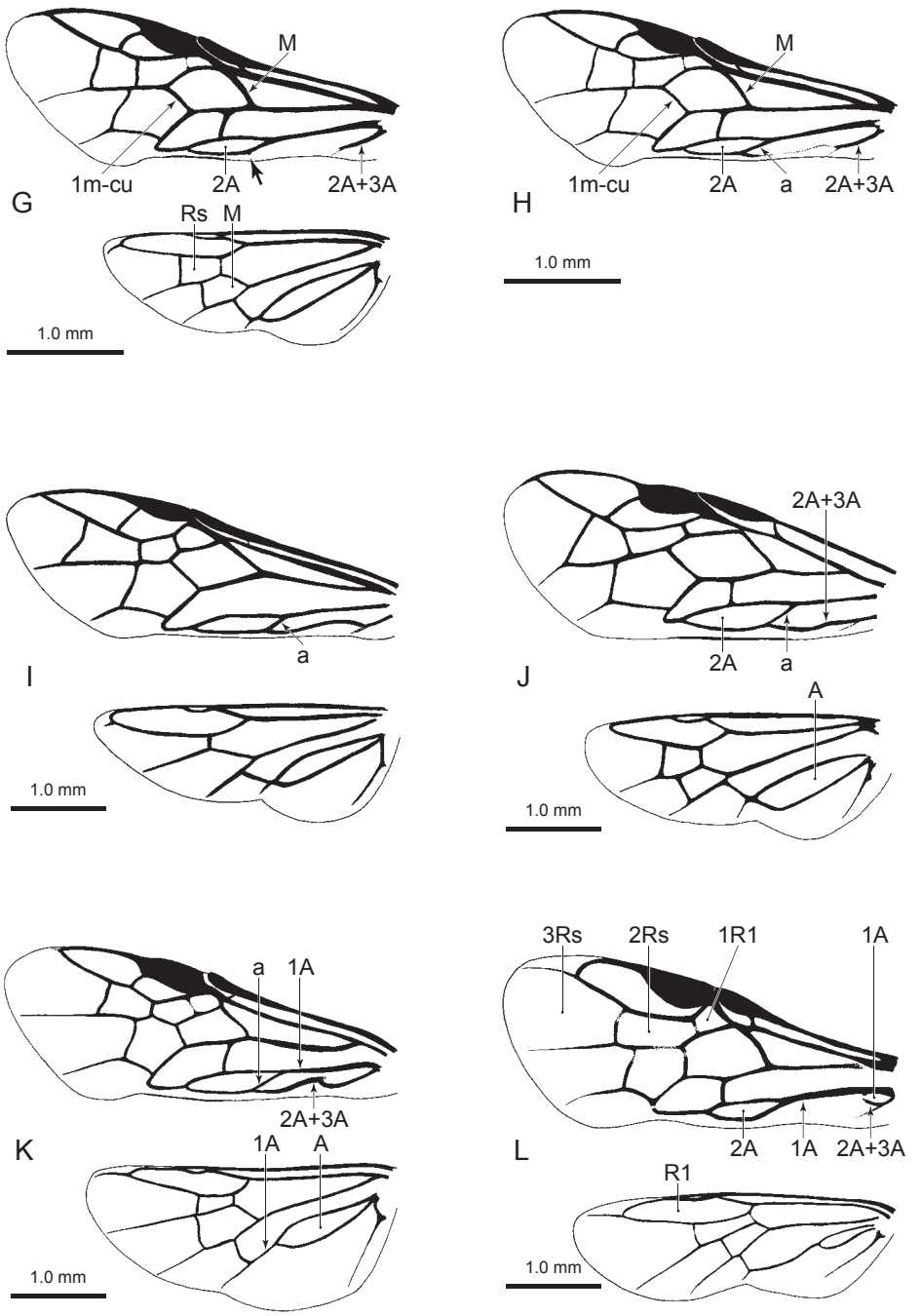

Fig. 41 (continued). G-L. Fore and hind wing of: **G**. *Distega* sp. **H**. *Distega bevisi* (fore wing). **I**. *Neacidiophora* sp. **J**. *Xenapates damaraensis*. **K**. *Athalia* sp. **L**. *Triarge namaquaensis*.

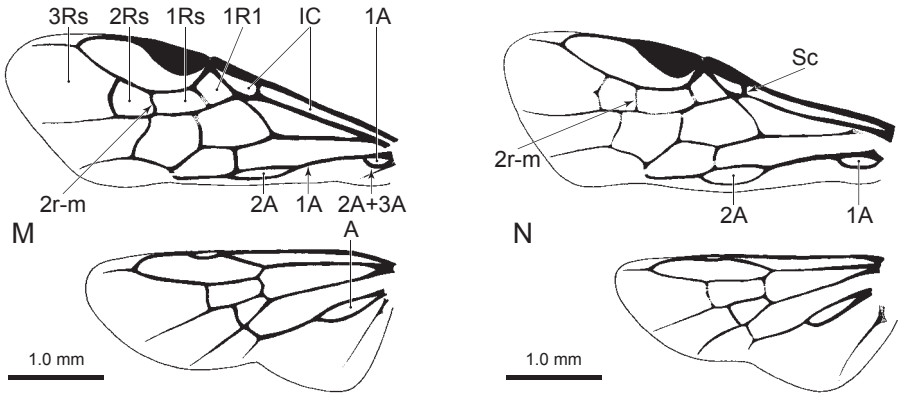

Fig. 41 (continued). M-N. Fore and hind wing of: **M**. *Arge* sp.
N. *Pampsilota brandbergensis*.

South Africa. The 5 native species of *Afrotremex* are restricted to the west and central African forest areas (Goulet 2014).

In the larger species of Siricidae, which are about 30.0-40.0 mm in length, the ovipositor is long and slender and is used for oviposition in woody tissue, and only one apical spine of the fore tibia is developed.

The fourth Afrotropical sawfly superfamily is Orussoidea with 19 valid species in the region (Taeger *et al*. 2010). The species of the only Afrotropical family Orussidae differ from other Symphyta in their cylindrical cross section, several thorn-like structures on the head around the median ocellus (Figs 161A-C, 162A, B) and in the black to metallic bluish-green colouration. The ovipositor is long and thin, similar to that of Ichneumonidae (Hymenoptera).

The importance of the genitalia for the identification of species

Many of the keys of Afrotropical sawflies are based almost entirely on colour. Nevertheless, in all species treated here, except for the introduced species, a thorough examination of the genitalia is essential for an exact species identification. However, the genital morphological features have varying taxonomic value within each genus (Table 1).

Genitalia of males

In the genus *Athalia* the penis valves exhibit only a few interspecific differences within the species-groups and cannot always be used for reliable identification. Additionally, the penis valve is often poorly sclerotized, especially the dorsal part. Its shape may be distorted in lateral view as a result of the laterally projecting medio-subapical appendage (Fig. 125I). Conversely, both the shape of the parapenis and

Table 1: The morphological structures of the genitalia and their significance for the identification of Afrotropical species, separated according to their genera (XXX - very high; XX - medium to moderately; X - low; O - without).

	Males			Females		
	Penis valve	Cuspis/Digitus	Harpe/Parapenis	Lancet/Serrulae	Sawsheath	Hypopygium
Argidae						
Arge	xx(x)	o	x	xxx	xx	o
Pampsilota	xxx	o	x	xxx	xx	o
Triarge	x(x)	o	x	xxx	xxx	o
Selandriinae						
Dulophanes	xxx	o	x	xx	x	o
Blennocampinae						
Distega	xxx	o	xx	xxx	x	o
Durbadnus	xxx	o	xx	xxx	x	o
Trisodontophyes	xxx	o	xx	xxx	x	o
Athaliinae						
Athalia	x(x)	xxx	xxx	xx(x)	xx	xxx
Allantinae						
Xenapates	xxx	o	o	xx(x)	x	o

harpe in ventral view as well as the digitus and cuspis in dorsal or lateral view are characteristic for the species (Fig. 42C) (Abe 1988, Koch 2003, 2006c, 2007).

It is often difficult to make an unambiguous identification based on the lateral view of penis valve for species in the family Argidae. This is because the penis valves are very voluminous in most species and have horn-shaped appendages especially in the middle area. When embedding a microscopic preparation positioning is critical to prevent distortion of the actual shape.

In addition, the inner, more or less large horn projection is surrounded by plenty of muscle tissue and its removal during preparation is often very difficult. The

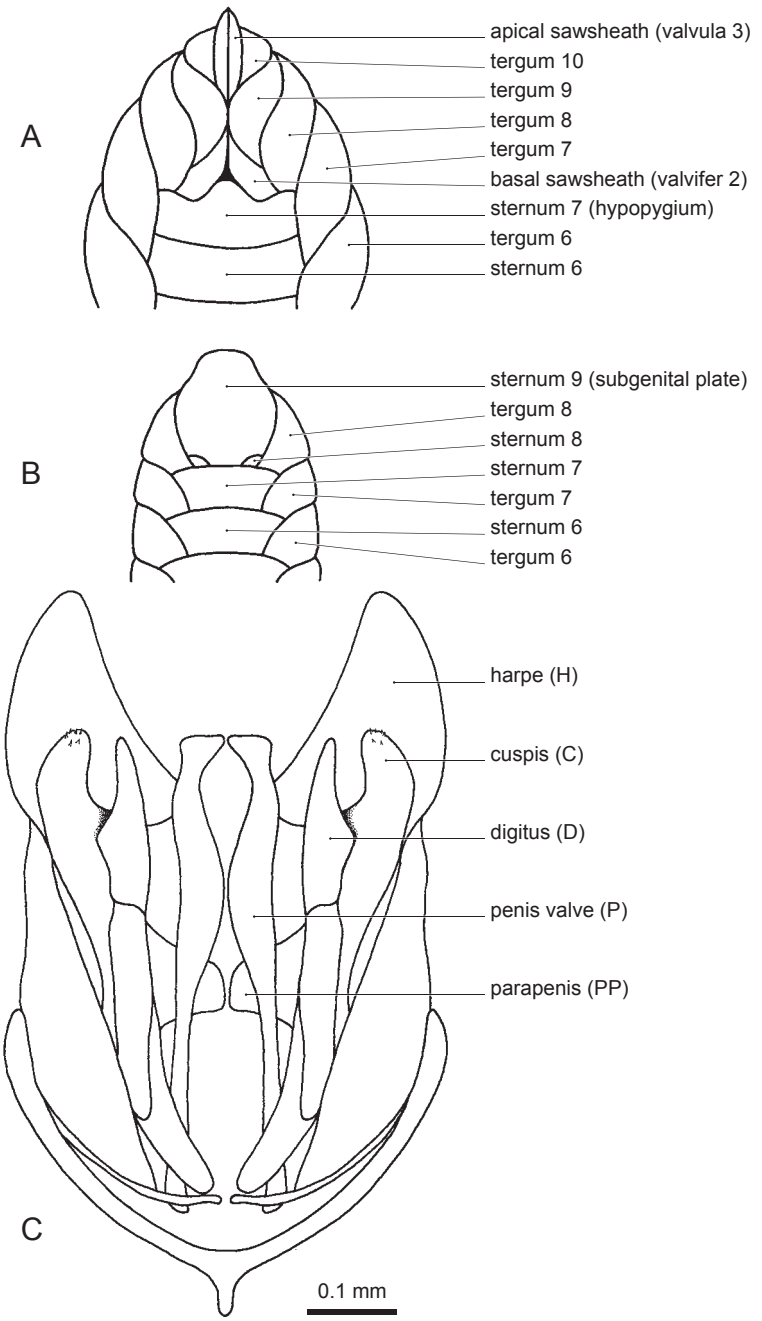

Fig. 42. A-C. Schematic depiction of the apical portion of the abdomen of a hypothetical Tenthredinidae species (ventral aspect): **A**. Female. **B**. Male. **C**. Schematic depiction of the capsule of a male of a hypothetical *Athalia* species (dorsal aspect).

extension can break relatively easily and this creates an unrealistic representation. Finally, intraspecific variability, can confound interpretation, particularly when only a small number of specimens are available for examination. This variability is more or less present in all species.

Genitalia of females

As presented in Table 1 assessment of the lancet and the shape of the serrulae is critically important in all genera for the correct identification of species.

However, there are some species within the genus *Athalia* that are difficult to distinguish based only on the shape of the serrulae. For example these include the species in the *A. vollenhoveni* species group (Koch 2006c) and the *A. himantopus* species group (Koch 2007). In addition, depending on the age of the females and the frequency of oviposition abrasions of the serrulae are apparent resulting in wear or disappearance of crucial morphological features resulting in an unrealistic picture. However, experience has shown that this phenomenon is relatively rare.

This deficit is primarily compensated by the shape of the posterior margins of the hypopygia (Fig. 42A), which have a very high taxonomic value. Their shape should always be studied in the *Athalia* species. For this purpose the hypopygium must be completely separated and spread over its entire surface, only then will the shape of the taxonomically relevant posterior margin be undistorted and visible for interpretation.

8.2 Morphological terms

Head

Antennal furrow	:	Paired; more or less conspicuously developed lateral furrows of frontal area (Fig. 38).
Clypeus	:	Covers more or less the base of mouthparts (Fig. 43A).
Epistomal suture	:	Consists of lateral furrows of clypeus and supraclypeal furrow (Fig. 43A).
Eye (compound eye)	:	Occupy the greater part of the lateral parts of the head (Fig. 39).
Frons	:	Central face between eyes, downwards from the front ocellus including the toruli.
Frontal ocellus	:	Anterior ocellus (Fig. 38).
Frontal area	:	Between postocellar area and supraclypeal area, includes the ocelli, laterally limited by more or less conspicuously antennal furrows (Fig. 38).
Gena	:	Area behind eyes (Fig. 39).
Interantennal area	:	Area between toruli (Fig. 43A).
Interantennal carina/e	:	Vertical ridges between antennae (Figs 44C, 107B).

Interantennal groove	:	Between supraclypeal and frontal area; very different developed.
Intercarinal area	:	Area between interantennal carinae (Figs 44C, 107B).
Labrum	:	Is attached under the clypeus (Fig. 43A).
Lateral ocellus (ocelli)	:	Two posterior ocelli (Fig. 38).
Malar space	:	Area between base of mandible and ventral margin of eye (Fig. 43A).
Mandible	:	Paired; belongs to the mouthparts, with apical tooth and sometimes with symmetrically or asymmetrically subapical teeth (Figs 39, 43A); used for biting.
Maxillary palp	:	Paired; appendage of the mouthparts (Fig. 134A).

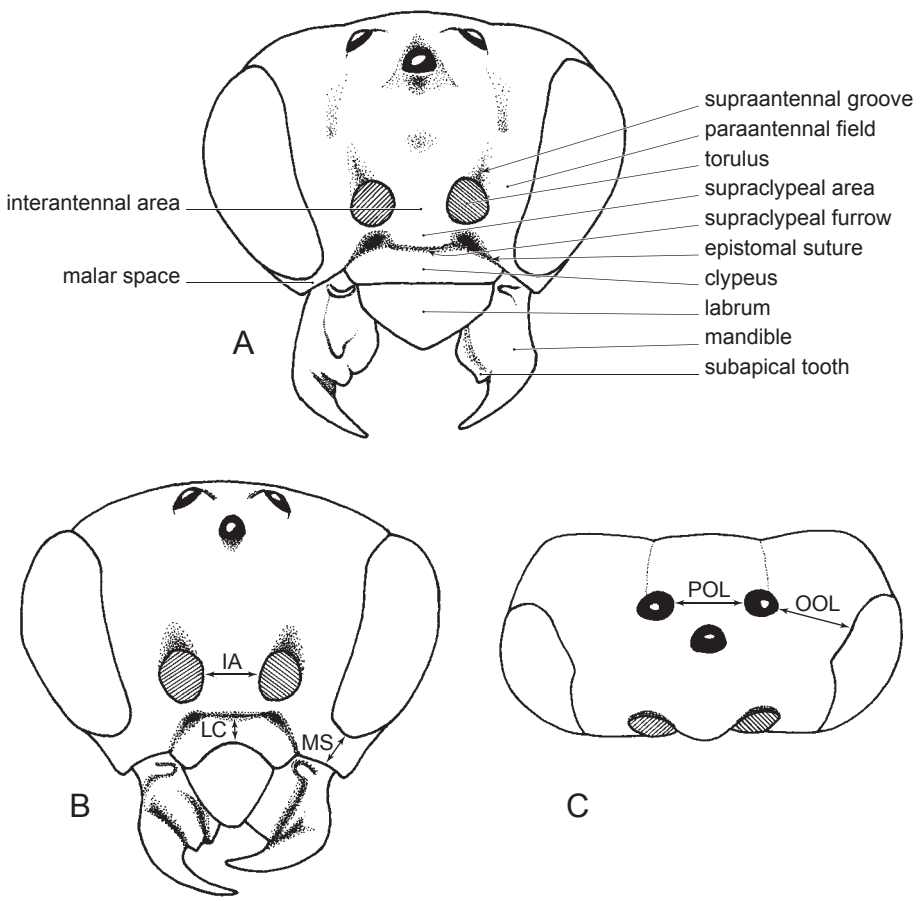

Fig. 43. A-C. Schematic depiction of the Head (frontal aspect): **A**. *Athalia himantopus* species group. — **B-C**. *Athalia vollenhoveni* species group, illustrating measurements: **B**. Frontal aspect. **C**. Dorsal aspect.

Occipital carina	:	Posterior vertical ridge of gena (see morphology of adults).
Paraantennal field	:	Area between eyes and antennae (Figs 38, 43A).
Postocellar area	:	Is located on the top of the head and more or less conspicuously separated by lateral furrows and anteriorly by a line between the lateral ocelli (Figs 38).
Subapical teeth	:	In some genera symmetrically or asymmetrically presented on the mandibles (Fig. 43A).
Supraantennal crest (supraantennal bulge)	:	Paired, a prominent bulge dorso-medial of torulus (Fig. 38).
Supraantennal groove	:	Paired; vertical furrow dorsally of torulus, sometimes with antennal furrow connected (Fig. 43A).
Supraclypeal area	:	Upwards from supraclypeal furrow to toruli (Fig. 43A).
Supraclypeal furrow	:	Dorsal portion of epistomal suture and dorsal margin of clypeus (Fig. 43A).
Torulus (toruli)	:	Antennal socket; the scape of the antenna is articulated here (Fig. 43A).
Vertex	:	Top of the head, including the ocelli.

Antennae

Antenna	:	Consists of scape, pedicel and flagellum (Figs 40A, B).
Flagellomere(s)	:	Segments of flagellum (Fig. 40B).
Flagellum	:	Very long and unsegmented (Fig. 40A), or segmented in more or less short flagellomeres (Fig. 40B).
Pedicel	:	Second segment of antenna (Figs 39, 40A, B).
Scape	:	First segment of antenna (Figs 39, 40A, B).

Thorax

Anepimeron	:	Dorsal part of mesepimeron (Fig. 39).
Epicnemial groove	:	Vertical groove between epicnemium and mesepisternum (Fig. 39).
Epicnemium	:	Anterior region of mesepisternum, separated by a more or less conspicuously vertical epicnemial groove (Fig. 39).
Katepimeron	:	Ventral part of mesepimeron (Fig. 39).
Lateral lobe	:	Part of mesoscutum (Figs 38, 39).
Median lobe	:	Part of mesoscutum (Figs 38, 39).
Mesepimeron	:	Anepimeron and katepimeron together, posterior part of mesopleuron (Fig. 39).
Mesepisternum	:	Anterior part of mesopleuron (Fig. 39).
Mesonotum	:	Mesoscutum and mesoscutellum together (Fig. 38).

Mesopleuron	:	Mesepisternum and mesepimeron together (Fig. 39).
Mesoscutellar appendage	:	Adjacent to posterior margin of mesoscutellum (Fig. 38).
Mesoscutellum	:	Distal part of mesonotum (Fig. 38).
Mesoscutum	:	Median and lateral lobes together (Fig. 38).
Mesosternum	:	Ventral part of mesepisternum, separated by a more or less conspicuously horizontal suture (Fig. 39).
Metanotum	:	Metascutum, metascutellum and metapostnotum together (Fig. 38).
Metapleuron	:	Metepimeron and metepisternum together (Fig. 39).
Metapostnotum	:	Posterior part of metanotum (Fig. 38).
Metascutellum	:	Middle part of metanotum (Fig. 38).
Metascutum	:	Anterior part of metanotum (Fig. 38).
Metepimeron	:	Dorsal part of metapleuron (Fig. 39).
Metepisternum	:	Ventral part metapleuron (Fig. 39).
Notaulus (notauli)	:	Furrow between median and lateral lobe of mesoscutum (Fig. 38).
Postspiracular sclerite	:	Small sclerite located between pronotum and mesepisternum (Fig. 39).
Pronotum	:	Dorsal part of prothorax (Figs 38, 39).
Propleuron	:	Lateral part of prothorax (Fig. 39).
Tegula (tegulae)	:	Small plates laterally of the thorax covering the junction of the fore wings (Figs 38, 39).

Legs

Apical spine (apical spur)	:	In Tenthredinoidea paired spines (spurs) at the apex of tibiae (Fig. 40D).
Basal lobe	:	A different shaped enlargement at base of tarsal claw (Figs 137D, 142E, 150D, 155E).
Basitarsomere	:	Tarsomere 1, nearest to the tibia (Fig. 40D).
Coxa (coxae)	:	(Figs 39, 40D).
Femur (femora)	:	(Fig. 40D).
Preapical spine (preapical spur)	:	A single spine in the apical half of hind tibia (Fig. 40C).
Subapical tooth (teeth)	:	One or two teeth additionally to the apical tooth of tarsal claw (Figs 137D, 150D, 155E).
Tarsal claw	:	Paired; simple, or with basal lobe and/or subapical tooth (teeth) (Figs 40D, 44E, 137D, 155E).
Tarsomere	:	Segment of tarsus (Fig. 40D).
Tarsus (tarsi)	:	Segmented in 5 tarsomeres (Fig. 40D).

Tibia (tibiae)	:	(Fig. 40D).
Trochantellus	:	Basal end of the femur; therefore the trochanter seems to be subdivided in two (Fig. 40D).
Trochanter	:	The segment between coxa and trochantellus (femur) (Fig. 40D).

Wings including morphological abbreviations

Wing cells

Fore wing (Figs 41A-N)

Anal cell	:	A
Basal anal cell	:	1A
First radial cell	:	1R1
First radial sector	:	1Rs
Intercostal area	:	IC
Second anal cell	:	2A
Second radial sector	:	2Rs
Third radial sector	:	3Rs

Hind wing (Figs 41A-N)

Anal cell	:	A
Medial cell	:	M
Radial cell	:	R1
Radial sector	:	Rs

Wing veins

Fore wing (Figs 41A-N)

Anal crossvein	:	a
Costa (costal vein)	:	C
Costal cross vein	:	Sc
First anal vein	:	1A
Media	:	M
Mediocubital crossvein	:	1m-cu
Radial crossvein	:	2r
Radial sector	:	Rs
Radial sector and media	:	Rs+M
Radius	:	R
Second and third anal vein	:	2A+3A

Second radiomedial crossvein	:	2r-m
Stigma	:	Strongly sclerotized and broadened apex of costa; palely or darkly coloured.
Subcosta and radius	:	Sc+R

Hind wing (Figs 41A-N)

First anal vein	:	Petiole of anal cell (1A).

Abdomen

Hypopygium	:	Sternum 7 of females (Fig. 42A).
Sternum (sterna)	:	Ventral segments 2-7 (females), 2-9 (males) (Figs 39, 42A, B).
Subgenital plate	:	Sternum 9 of males (Fig. 42B).
Tergum (terga)	:	Dorsal segments 1-10 (Fig. 38).

Genitalia of male including morphological abbreviations

Cuspis (C)	:	Part of male genitalia (Fig. 42C).
Digitus (D)	:	Part of male genitalia (Fig. 42C).
Harpe (H)	:	Part of male genitalia (Fig. 42C).
Medio-subapical appendage (MSA)	:	Lateral projection of penis valve (Fig. 125I).
Parapenis (PP)	:	Part of male genitalia (Fig. 42C).
Penis valve (P)	:	Part of male genitalia (Fig. 42C).

Genitalia of female

Lancet	:	Valvula 1 (ventral part of the saw-like ovipositor).
Lance	:	Valvula 2 (dorsal part of the saw-like ovipositor).
Ovipositor	:	Consists of valvula 1 (ventral) and valvula 2 (dorsal); laterally flanking by the sawsheath.
Sawsheath	:	Valvula 3 (apical) and valvifer 2 (basal) are connected; envelope the ovipositor (Figs 38, 39, 42A).
Serrula (serrulae)	:	Tooth (teeth) of lancet.

8.3 Sexual dimorphism

The primary sexual morphological differences between males and females are well developed and readily visible on the ventral side of abdomen (Fig. 42A, B). In the females the sawsheath is clearly visible for its entire length as well as the hypopygium, the shape of which is characteristic for many species, particularly those in the genus *Athalia* (Figs 125D, 128D, 130F, 132D, 134E, 136C). The shape of the male subgenital plate situated at the top of the abdomen is sometimes also diagnostic at species level. Except for the apical part of the harpes the actual copulatory organ, comprising the sclerotized genital capsule, is scarcely visible.

The secondary sexual morphological characters such as the shape of the antennae, colouration of the body and pubescence are of variable diagnostic value across the various genera. For example, the flagellum of the male of *Arge* species is much longer and more slender than in the females. Furthermore, the pubescence on the mesepisternum and the mesosternum is sometimes gender-specifically developed, especially for certain *Athalia* species.

With regard to the colouration in certain *Arge* species the proportion of black in the males may be more extended than in the females. Particularly striking is the colour difference in *Sirex noctilio* (Figs 168A, B) the introduced European woodwasp into the study area, in which the female is almost completely black and the abdomen of the male is mostly yellowish-orange. Finally, the females of almost all species are larger than the males.

8.4 Morphology of larvae

Larvae are known for only very few Afrotropical sawfly species (Benson 1962, Prinsloo 1985, Visser 2009). Therefore, their morphology is described only briefly in this book. The morphology of sawfly larvae is described in detail by Lorenz & Kraus (1957) and Viitasaari (2002).

Sawfly larvae are superficially similar in appearance to caterpillars, which are the larvae of butterflies and moths. The larvae of sawflies have one simple eye (stemmentum) on each side of the head, whereas in caterpillars of Lepidoptera several eyes are present, and appear as black spots at the lower side margins of the head. Furthermore, the caterpillars of butterflies and moths are distinguished by the possession of five or fewer pairs of abdominal prolegs with crochets, whereas the larvae of most exophytic Tenthredinoidea have six to eight pairs of abdominal legs without crochets. The larvae of most species of Tenthredinidae have prolegs on abdominal segments 2 to 8 and 10 (anal prolegs); the abdominal segments 1 and 9 are free (Fig. 37C). In Nematinae species the prolegs are presented on abdominal segments 2 to 7 and 10.

The larvae of the introduced Heterarthrinae species are different from other Tenthredinidae. The larva of *Caliroa cerasi* is clearly distinguished by the slug-like appearance and its dark or transparent slimy coating (hence the common name). Additionally, the larva is distinguished by possession of a fleshy protuberance, which extends anteriorly from each prothoracic leg.

Fenusa dohrnii is one of the leaf-mining sawflies. The larvae are characterized by the more dorsoventrally flattened appearance, smaller thoracic legs and conspicuously reduced prolegs on abdominal segments 2 to 8 and 10.

The morphology of the larvae of the Argidae species is similar to that of Tenthredinidae. The larvae are distinguished by the presence of prolegs on abdominal segment 2 to 6, 2 to 7, 2 to 8 and 10 (Lorenz & Kraus 1957). Argidae

larvae usually have a distinct pad or divergent lobe (emposium) adjacent to the tarsal claw; prothoracic tarsal claw sometimes absent, and abdominal segment with no more than three dorsal annulets.

Larval colour is mostly greenish with small differently coloured spots, larger flecks or stripes, rarely entirely pale without any colour patterns. In many cases the head is differently coloured to the rest of the body. The larva of the invasive *Sirex noctilio* is creamy white, the legs of the thorax are inconspicuous and abdominal legs are absent. A distinctive dark spine is present at the rear of the abdomen.

9. Systematic presentation

The systematic arrangement follows the classification structure proposed by Viitasaari (2002) and Taeger *et al*. (2010).

9.1 Key to families of Symphyta

1 Antennae inserted on ventral side of head, below ventral margin of eyes and below the posterior margin of clypeus; head with a crown of several thorn-like structures (coronal teeth) around median ocellus (Figs 161A-C, 162A, B); not reported in the study area ……**Orussidae**

1* Antenna inserted in frontal aspect on head, above clypeus and between eyes; head without thorn-like structures around median ocellus (Figs 138A, C) ……2

2 Antenna 3-segmented (3 antennomeres) with only one, very long unsegmented flagellum (Fig. 40A) ……**Argidae**

2* Flagellum of antenna segmented with more than 6 flagellomeres (Figs 40B, 123D, 130B, C, 134C, 137E, 142D, 150C, 155D) ……3

3 Antenna with about 18 flagellomeres (Figs 168A, B); apical tergum of female (Fig. 168A) and apical sternum of male (Fig. 168B) with tube-like projection ……**Siricidae**

3* Antenna mostly with 7-10 flagellomeres, apical sternum and tergum without such projections ……**Tenthredinidae**

9.2 Family Argidae

Key to genera

1 Fore wing with crossvein 2r-m absent and cells 1Rs and 2Rs fused, thus there only three submarginal cells with the second very large (Fig. 41L); body usually entirely black ……***Triarge* Forsius**

1* Fore wing with crossvein 2r-m present and cells 1Rs and 2Rs present, thus there are four submarginal cells with the second not conspicuously larger (Fig. 41M); body usually bi-coloured ……2

2 Hind tibia with preapical spine (Fig. 40C ……***Arge* Schrank**
2* Hind tibia without preapical spine ……***Pampsilota* Konow**

Genus *Arge* Schrank, 1802

Key to species

1 Pale body parts orange, at least some of the black body parts with blue metallic lustre; sawsheath conspicuously pincer-shaped without conspicuous coarse bristly setae on interior surface; penis valve as in Figs 55E, 84C, 99B *A. capensis* species group ……2
1* Body black with yellow markings or predominantly yellow with black markings, black body parts without blue metallic lustre, when with metallic lustre then sawsheath robust (Figs 88B, 90B) and interior surface with more or less conspicuous coarse bristly setae, penis valve different to above Figs 48E, 52E, 59 D, 94D ……9

2 Abdomen with orange apex ……5
2* Abdomen entirely black with blue metallic lustre or mid terga and mid sterna orange ……3

3 Abdomen entirely black with blue metallic lustre ……4
3* Abdomen black with blue metallic lustre, mid terga and sterna more or less orange ……***A. elandsbayensis* Koch & Goergen**

4 Thorax predominantly orange, mesosternum black ……
……***A. whiteheadi* Koch & Goergen**
4* Thorax black with blue metallic lustre, only pronotum and tegulae orange ……***A. vannoorti* Koch & Liston**

5 Terga 2-4 orange laterally, mesopleuron and mesosternum black……
……***A. cochraneae* Koch & Goergen**
5* Abdomen without orange markings laterally, at least mesopleuron with orange markings or male ……6

6 Male……7
6* Female ……8

7 Mesoscutum black with blue metallic lustre, median lobe of mesoscutum orange ……***A. capensis* (Klug)**
7* Mesoscutum without orange markings ……***A. namaensis* Koch & Goergen**

8 Thorax nearly entirely orange; lancet with more or less uniformly cigar-shaped trichoid sensilla ……***A. rufocyanea* (Enslin)**
8* Thorax sometimes partly more black coloured, especially on mesopleuron and mesosternum; lancet with long filiform trichoid sensilla ……***A. capensis* (Klug)**

9 Thorax entirely black with conspicuous blue metallic lustre; fore wing with fuscous crossband under stigma ……***A. speciosa* (Klug)**

9* Thorax nearly entirely black or predominantly yellow, fore wing without conspicuously infuscate crossband ……10

10 Thorax nearly entirely black; abdomen entirely yellow, at most with small blackish markings ……11

10* Thorax partly or predominantly yellow; abdomen differently coloured ……13

11 Wings sharply bicoloured, basal half slightly flavescent-hyaline and apical half fuscous, costa entirely yellow, intercostal area flavescent-hyaline ……***A. bisignata* Konow**

11* Wings uniformly flavescent-hyaline or very slightly infuscate throughout, costa and intercostal area dark brown ……12

12 Wings uniformly flavescent-hyaline throughout; hind tibia black ringed apically; hind coxa predominantly yellow, at least ventral surface …… ……***A. annulipes* (Klug)**

12* Wings very slightly infuscate throughout; hind tibia entirely yellow; hind coxa entirely black ……***A. spei* (Enslin)**

13 Head more or less yellow, at least postocellar area yellowish ……14

13* Head black or with blue metallic lustre, at most mandible and labrum light brown ……17

14 Head black, only postocellar area yellow; sawsheath in dorsal view broadly and obtusely pincer-shaped apically (Fig. 75C) …… ……***A. kungveldensis* Koch & Eardley**

14* Head extensively yellow; sawsheath in dorsal view not pincer-shaped apically ……15

15 Head strongly enlarged behind eyes; legs entirely black with slight blue metallic lustre ……***A. sjoestedti* Konow**

15* Head slightly enlarged behind eyes; legs predominantly yellow ……16

16 Head entirely yellow; mesoscutellum black, mid femur broadly black ringed apically ……***A. hereroensis* Koch & Goergen**

16* Interocellar area and postocellar area black; mesoscutellum yellow; mid femur entirely yellow ……***A. meyi* Koch**

17 Legs entirely black ……22

17* Legs partly yellow ……18

18 Only fore tibia and fore basitarsomere yellow; hind tibia distinctively widened apically (Fig. 51A) ……***A. bensoni* Pasteels**

18* Legs extensively yellow; hind tibia not distinctively widened apically ……19

19 Costa entirely yellow ……20
19* Costa more or less brownish, apex adjacent to stigma always brown ……21

20 Anal vein 1A of fore wing and veins of hind wing brownish; abdomen yellow with more or less broad black median stripe on dorsal surface; in ♀♀ the median stripe reduced to median spots; penis valve as in Figs 59D, E ……***A. deckerti* Koch**
20* Veins of basal halves of fore and hind wings entirely yellow; abdomen yellow with black patch on apical half on dorsal surface; penis valve as in Fig. 71 ……***A. iota* Pasteels**

21 In ♂♂ at least mid and hind femur entirely black; in ♀♀ hind femur more or less black; apex of sawsheath black; sawsheath in dorsal view pincer-shaped (Fig. 66B); penis valve as in Fig. 66E ……***A. furvipes* Konow**
21* In ♂♂ and ♀♀ all femora entirely yellow; sawsheath yellow; sawsheath in dorsal view not pincer-shaped, moderately rounded apically (Fig. 94A); penis valve as in Fig. 94 D ……***A. stuhlmanni* (Kohl)**

22 Abdomen entirely black with slight blue metallic lustre …… ……***A. krabbefonteinensis* Koch & Goergen**
22* Abdomen more or less yellow ……23

23 Dorsal half of mesopleuron and lateral lobe of mesoscutum yellow…… ……***A. taeniata* (Klug)**
23* Mesopleuron and mesonotum entirely or nearly entirely black or black with blue metallic lustre ……24

24 At least some of the black body parts with blue metallic lustre; sternum 9 of ♂♂ black; sawsheath of ♀♀ entirely black, in dorsal view compact, moderately rounded apically, interior surface slightly convex with coarse, very short bristles (Fig. 63B) ……***A. dirce* (Kirby)**
24* Black body parts without blue metallic lustre, sternum 9 of ♂♂ yellow; sawsheath of ♀♀ yellow with black apex, pincer-shaped (Figs 45B, 77B, 82B) ……25

25 Costa and subcosta nearly entirely yellow, only apex adjacent to stigma brown, intercostal area flavescent-hyaline; serrulae at centre moderately flattened, obtusely angular on anterior edge (Fig. 45D); penis valve as in Fig. 45E ……***A. angulifera* Pasteels**
25* Costa and subcosta predominately brownish with yellow base, intercostal area infuscate; serrulae at centre flattened or prominent, each with rounded anterior edge (Figs 77D, 82 D); penis valve as in Figs 77E, 82E ……26

26 Head slightly enlarged behind eyes; dorsal surface of abdomen medially with narrow black longitudinal stripe; serrulae at centre flattened (Figs 82C, D); penis valve as in Fig. 82E ……***A. montana* Koch & Goergen**

26* Head parallel behind eyes; dorsal surface of abdomen of ♂♂ nearly entirely black; ♀♀ medially with somewhat broader black longitudinal stripe; serrulae at centre prominent (Figs 77C, D); penis valve as in Fig. 77E ……***A. langebergensis* Koch & Goergen**

Genus *Pampsilota* Konow, 1899

Key to species

1 Thorax entirely black; femora black, tibiae and tarsi pale ……
……***P. luederitzensis* Koch**
1* Pronotum and tegula yellow; legs black, fore tibia and tarsus brownish ……***P. brandbergensis* Koch**

Genus *Triarge* Forsius, 1931

Key to species

1 Abdomen entirely black or black with metallic lustre ……2
1* Abdomen black with yellow apex……***T. flavoapicalis* Koch**

2 ♂♂ ……3
2* ♀♀ ……5

3 Supraclypeal area rounded in lateral view (Fig. 107A) ……
……***T. citrusdalensis* Koch**
3* Supraclypeal area more or less flat or slightly rounded ……4

4 Parapenis roundly excised for about a half of its length (Fig. 116G) ……***T. namaquaensis* Koch**
4* Parapenis circularly excised for about a third of its length (Fig. 107G) ……***T. mosselbayensis* Koch**

5 Sawsheath in dorsal view very broadly forcipated (Figs 114D, 115D) ……6
5* Sawsheath in dorsal view more or less narrowly forcipated (Figs 107D, 110D, 112D, 116D, 119D, 121D, 122D) ……7

6 Tibiae more or less yellowish. Namibia ……***T. karooensis* Koch**
6* Tibiae black. South Africa ……***T. mosselbayensis* Koch**

7 Abdomen black without blue metallic lustre ……8
7* Abdomen black with blue metallic lustre ……10

8 Interantennal carina very short (Fig. 122B) ……***T. winterhoekensis* Koch**
8* Interantennal carina longer ……9

9 Sawsheath in dorsal view slightly broadly forcipated (Fig. 116D); serrulae sharp, hook-like (Figs 116E, F) ……***T. namaquaensis* Koch**

9* Sawsheath in dorsal view narrowly forcipated (Fig. 110D); serrulae less acute and less hooked (Figs 110E, F) ……***T. driehoekensis* Koch**

10 Interantennal carina short, extending about ¼ way to clypeus ……11

10* Interantennal carina distinctly longer, extending about half way to clypeus ……***T. plumbea* Forsius**

11 Fore tibia light brown ……***T. citrusdalensis* Koch**

11* Fore tibia blackish ……***T. nigra* Koch**

9.3 Family Tenthredinidae

Key to subfamilies

1 Fore wing with radial crossvein 2r present (Figs 41B-K) ……2

1* Fore wing with radial crossvein 2r absent (Fig. 41A) ……**Nematinae**

2 Fore wing with anal cell present, anal veins (2A+3A) completely outlined, without anal crossvein (a) (Fig. 41B); anterior part of mesepisternum with epicnemium, separated by a more or less conspicuous epicnemial groove (Fig. 39) ……**Selandriinae**

2* Fore wing with anal cell 2A petiolate (1A), 2A+3A reduced to a stub (Figs 41E-H) or curved up to anal vein 1A (Figs 41D, E); or 2A+3A complete and anal crossvein (a) present (Figs 41C, I-K); mesepisternum without epicnemium …3

3 Fore wing with vein M and crossvein 1m-cu more or less convergent (Figs 41C, D) ……**Heterarthrinae**

3* Fore wing with veins M and 1m-cu parallel (Figs 41E-K) ……4

4 Fore wing with anal cell 2A petiolate (1A), 2A+3A reduced to a stub (Figs 41E-H) ……**Blennocampinae**

4* Fore wing with anal cell entirely present, 2A+3A completely outlined, anal crossvein (a) present (Figs 41I-K) ……5

5 Antenna 10-12-segmented, apical flagellomere sometimes indistinctly separated (Fig. 123D); tarsal claws simple (Fig. 123E) ……**Athaliinae**

5* Antenna 9-segmented, distal flagellomeres conspicuously separated (Fif. 40B); tarsal claws with enlarged basal lobe (Fig. 142 E) or with basal lobe and apical tooth (Fig. 137D) ……**Allantinae**

Subfamily Athaliinae

Genus *Athalia* Leach, 1817

Key to species groups of *Athalia* in the Afrotropical Region

1 Clypeus elongate medially and rounded in front (Fig. 123A) ……
……***Athalia* "*incomta*" species group**
1* Clypeus short medially and more or less truncate or conspicuously excised in front ……2

2 Clypeus short medially and truncate to subtruncate in front (Fig. 123B) ……***Athalia himantopus* species group**
2* Clypeus very short medially and conspicuously excised in front (Fig. 123C) ……***Athalia vollenhoveni* species group**

Key to *Athalia* species

1 Clypeus elongate medially and rounded in front ……2
1* Clypeus short medially and more or less truncate to subtruncate in front ……***A. marginipennis* Enderlein**

2 Mesonotum nearly entirely black; maxillary palp not extensively elongated …3
2* Mesonotum yellow with black median lobe of mesoscutum; maxillary palp extensively elongated (Fig. 134A.) ……***A. turneri* Forsius**

3 Fore and mid tibia entirely yellow, only hind tibia black apically; pronotum and tegula yellow or black ……4
3* Mid and hind tibia black apically; pronotum and tegula black ……
……***A. ustipennis* Mocsáry**

4 Male ……5
4* Female ……7

5 Pronotum, tegula and mesopleuron yellow ……***A. brevicornis* Benson**
5* Pronotum, tegula and mesopleuron more or less black ……6

6 Pronotum, tegula, mesopleuron and dorsal margin of mesosternum entirely black ……***A. incomta* Konow**
6* Pronotum and mesopleuron partly blackish, tegula yellow, mesosternum entirely yellow ……***A. maraisi* Koch**

7 Pronotum, tegula and mesopleuron yellow; sawsheath in dorsal view conspicuously enlarged apically (Fig. 130E) ……***A. maraisi* Koch**
7* Pronotum, tegula, mesopleuron and dorsal margin of mesosternum entirely black; sawsheath in dorsal view pointed apically (Fig. 128C) ……***A. incomta* Konow**

Subfamily Allantinae

Key to genera

1 Hind wing with cells Rs and M absent (Fig. 41I) ……*Neacidiophora* **Enslin**
1* Hind wing with cells Rs and M (Fig. 41J) present ……*Xenapates* **W.F. Kirby**

Genus *Neacidiophora* Enslin, 1911

Neacidiophora brevicornis Pasteels, 1954

Genus *Xenapates* W.F. Kirby, 1882

Key to species

1 Mesopleuron entirely black ……2
1* Mesopleuron with white marking ……3

2 Head entirely black ……*X. beateae* **Koch**
2* Labrum, anterior margin of clypeus, base of mandible and a spot at genal orbit white ……*X. damaraensis* **Koch**

3 Dorsal half and a narrow posterior margin of genal orbit white; terga black with only narrow white posterior margins ……*X. eardleyi* **Koch**
3* Genal orbit entirely black; mid terga additionally with more or less large dirty whitish medial spot, in male fused to a large pale longitudinal patch (Fig. 147C) ……*X. similis* **Benson**

Subfamily Blennocampinae

Key to genera

1 Hind wing with cell M (Fig. 41F) or both Rs and M (Fig. 41G) present ……2
1* Hind wing with cells Rs and M absent (Fig. 41E) ……*Durbadnus* **Pasteels**

2 Hind wing only with cell M present (Fig. 41F); tarsal claw tridentate with large basal lobe (Fig. 155E); mesepisternum without transverse groove or suture …… ……*Trisodontophyes* **Enslin**
2* Hind wing with Rs and M both present (Fig. 41G); tarsal claw with one inner tooth and enlarged basal lobe (Fig. 150D); upper half of mesespisternum separated from lower by a transverse groove or suture (Fig. 149A) ……*Distega* **Konow**

Genus *Distega* Konow, 1904

Key to species

1 Thorax entirely black, abdomen and femora yellow ……*D. montium* **Konow**

1* Dorsal surface of thorax and upper half of mesopleuron yellow, femora nearly entirely black, dorsal surface of abdomen predominantly black, ventral surface yellow ……***D. bevisi* Forsius**

Genus *Durbadnus* Pasteels, 1954

Durbadnus taegeri Koch & Liston, 2012

Genus *Trisodontophyes* Enslin, 1911

Trisodontophyes diversa Koch, 2001

Subfamily Heterarthrinae

Key to genera

1 Fore wing with crossvein Rs present, sometimes partly obliterated, thus here are four cells (Fig. 41C); hind wing with cells Rs and M present (Fig. 41C), both absent, or either Rs or M present; tarsal claw with enlarged basal lobe (Fig. 164A) ……***Caliroa* Costa**

1* Fore wing with crossvein Rs absent, cells 1R1 and 1Rs are fused, thus here only three cells (Fig. 41D); hind wing with cells Rs and M absent (Fig. 41D); tarsal claw simple (Fig. 166A) ……***Fenusa* Leach**

Genus *Caliroa* Costa, 1859

Key to species

1 Fore wing with anal veins 2A+3A completely outlined, anal crossvein (a) present (Fig.v 41C); mid and hind legs blackish. Introduced species in southern Africa ……***C. cerasi* (Linnaeus)**

1* Fore wing with anal veins 2A+3A reduced to a furcated stub, with upper branch curved up and meeting or nearly meeting first anal vein 1A to form a small basal anal cell (similar to Fig. 41E); legs almost entirely yellow. Native to southern Africa, known from Limpopo and Mpumalanga Provinces ……***C. blanki* Koch & Smith**

Genus *Fenusa* Leach, 1817

Fenusa dohrnii (Tischbein, 1846)

Subfamily Nematinae

Genus *Nematus* Panzer, 1801

Nematus oligospilus Förster, 1854

Subfamily Selandriinae

Genus *Dulophanes* Konow, 1907

Dulophanes obscurus Forsius, 1931

9.4 Presentation of the genera and species

The genera of the families and the corresponding species are arranged in alphabetical order (Taeger *et al*. 2010).

Family Argidae

(http://www.waspweb.org/Tenthredinoidea/Argidae/index.htm)

Genus *Arge* Schrank, 1802

Arge Schrank, 1802: 236. Type species: *Tenthredo enodis* Linnaeus, 1767 [= *Arge enodis* (Linnaeus, 1767)], designated by Rohwer, 1911.(http://www.waspweb.org/Tenthredinoidea/Argidae/Arginae/Arge/index.htm)

Synonyms only included if relevant to Afrotropical fauna. The full synonymy is listed by Taeger *et al.* (2010).

Hylotoma Latreille, 1803: 302. Type species: *Tenthredo ochropus* Gmelin, 1790 [= *Arge ochropus* (Gmelin, 1790)], by subsequent designation of Blank *et al*. (2009).

Didocha Konow, 1907b: 306. Type species: *Didocha braunsi* Konow, 1907 [= *Arge hansi* Forsius, 1930], by monotypy.

Alloscenia Enderlein; 1919: 115. Type species: *Alloscenia maculitarsis* Enderlein, 1919 [= *Arge massajae* Gribodo, 1879], by original designation.

Description

Antennae 3-segmented, scape and pedicel short, flagellum very long and unsegmented (Fig. 44D). Interantennal area with a pair of more or less sharply ridged interantennal carinae (Fig. 44C); clypeus not separated by an epistomal suture from the supraclypeal area (Fig. 44A). Hind tibia with preapical spine (Fig. 40C); tarsal claws simple (Fig. 44E). Fore wing with radial crossvein (2r) absent and crossvein 2r-m present, with basal anal cell (1A) closed and anal cell (2A) long petiolate (1A) (Fig. 41M); radial cell of hind wing (R1) closed, with anal cell (A) and two middle cells (Rs and M) present (Fig. 41M); tergum 1 with a more or less narrow and deep median split (Fig. 44F).

The colouration of the species is all black or black with yellowish/orange markings or yellowish with black markings, black parts may be with more or less blue metallic lustre.

Ranging from 5.0 to 12.0 mm in length.

Remarks

The species of the genus *Arge* are distributed in all biogeographical regions except Australia and the Antarctic Region; in the Neotropics only south to Colombia. According to Taeger *et al*. (2010) 113 valid *Arge* species are documented for the Afrotropical Region, and thus it is the most species-rich sawfly genus of this region.

This list is based especially on the important revisions by Pasteels (1953a, 1963). In subsequent years, an additional 18 species were described, and four species are synonyms (Koch & Goergen 2010, Koch 2011, 2012a, 2013, Koch & Eardley 2011, Koch & Liston 2012a, b), thus currently in total 127 species are known.

Arge urgently needs a revision for all species including clear definitions for the species groups postulated by Pasteels (1953a, 1963). Only the *Arge capensis*

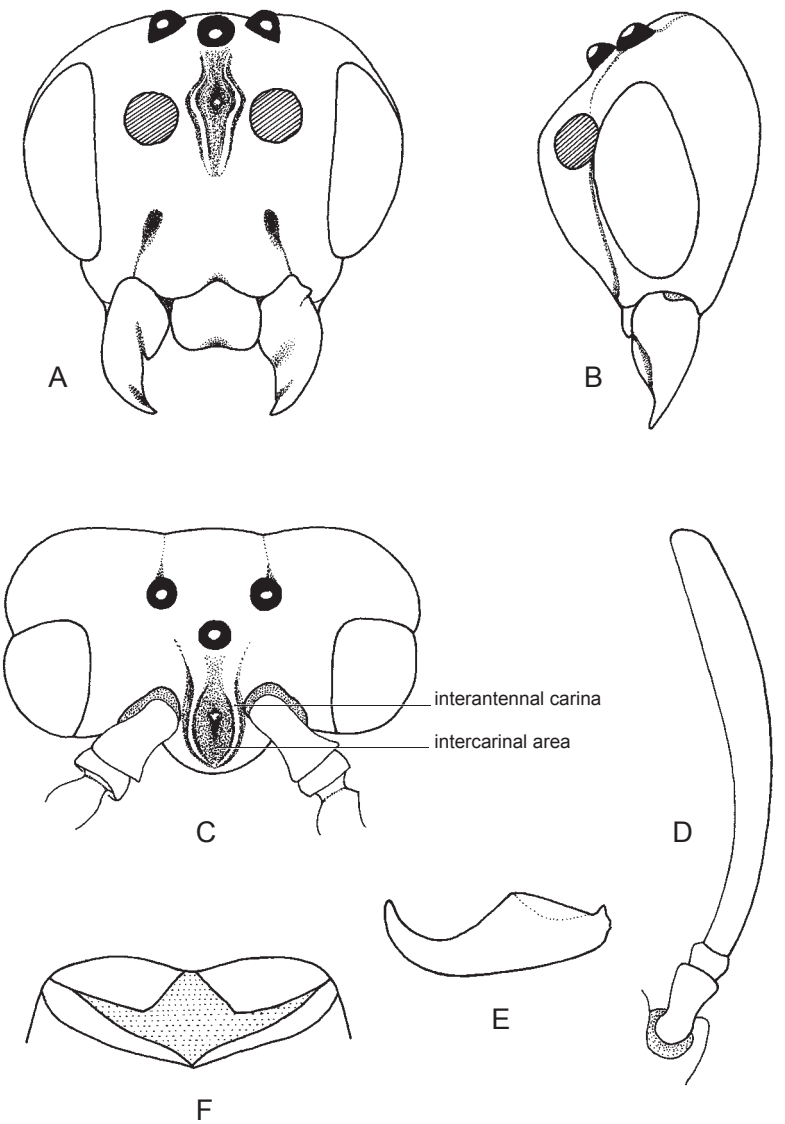

Fig. 44. A-F. *Arge* sp. **A**. Head (frontal aspect). **B**. Head (lateral aspect). **C**. Head (dorsal aspect). **D**. Antenna. **E**. Tarsal claw. **F**. Tergum 1**.**

species group (Koch & Liston 2012a) and the *A. mirabilipes* species group (Koch & Eardley 2011, Koch 2012a) have been defined and revised.

Host plants

Very little is known about the host plants of the species occurring in the study region. *Arge taeniata* is known as Pelargonium sawfly and its larvae feed on *Pelargonium* L'Héritier de Brutelle ex Aiton (Geraniaceae) (Prinsloo 1985). The larvae of *A. capensis* and *A. cochraneae* feed on *Geranium* sp. (Geraniaceae) (Pasteels 1953), and *A. dirce* is associated with *Diospyros lycioides* Desfontaines (bluebush, red star-apple) (Ebenaceae).

Arge angulifera Pasteels, 1953

Arge angulifera Pasteels, 1953a: 72, 76. ♀. Type locality: Viljoens Pass (Western Cape Province, South Africa) (BMNH).

Arge nigrofulva Pasteels, 1953a: 72, 79. ♂. Type locality: Pinelands, C. P. [Cape Province] (Western Cape Province, South Africa) (DEUS).

Female

Head and antenna black; apical half of mandible light brown becoming dark reddish to blackish apically. Thorax yellow with following black: one spot on ventral surface of propleuron, mesoscutum except for narrow lateral stripe of lateral lobe, mesoscutellum, metascutellum ventral half of mesopleuron, mesosternum, katepimeron except for its posterior margin, metapleuron with two spots on anterior and posterior margin. Legs black. Wings uniformly flavescent-hyaline throughout; fore wing with small smoky substigmal spot; intercostal area yellow; costa, subcosta, yellow with dark brown at extreme apex adjacent to dark brown stigma, rest of venation yellow to light brown in apical half. Abdomen yellow, tergum1 with two small blackish medial spots, tergum 2 with very small medial spot on anterior margin, terga 5-8 with very small black medial spots, sawsheath with black apex.

Head very slightly enlarged behind eyes. Antenna 1.4× as long as maximum head width; flagellum conspicuously enlarged towards apex, quadrangular in cross section, interior surface with moderately compressed longitudinal carina, weaker apically, other longitudinal carinae weakly compressed. Eyes converging below. Anterior margin of clypeus circularly emarginate medially, supraclypeal area rounded to start of interantennal carinae, interantennal carinae sharply ridged between antennae, very slightly converging downwards, extending about one third way to clypeus.

Vertex nearly impunctate, shiny; gena and frons sparsely micropunctate, shiny, supraclypeal area moderately densely punctate, shiny, clypeus shallowly rugose sculptured, shiny; pubescence brownish. Mesoscutum very shallowly punctate,

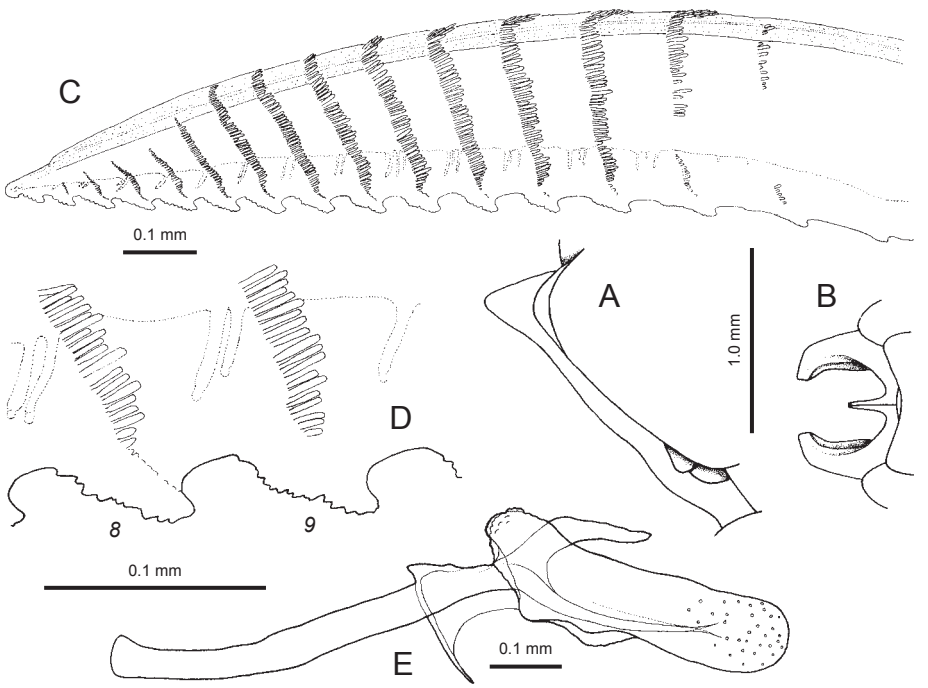

Fig. 45. A-E. *Arge angulifera*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 8-9. **E**. Penis valve (left, lateral aspect).

shiny; pubescence similar to that on head. Abdomen irregularly microsculptured, shiny. Sawsheath: Figs 45A, B. Lancet with about 16 serrulae (Figs 45C, D).

Length: 8.3 mm.

Male (Figs 46A, B)

Head and antenna black; apical half of mandible reddish to dark reddish apically. Thorax black with pronotum and tegula yellow. Legs black; tibiae and tarsi brown to dark brown. Abdomen yellow; tergum1 nearly entirely black, terga 2-8 with black medial markings of various widths, the whole appearing like a median stripe, sternum1 blackish medially.

Head very slightly narrowed behind eyes. Antenna 1.8× as long as maximum head width; flagellum not enlarged towards apex, triangular in cross section, interior surface with conspicuously compressed longitudinal carina, the other longitudinal carinae weaker. Head moderately densely punctate, shiny; supraclypeal area somewhat more densely punctate, shiny; pubescence yellowish. Mesoscutum sparsely micropunctate, shiny. Other features as for female. Genitalia: Fig. 45F.

Length: 7.3-8.3 mm.

Etymology

From Latin; *angulus* (corner), *-fera* (bearing), but it is not clear to which part of the body this refers.

Distribution

South Africa (Western Cape Province) (Fig. 173).

Host plant

Unknown.

Ecology and habitat

The habitats are located in the Fynbos Biome, which is situated in the winter rainfall zone. The flight season is poorly known, some records are documented in November and December.

Remarks

In males the medial stripe of the abdomen varies in its width from a nearly entirely black dorsal surface to a conspicuously narrowed stripe, especially in the middle, and the sternum 1 may be entirely yellow.

The general colouration of *Arge angulifera* closely resembles that of *A. langebergensis* and *A. montana*, but the latter have an infuscate intercostal area. Additionally, there are differences in the genitalia, especially in females. The serrulae of the lancet of *A. langebergensis* are rounded apically (Figs 77C, D) and the serrulae of *A. montana* are more flattened (Figs 77C, D) than those of *A. angulifera*.

Fig. 46. A-B. *Arge angulifera*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Arge annulipes (Klug, 1834)

Hylotoma annulipes Klug, 1834: 234. ♀. Type locality: Uitenh.[Uitenhage], Pr. [Promontorium] b. [Bonae] sp. [Spei] [Cape of Good Hope] (Western Cape Province, South Africa) (MFN).

Hylotoma pretoriensis Buysson, 1898: 351. ♀. Type locality: Pretoria, South Africa (MNHN).

Female (Figs 47A, B)

Head black; apical half of mandible light brown becoming dark reddish apically, scape and pedicel black, flagellum brown with dirty yellow dorsal surface. Thorax black; metepimeron yellow. Legs yellow; fore coxa entirely black, mid coxa black with narrow apical margin, hind coxa black with apical half and ventral surface yellow, trochanters blackish, mid and hind tibia black apically, tarsomeres1-3 of fore-, mid- and hind legs black ringed apically, tarsomeres 4/5 entirely black. Wings uniformly flavescent-hyaline throughout; fore wing with small brown substigmal spot; intercostal area of fore wing blackish infuscate, stigma and costa black, subcosta black with dirty yellow basal half, venation in basal half yellow, in apical half brown. Abdomen yellow; sawsheath with black apex.

Head very slightly enlarged behind eyes. Antenna 1.5× as long as maximum head width; flagellum slightly enlarged towards apex, and slightly quadrangular in cross section, dorsal surface with conspicuously compressed longitudinal carina, the other longitudinal carinae weaker. Eyes scarcely converging below. Anterior margin of clypeus circularly emarginate medially, supraclypeal area very flatly rounded up to start of interantennal carinae, interantennal carinae ridged between antennae, converging downwards, extending about one third distance to clypeus.

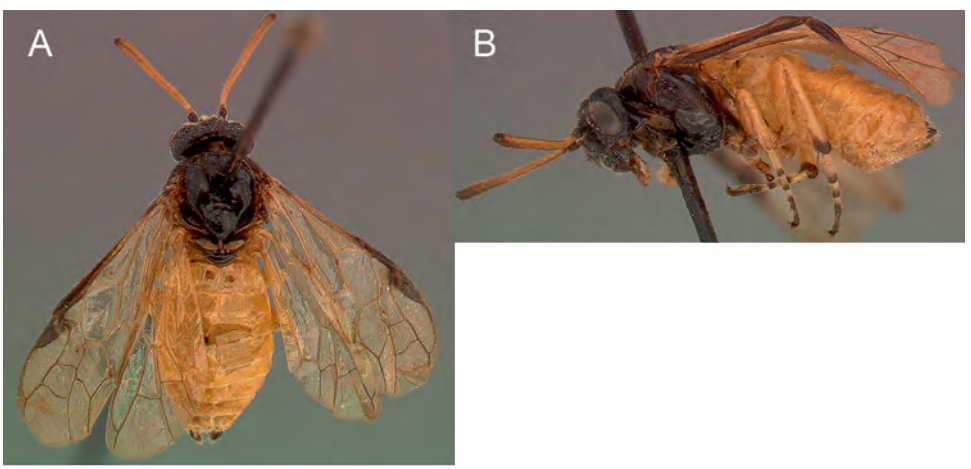

Fig. 47. A-B. *Arge annulipes*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Vertex and gena scattered micropunctate, shiny; frons moderately densely punctate, shiny; clypeus and supraclypeal area densely, irregularly sculptured, shiny; pubescence yellowish. Mesoscutum moderately, densely punctate, shiny; pubescence similar to that on head. Abdomen with basal terga obscurely microsculptured, shiny. Sawsheath: Figs 48A, B. Lancet with about 16 serrulae (Figs 48C, D).

Length: 8.7-9.2 mm.

Male

Head and antenna black; apical half of mandible light brown becoming dark reddish to black towards apex. Thorax black; katepimeron and metapleuron yellow. Legs similar to female except for mid tibia with black basal half and entirely yellow hind tibia.

Head slightly narrowed behind eyes. Antenna 1.9× as long as maximum head width; third antennomere not enlarged towards apex, triangular in cross section, ventral carina more sharply compressed than in female. Supraclypeal area rugosely sculptured, dull; clypeus irregularly transversely sculptured, subshiny. Mesoscutum rather densely micropunctate. Other features as for female. Genitalia: Fig. 48E.

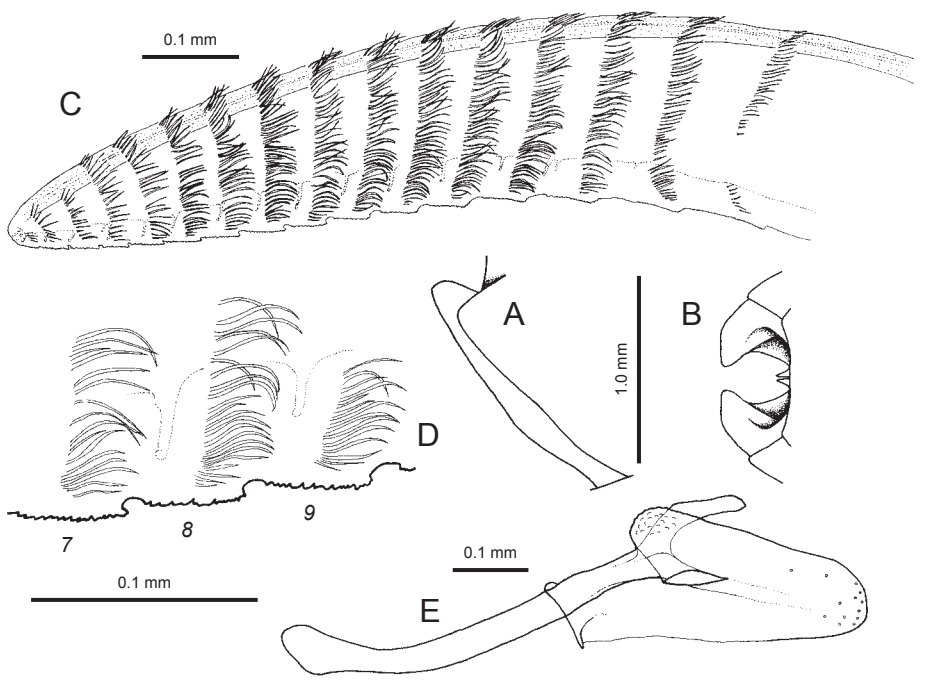

Fig. 48. A-E. *Arge annulipes*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 7-9. **E**. Penis valve (left, lateral aspect).

Length: 6.7-7.6 mm.

Etymology

Derived from Latin; *annulus* (ring) and *pes* (foot), referring to the black-ringed tarsomeres.

Distribution

South Africa (Province: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Western Cape) (Fig. 173).

Host plant

Not known, but one female has been found on *Ricinus communis* L. (Euphorbiaceae), Morgan Bay (Eastern Cape Province); and one male on flowering *Foeniculum vulgare* Miller (Apiaceae), Belmont Valley, Grahamstown (Eastern Cape Province).

Ecology and habitat

In the Wolkberg area (Limpopo Province) specimens were observed on the dense riverine vegetation. In the study region only three records from the Cape of Good Hope (Fig. 49) and from Mossel Bay (Western Cape Province) are known.

Fig. 49. The habitat of *Arge annulipes* in the Olifantsbos area comprising **-** West Coast Strandveld or “Cape Flats Dune Strandveld” (Mucina & Rutherford 2006) **-** on the Cape Peninsula, where shrubs of *Sideroxylon inerme* (white milkwood) (Sapotaceae) form dense thickets (Western Cape Province).(Photo by F. Koch)

The localities mentioned belong to the Coastal Fynbos vegetation type. In the area of Grahamstown (Eastern Cape Province) the flight season is from January to March.

Remarks

Variability is present, especially in the colouration of the mid- and hind coxae from more or less black to entirely yellow (hind coxa). The same applies to the katepimeron and the metapleuron. In pale forms of female the katepimeron and the metapleuron are entirely yellow, and the pronotum is yellow spotted laterally. In males, sometimes the mid and hind coxa is entirely black. The colouration of the katepimeron varies from entirely yellow to black and sometimes the metepimeron has only a yellow spot. The dark form differs in having small blackish medial spots on terga 6-8.

The differences between *A. annulipes* and the similarly coloured *A. spei* are discussed under the latter species and given in the key to species.

Arge bensoni Pasteels, 1953

Arge bensoni Pasteels, 1953a: 71, 84. ♀. Type locality: Lupane, South Rhodesia [Zimbabwe] (BMNH).

Female (Figs 50A, B)

Head black with slight bluish metallic lustre; labrum dark brown, apical half of mandible light brown becoming reddish apically; antenna blackish. Thorax black with following yellow: pronotum, postspiracular sclerite, a very narrow lateral margin of median and lateral lobe of mesoscutum, tegula, anepimeron, partly katepimeron, metepimeron, partly metepisternum. Legs black; extreme apex of fore femur and fore tibia yellowish. Wings uniformly flavescent-hyaline throughout, with obscure substigmal spot on fore wing; stigma dark brown, costa and subcosta

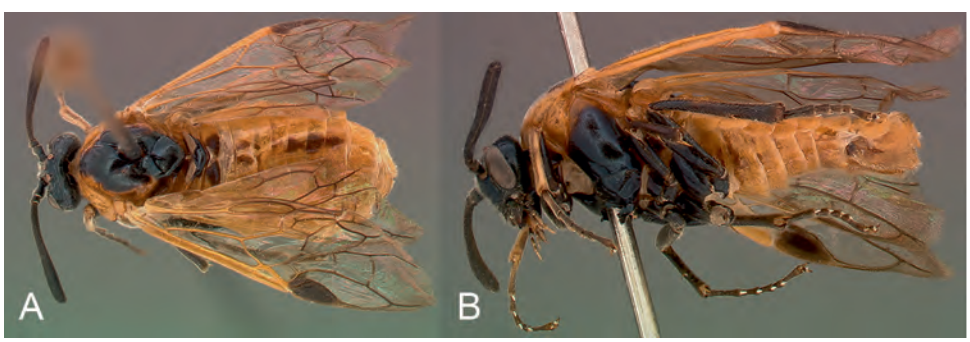

Fig. 50. A-B. *Arge bensoni*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

entirely yellow, venation in basal half yellow, in apical half brown. Abdomen yellow with following black; tergum 1 predominantly, tergum 2 with large narrowly divided medial spot, small medial spot of tergum 3, terga 4-7 with medial spots becoming larger towards apex.

Head very slightly enlarged behind eyes. Antenna 1.5× as long as maximum head width; flagellum conspicuously enlarged towards apex, and slightly quadrangular in cross section, the compressed longitudinal carina of inner surface not very strongly developed, the other longitudinal carinae weaker. Eyes slightly converging below. Anterior margin of clypeus shallowly circularly emarginate medially, supraclypeal area rising gently up to start of interantennal carinae, interantennal carinae obtusely ridged between antennae, conspicuously converging downwards, very short, extending approximately to the ventral margin of toruli. Hind and mid tibia conspicuously enlarged apically (Fig. 51A).

Vertex and gena densely punctate, shiny; frons and supraclypeal area very densely, nearly rugosely punctate, dull; clypeus irregularly transversely sculptured, subshiny; pubescence whitish. Mesoscutum moderately, densely micropunctate,

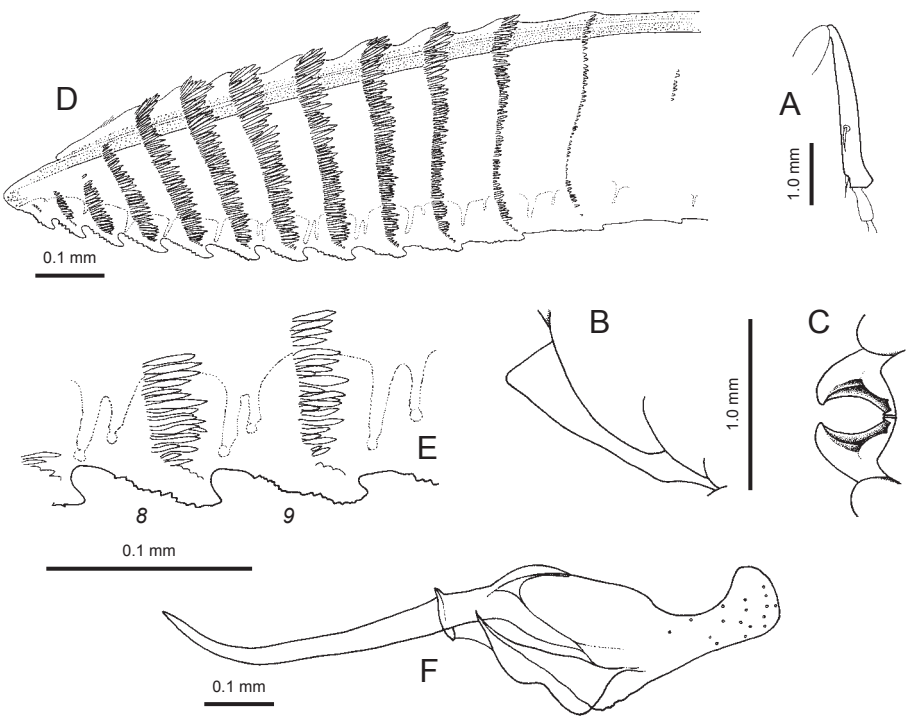

Fig. 51. A-F. *Arge bensoni*: **A**. Hind tibia. **B**. Sawsheath (lateral aspect). **C**. Sawsheath (dorsal aspect). **D**. Lancet. **E**. Serrulae 8-9. **F**. Penis valve (left, lateral aspect).

shiny; pubescence similar to that on head. Abdomen with tergum1 irregularly transversely microsculptured, shiny, following terga smooth and shiny. Sawsheath: Figs 51B, C. Lancet with about 13 serrulae (Figs 51D, E).

Length: 8.0-8.6 mm.

Male

Head and antenna black; apical half of mandible light brown becoming reddish towards apex. Thorax black with following yellow; pronotum except for its medial part, postspiracular sclerite, tegula. Legs black; apex of fore femur fore tibia and fore tarsus yellow, mid tibia and tarsus brown. Abdomen yellow; tergum1 predominantly black, tergum 2-7 with smaller blackish medial spots.

Head slightly narrowed behind eyes. Antenna 2.2× as long as maximum head width; flagellum not enlarged towards apex, triangular in cross section, ventral carina more sharply compressed than in female. Supraclypeal area rugosely sculptured, dull; clypeus irregularly transversely sculptured, subshiny. Thorax rather densely micropunctate, shiny. Other features as for female. Genitalia: Fig. 51F.

Length: 6.7-8.0 mm.

Etymology

This species was named after the well-known Symphyta specialist Robert Bernard Benson (1904-1967), curator of Hymenoptera at The Natural History Museum [formerly British Museum (Natural History)], London, United Kingdom.

Distribution

Botswana, Namibia (Region: Caprivi, Kunene, Okavango, Otjozondjupa) (Fig. 170), Zimbabwe.

Host plant

Unknown.

Ecology and habitat

Based on environmental conditions at the collecting localities Shakawe (Botswana) and Caprivi Strip, Nhoma River, Northern Kalahari (Namibia) *A. bensoni* seems to prefer more moist and vegetation-rich habitats. The localities are located in the Thornbush Savanna Biome and Woodland Savanna Biome. The flight season is from December to March.

Remarks

The apically enlarged mid and hind tibia clearly distinguishes *A. bensoni* from all other species (Pasteels 1953a).

This species is especially variable in its colouration. Occasionally in females the dorsal margin of the mesopleura is marked with yellow. The extent of yellow colouration on the mesepimeron and metapleuron is variable. The blackish dorsal stripe varies in width. Sometimes in males the black medial spots on tergum 3/4 are nearly entirely absent.

Based on the shape of the hind tibia and the ratio of the length of hind basitarsus to hind tibia (about 1.0 : 4.5) *A. bensoni* could belong to the *A. mirabilipes* species group (Koch & Eardley 2011), but members of the *A. mirabilipes* group are distinguished by the shape of the sawsheath and serrulae.

Arge bisignata Konow, 1907

Arge bisignata Konow, 1907b: 308. ♀. Type locality: Natal [KwaZulu-Natal Province] (South Africa) (SDEI).

Arge tibiale [sic!] Pasteels, 1963: 558. ♀. Type locality: Middlefontein, near Nylstroom [Modimolle] (Limpopo Province), South Africa (BMNH).

Arge tibialis: Taeger *et al*. (2010: 141), correction of spelling.

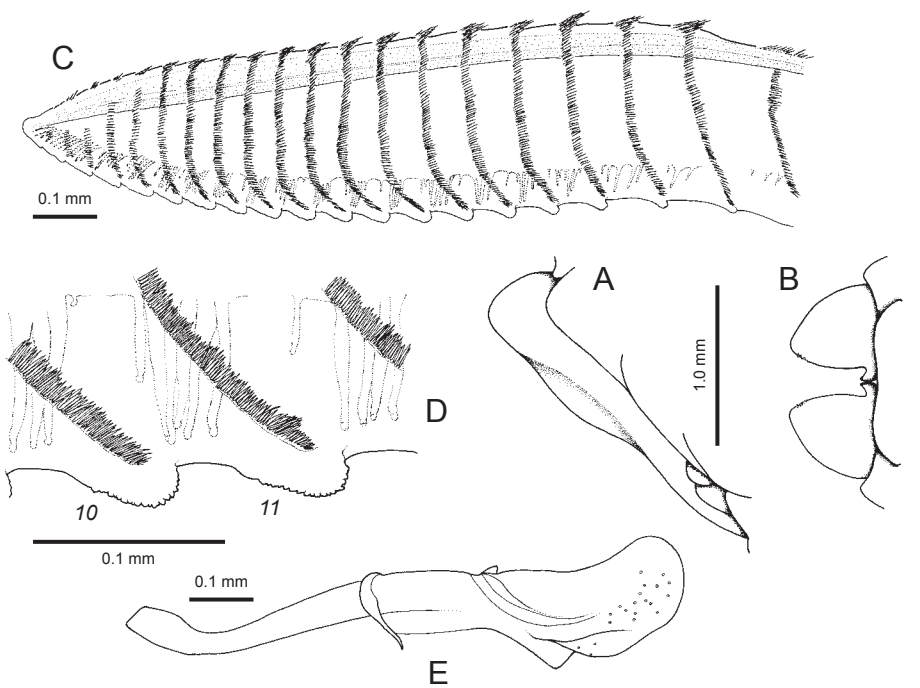

Fig. 52. A-E. *Arge bisignata*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 10-11. **E**. Penis valve (left, lateral aspect).

Female

Head black; mandible broadly yellow-ringed medially; antenna black, dorsal surface of scape brown. Thorax black; metanotum yellow. Legs yellow except for: fore coxa and trochanter as well as mid coxa and trochanter blackish, tarsi black, only fore basitarsomere yellowish with blackish apex. Wings sharply bicoloured, basal half slightly flavescent-hyaline and apical half fuscous; substigmal spot of fore wing indistinctly; stigma blackish with yellowish centre, costa, subcosta and basal half of venation yellow, rest of venation blackish. Abdomen yellow.

Head very slightly enlarged behind eyes. Antenna 1.3× as long as maximum head width; flagellum enlarged towards apex, and triangular in cross section, interior surface with compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes scarcely converging below. Anterior margin of clypeus shallowly emarginate, supraclypeal area flatly protruding up to start of interantennal carinae, interantennal carinae very obtusely ridged between antennae, converging downwards, very short, extending approximately to the ventral margin of toruli.

Vertex and gena scattered micropunctate, shiny; frons, supraclypeal area and clypeus densely punctate, subshiny; pubescence whitish. Micropunctures and pubescence of mesoscutum similar to that on vertex, shiny. Abdomen smooth and shiny. Sawsheath: Figs 52A, B. Lancet with about 19 serrulae (Figs 52C, D).

Length: 9.7-11.7 mm.

Male (Figs 53A, B)

Colouration similar to that of female. Scape and pedicel brown; fore and mid coxa only blackish at base, basitarsomeres entirely yellow. Tergum 8 with two blackish medial spots.

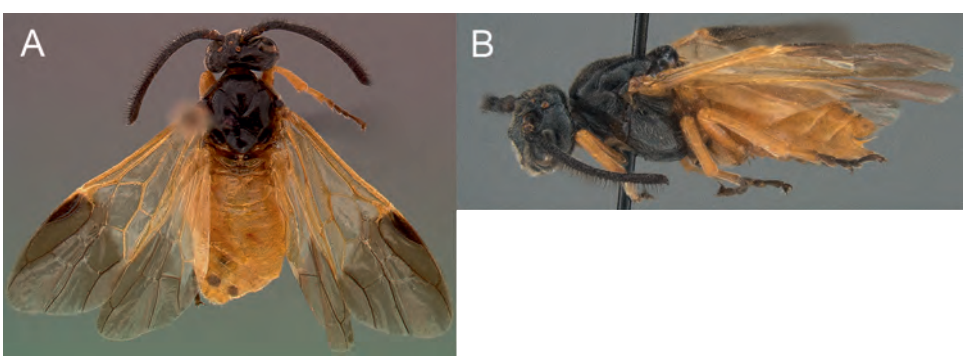

Fig. 53. A-B. *Arge bisignata*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Head scarcely enlarged behind eyes. Antenna 1.8× as long as maximum head width; flagellum not enlarged towards apex, triangular in cross section, ventral surface with conspicuously compressed longitudinal carina, the other longitudinal carinae weaker. Eyes scarcely converging below. Other features as for female. Genitalia: Fig. 53E.

Length: 7.2-8.8 mm.

Etymology

Derived from Latin; *bi* (two) and *signatus* (marked), with reference to two black medial spots on terga 7,8.

Distribution

Mozambique, Namibia (Caprivi Region) (Fig. 170), South Africa (Province: Limpopo, Mpumalanga, KwaZulu-Natal), Zambia, Zimbabwe; detailed distribution is presented by Koch & Eardley (2011).

Host plant

Unknown.

Ecology and habitat

Based on the sampling localities in the Caprivi Strip (Namibia), *A. bisignata* seems to prefer more moist and vegetation-rich habitats. All localities belong to the Woodland Savanna Biome. The flight season is from November to March.

Remarks

Variability of *A. bisignata* is apparent in the pattern of colouration. According to Konow (1907b) the presence of the above mentioned two black medial spots on terga 7,8 is confirmed only in the holotype. Mostly the abdomen is entirely yellow, or in some specimens only tergum 8 is marked with two medial spots.

In old material, the bicolouration of the wings is somewhat faded and thus lacks contrast.

Arge capensis (Klug), 1814

Hylotoma capensis Klug, 1814: 297. ♂. Type locality: Pr. b. sp. [Promontorium Bonae Spei] [Cape of Good Hope], Capland (Western Cape Province, South Africa) (MFN).

Female (Figs 54A, B)

Head black with very slight blue metallic lustre; apical half of mandible reddish to dark reddish apically; antenna black. Thorax orange with following black:

propleuron, a very narrow antero-lateral margin of pronotum, a small patch in apical half of median lobe of mesoscutum adjacent to lateral lobe and mesoscutellum, a small spot on centre of mesoscutellum, metascutellum, the posterior margin of katepimeron and metapleuron. Legs black. Wings slightly infuscate throughout; fore wing with a small smoky substigmal spot; intercostal area somewhat darker, stigma, costa, subcosta and venation black. Abdomen black with blue metallic lustre; terga 8-10 and sawsheath orange.

Head slightly enlarged behind eyes. Antenna 1.4× as long as maximum head width; flagellum slightly enlarged towards apex, and quadrangular in cross section, ventral surface with conspicuously compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes converging below. Anterior margin of clypeus shallowly circularly emarginate, supraclypeal area flatly rising up to start of interantennal carinae, interantennal carinae moderately ridged between antennae, converging downwards, short, extending about one third way to clypeus.

Vertex and gena moderately densely micropunctate, shiny; frons, supraclypeal area and clypeus somewhat more densely punctate, shiny; pubescence brown. Mesoscutum nearly impunctate, shiny; pubescence yellowish. Abdomen irregularly transversely microsculptured, shiny. Sawsheath: Figs 55A, B. Lancet with about 15 serrulae (Figs 55C, D).

Length: 6.8-7.8 mm.

Male

Colouration similar to that of female. Third antennomere dark brown. Thorax black with following orange: pronotum except for its narrow antero-lateral margin, postspiracular sclerite, lateral lobe of mesoscutum except for its posterior downturned portion, tegula. Abdomen black with blue metallic lustre; tergum 8 and sterna 7-9 orange.

Fig. 54. A-B. *Arge capensis*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Head scarcely enlarged behind eyes. Antenna 1.8× as long as maximum head width; flagellum not enlarged towards apex, triangular in cross section, ventral surface with conspicuously compressed longitudinal carina, the other longitudinal carinae weaker. Other features as for female. Genitalia: Fig. 55E.

Length: 7.0 mm.

Etymology

This species is named after its collection locality, the Cape of Good Hope.

Distribution

South Africa (Fig. 171) (Western Cape Province).

Host plant

According to Pasteels (1953) “ex larvae on foliage on cultivated *Geranium* (Geraniaceae) and causing extensive damage”; but see comments under *Arge cochraneae*. Some females were observed on *Euphorbia* plants (Euphorbiaceae) in Langebaan (Western Cape Province).

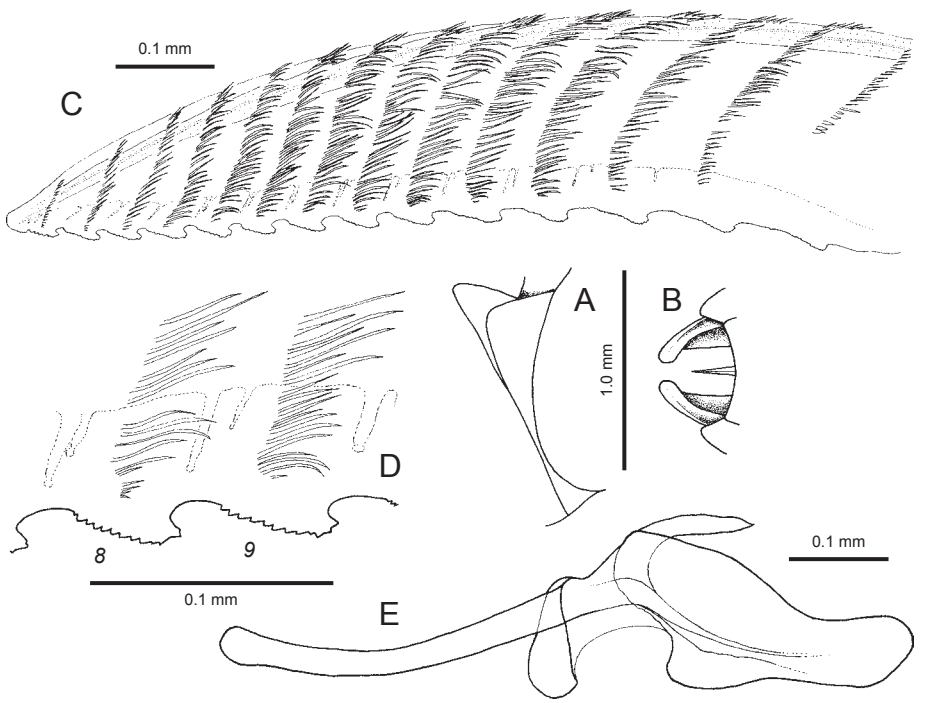

Fig. 55. A-E. *Arge capensis*: **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 8-9. **E**. Penis valve (left, lateral aspect).

Ecology and habitat

The habitats belong to the Succulent Karoo Biome and the Fynbos Biome (West Coast Strandveld vegetation type (Fig. 56) and Sand Plain Fynbos vegetation type) in the winter rainfall zone. The flight season appears to be from May to October.

Remarks

Variability of *A. capensis* is apparent in the pattern of colouration. Sometimes the black medial patch on the median lobe of the mesoscutum is extended to a broad longitudinal stripe. The same holds for the black spot situated in the centre of mesoscutellum, in which case the posterior margin of mesoscutellum is also black. Furthermore the mesosternum and the ventral part of mesopleuron as well as the complete katepimeron can be black. In one female the medial lobe of the mesoscutum is nearly entirely black, and the orange colouration of the mesopleuron is reduced to a large antero-dorsal patch.

The similarly coloured *A. namaensis*, only known from males, differs from *A. capensis* in the entirely black mesoscutum and in the shape of the penis valve (Figs 84C, D). The differential diagnosis to the similarly coloured *A. rufocyanea* is presented under that species.

Fig. 56. The habitat of *Arge capensis* and *A. namaensis* (West Coast Strandveld) in the Koeberg Nature Reserve with view to the Table Mountain (Western Cape Province). (Photo by S. van Noort)

Arge cochraneae Koch & Goergen, 2010

Arge cochraneae Koch & Goergen, 2010: 20. ♀. Type locality: Fort Beaufort, Cape Province (Western Cape Province, South Africa) (SAMC).

Female (Fig. 57A, B)

Head black; apical half of mandible dark reddish apically; scape and pedicel black, flagellum dark brown. Thorax orange with the following black: propleuron except for two orange spots on posterior margin, a medial longitudinal stripe on median lobe of mesoscutum, ventral half of posterior downturned portion of lateral lobe, mesoscutellum, mesopleuron, mesosternum, katepimeron, metapleuron. Legs black. Wings slightly infuscate throughout; fore wing with a small smoky substigmal spot; intercostal area somewhat more infuscate, stigma, costa, subcosta, and rest of venation dark brown. Abdomen black with conspicuous blue metallic lustre and with following orange: narrow posterior margin of tergum 1, lateral parts of terga 2-4, narrow posterior margins and lateral parts of sterna 2,3, sternum 4 light brown laterally, terga 9,10 yellow, sawsheath yellow with blackish medio-lateral spot.

Head parallel-sided behind eyes. Antenna 1.4× as long as head maximum width; flagellum very slightly enlarged towards apex, more or less triangular in cross section, interior surface with moderately compressed longitudinal carina, other longitudinal carinae weakly compressed. Eyes converging below. Anterior margin of clypeus circularly emarginate medially, supraclypeal area roundly protruding up to base of interantennal carinae, interantennal carinae moderately ridged between antennae, slightly converging downwards, short, extending about a quarter way to clypeus.

Head moderately densely micropunctate, shiny; supraclypeal area and clypeus somewhat rugose, moderately shiny; pubescence white. Mesoscutum nearly impunctate, shiny; pubescence similar to that on head. Abdomen shiny; terga 1-5 with transverse microsculpture, following terga irregularly microsculptured. Sawsheath: Figs 58A, B. Lancet with about 15 serrulae (Figs 58C, D).

Fig. 57. A-B. *Arge cochraneae*, habitus, female (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Length: 7.0 -8.2 mm.

Male

Unknown.

Etymology

This species was named after Margie A. Cochrane, the former collection manager of the Department of Entomology, Iziko South African Museum, Cape Town, South Africa.

Distribution

South Africa (Western Cape Province) (Fig. 175).

Host plant

Pelargonium spp. In South African collections three females were found with the following indication: “Ex larvae on foliage of cultivated *Geranium*, and causing extensive damage” or “Ex larvae *Geranium* foliage”. The same note is given by Pasteels (1953a: 79) for the biology of *Arge capensis* (Klug, 1814). Probably, the mentioned *Geranium* refers to *Pelargonium graveolens* L’Héritier de Brutelle, which is cultivated in the Cape Region, and used for the distillation of the so-called rose oil.

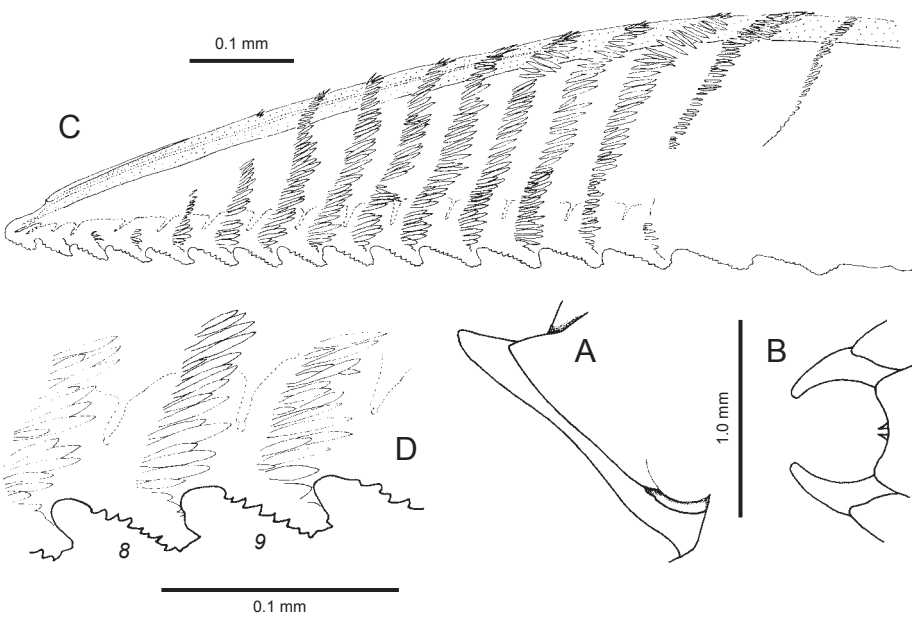

Fig. 58. A-D. *Arge cochraneae*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D** Serrulae 8-9.

Ecology and habitat

The habitat belongs to the Coastal Fynbos vegetation type of the winter rainfall zone. The flight season is not well known; only a few adults have been collected in December and January.

Remarks

Arge cochraneae belongs to the *A. capensis* species group (Koch & Liston 2012a).

Variability of *A. cochraneae* is apparent in the pattern of colouration. In one paratype the orange markings of the abdomen are missing. In the other paratypes the orange colour of the sterna is more or less reduced. The black medial longitudinal stripe on the median lobe of mesoscutum may be more extended, so that the median lobe appears almost entirely black.

Arge cochraneae differs from *A. whiteheadi* in the entirely black mesopleuron and the yellow terga 9,10 including sawsheath. One female was investigated by R.B. Benson in 1951 and labelled as "*A. capensis* (?)". Probably, this specimen was examined by J. Pasteels when he wrote his comments on host plants of *A. capensis* (Pasteels 1953a: 79).

Arge capensis is distinguished by the almost entirely orange mesoscutum, mesopleuron and mesosternum. In addition, the species is clearly distinct in the shape of lancets (Figs 55C, D, 58C, D).

Arge deckerti Koch, 2005

Arge deckerti Koch, 2005c: 194. ♀. Type locality: Otjiamongombe [Erichsfelde], Okahandja, Namibia (NNIC).

Female (cover photograph)

Head and antenna black; base of mandible yellow, apical half reddish becoming dark reddish to blackish towards apex. Thorax yellow; mesoscutum except for narrow lateral margin of median lobe and lateral lobe black, mesoscutellum, metascutellum, narrow ventral part of mesopleuron and mesosternum black. Legs yellow; apical tarsomere of fore leg and tarsus of middle leg blackish, apex of hind tibia and hind tarsus black. Wings slightly flavescent-hyaline with apical half very slightly infuscate; fore wing with a small smoky substigmal spot; intercostal area of fore wing flavescent-hyaline, stigma and venation in apical half blackish, costa and subcosta entirely yellow, venation in basal half more or less yellowish. Abdomen yellow; two medial spots on terga 1,2 and one medial spot on terga 3,5-7 blackish.

Head parallel behind eyes. Antenna 1.6× as long as maximum head width; flagellum slightly enlarged towards apex, and slightly quadrangular in cross section, ventral surface with conspicuously compressed longitudinal carina, the other longitudinal carinae weaker. Eyes very slightly converging below. Anterior margin of clypeus

shallowly, circularly emarginate medially, supraclypeal area rounded up to base of interantennal carinae, interantennal carinae ridged between antennae, converging downwards, extending about half way to clypeus.

Vertex and gena scattered micropunctate, shiny; frons and clypeus with scattered, shallow punctures, shiny; supraclypeal area densely punctate and subshiny; pubescence whitish. Mesoscutum very sparsely micropunctate, shiny; pubescence similar to that on head. Abdomen irregularly microsculptured, shiny. Sawsheath: Fig. 59A. Lancet with about 17 serrulae (Figs 59B, C).

Length: 6.0-7.5 mm.

Male (Fig. 60)

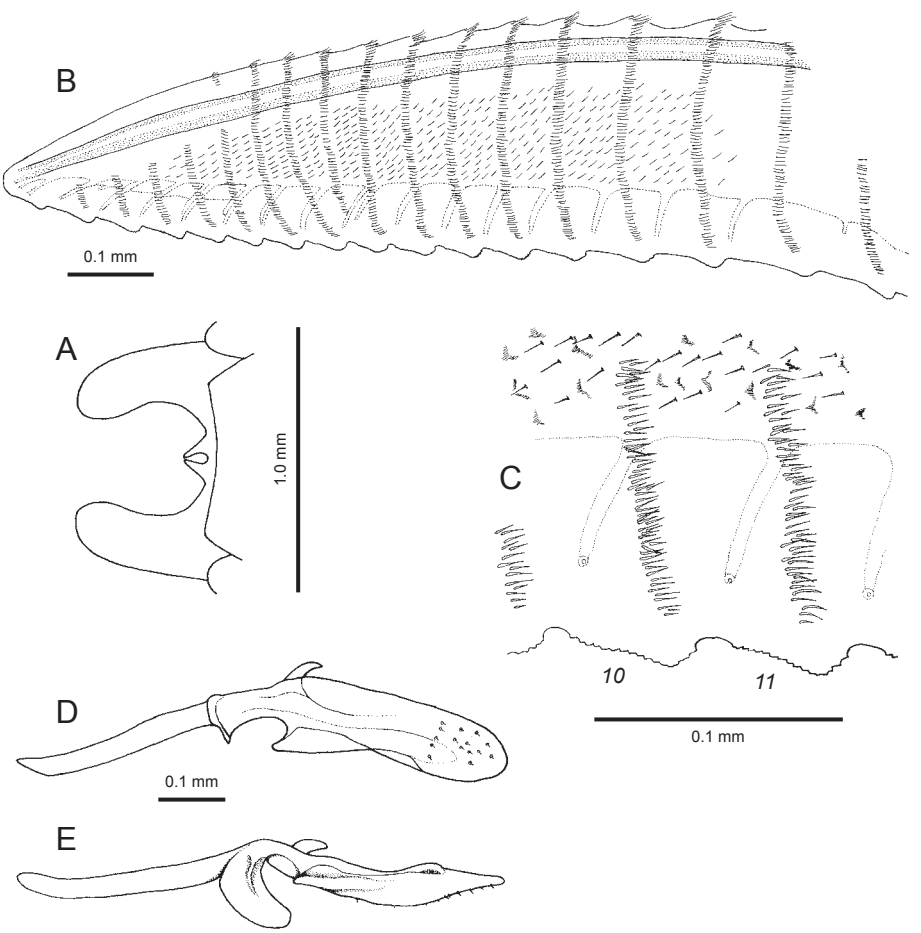

Fig. 59. A-E. *Arge deckerti*. **A**. Sawsheath (dorsal aspect). **B**. Lancet. **C**. Serrulae 10-11. **D**. Penis valve (left, lateral aspect). **E**. Penis valve (left, dorsal aspect).

Fig. 60. *Arge deckerti*, habitus, male. alive. (Photo by J. Deckert)

Head and antenna black; apical half of mandible yellow becoming dark reddish apically. Thorax black; pronotum yellow with black medial marking, tegula and lateral lobe of mesoscutum laterally narrowly dirty yellow. Legs yellow with coxae, trochanters and base of femora broadly black, apex of hind tibia and hind tarsus blackish. Abdomen yellow; terga 1,2,5-7 broadly and terga 3,4 narrowly black medially.

Fig. 61. The habitat of *Arge deckerti* on the Farm “Erichsfelde”, near Okahandja, Namibia (Thornbush Savanna Biome) with yellow flowering *Nidorella resedifolia* (Asteraceae) in the foreground and *Acacia mellifera* trees (Mimosoideae) in the background. (Photo by J. Deckert)

Head slightly narrowed behind eyes. Antenna 2.2× as long as maximum head width; flagellum not enlarged towards apex, ventral carina more sharply compressed than in female. Other features as for female. Genitalia: Figs 59D, E.

Length: 5.5-7.0 mm.

Etymology

This species was named after Dr. Jürgen Deckert, entomologist at the Museum für Naturkunde, Berlin, Germany.

Distribution

Botswana, Ethiopia, Kenya, Namibia (Region: Kunene, Otjozondjupa) (Fig. 172), South Africa (Province: KwaZulu-Natal, Limpopo, Mpumalanga), Tanzania, Zambia, Zimbabwe; detailed distribution is presented by Koch (2005c) .

Host plant

Unknown.

Ecology and habitat

In Otjiamongombe (Namibia), adults were found feeding on pollen of *Nidorella resedifolia* (Asteraceae) (Fig. 61) and *Chyphostemma congestum* (Vitaceae) (cover photo, Fig. 60). In Ndumu Game Reserve in the South African province KwaZulu-Natal males were observed feeding on pollen in the flowers of *Nidorella auriculata*. (Asteraceae). The Namibian habitats are located in the Thornbush Savanna Biome. The flight season in Namibia is from January to March.

Remarks

Arge deckerti is very similar to *A. stuhlmanni* but *A. deckerti* differs mostly by the entirely yellow costa of fore wing. The lancet of *A. deckerti* is uniformly covered with sensilla (Fig. 59B), which are absent in *A. stuhlmanni* (Fig. 59B), and the serrulae are flatter (Figs 59B, C). In lateral aspect, the penis valve of *A. stuhlmanni* is distinctly broader than in *A. deckerti* (Figs 59D, 94D).

The colour pattern is especially variable. In females, the black markings on the abdomen may be reduced to very small median spots on terga 1,6,7, and the lateral lobes of the mesoscutum may have two yellow medial stripes. In males, the black on tergum1 is either reduced to very small median spots or is more extended laterally, and the upper surface of the abdomen may be almost entirely black except for terga 8,9. Sometimes the black on the femora extends from the base almost to the apex, the hind tibia may be entirely yellow, and the hind tarsus only slightly blackish.

Arge deckerti and *A. stuhlmanni* often live in the same habitat and the adults are active at the same time of year.

Arge dirce (W.F. Kirby, 1882)

Hylotoma dirce W.F. Kirby, 1882: 74. ♀. Type locality: Lake Ngami (Botswana) (BMNH).

Female (Figs 62A, B)

Head and antenna black; apical half of mandible dark reddish apically. Thorax black with the following yellow: pronotum except for narrow anterior margin, postspiracular sclerite, tegula, narrow lateral margin of median and lateral lobe of mesoscutum, a small antero-dorsal spot on mesopleuron adjacent to postspiracular sclerite. Legs black, especially hind legs with very slight blue metallic lustre. Wings infuscate; fore wing with a small smoky substigmal spot; intercostal area conspicuously darker, costa light brown becoming blackish towards stigma; stigma, subcosta and rest of venation blackish. Dorsal surface of abdomen black with blue metallic lustre; terga 1-6 yellow laterally, ventral surface of abdomen yellow, sternum 7 blackish, sawsheath black with slight blue metallic lustre.

Head slightly enlarged behind eyes. Antenna 1.3× as long as maximum head width; flagellum conspicuously enlarged towards apex, quadrangular in cross section, interior surface with moderately compressed longitudinal carina, other longitudinal carinae weakly compressed. Eyes slightly converging below. Anterior margin of

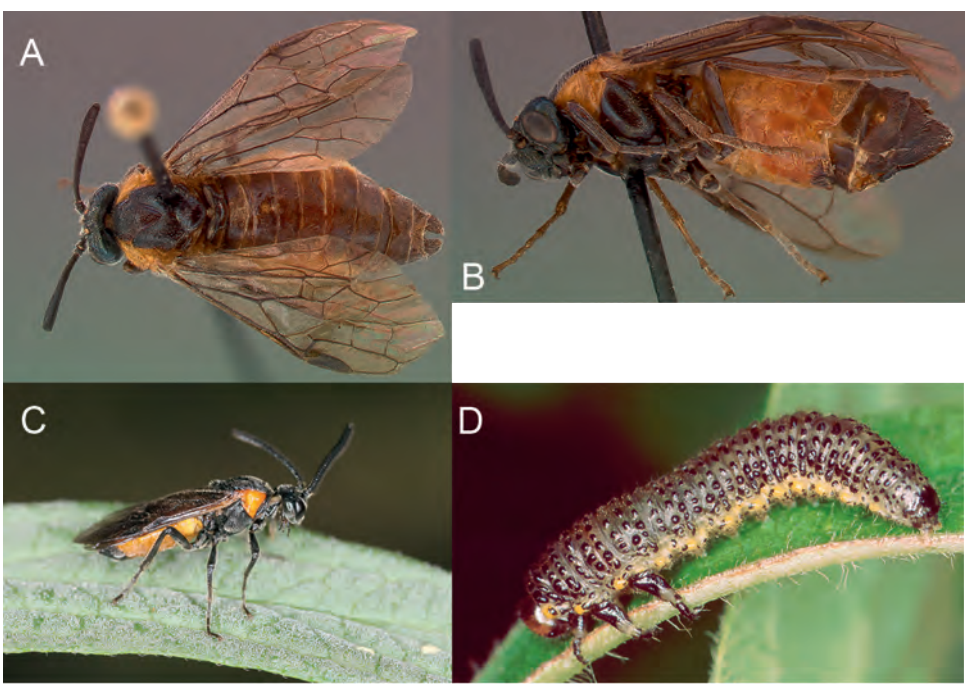

Fig. 62. A-D. *Arge dirce*, habitus. **A**. Female (dorsal aspect). **B**. Female (lateral aspect). **C**. Male, alive. **D**. Larva on *Diospyros lycioides* (Ebenaceae). (Photos C–D by J. Deckert, A–B by A.D. Liston)

clypeus circularly emarginate medially, supraclypeal area roundly protruding up to base of interantennal carinae, interantennal carinae obtusely ridged between antennae, converging downwards, short, extending about a quarter of distance to clypeus.

Vertex and gena moderately densely micropunctate, shiny; frons, supraclypeal area and clypeus densely punctate, moderately shiny; pubescence white. Mesoscutum moderately densely punctate, shiny; pubescence similar to that on head. Abdomen irregularly transversely microsculptured, shiny. Sawsheath: Figs 63A, B. Lancet with about 25 serrulae (Figs 63C, D).

Length: 8.5-10.2 mm.

Male (Fig. 62C)

Colouration similar to that of female. Wings slightly infuscate, substigmal spot of fore wing more weakly developed than in female; intercostal area scarcely darker,

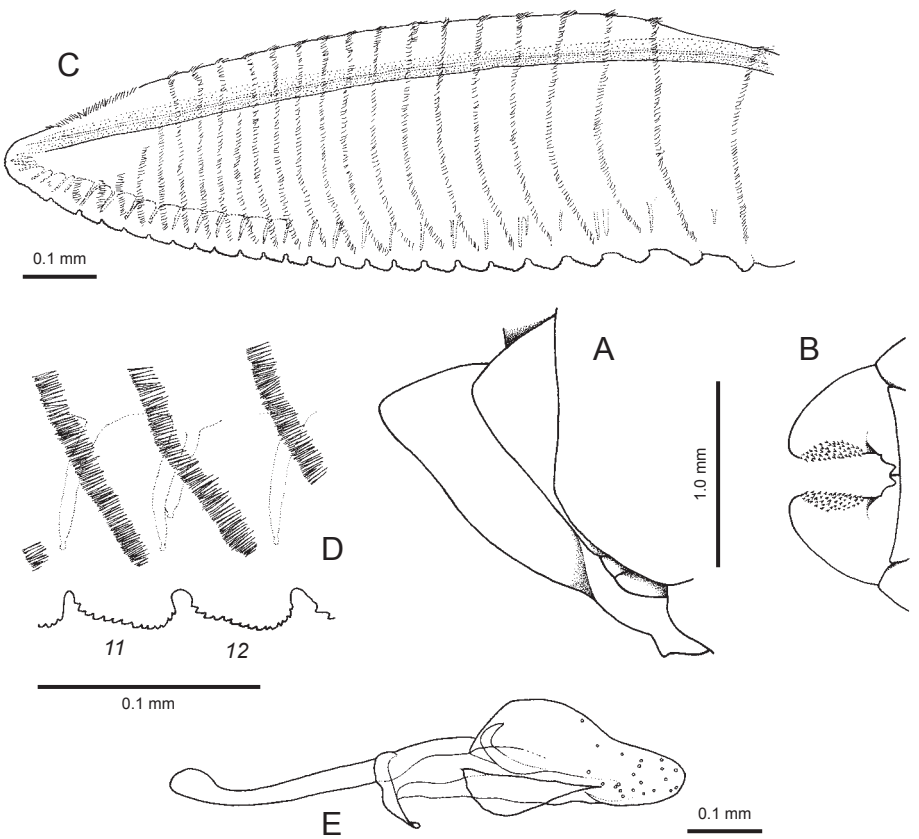

Fig. 63. A-E. *Arge dirce*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 11-12. **E**. Penis valve (left, lateral aspect).

costa dirty whitish with blackish apex adjacent to light brown, subcosta pale, dark brown. Dorsal surface of abdomen more or less blackish striped with slight blue metallic lustre, tergum 9 entirely black, ventral surface of abdomen yellow, sternum 9 black with blue metallic lustre.

Head parallel behind eyes. Antenna 2.4× as long as maximum head width; flagellum not enlarged towards apex, triangular in cross section, interior surface with conspicuously compressed longitudinal carina, the other longitudinal carinae weaker. Other features as for female. Genitalia: Fig. 63E.

Length: 6.8-8.2 mm.

Etymology

Dirce (Ancient Greek: Δίρκη, pronounced *Dirke*, modern Greek pronunciation *Dirki*, meaning “double” or “cleft”) was the wife of Lycus in Greek mythology.

Distribution

Botswana, Namibia (Region: Caprivi, Okavango) (Fig. 171), Zimbabwe.

Host plant

In Rhodes Inyanga Nature Reserve (Eastern Highlands, Zimbabwe) larvae (Fig. 62D) were found feeding on leafs of the shrubby tree *Diospyros lycioides* Desfontaines (bluebush, red star-apple) (Ebenaceae).

Ecology and habitat

The habitats of this species are located in the Woodland Savanna Biome. It seems that the Caprivi Strip is a suitable area for this species. Trees and shrubs of the riverine vegetation (Fig. 23) appear to be the preferred habitat. The flight season is from January to March.

Remarks

Arge dirce belongs to the *A. sugillata* species group (Pasteels 1953a).

Variability affects the colouration, especially of the ventral surface of abdomen. In females the colour of the sterna varies from black with broad yellow lateral and narrow posterior margins, to predominantly yellow with only the distal sterna and the sawsheath black. The black colouration of the distal sterna of the male can also be more extensive. Furthermore, in males sometimes tergum 2 is entirely yellow. The development of the blue metallic lustre is variable: it may be extensive or conspicuously reduced. The colouration of stigma, costa and subcosta also varies from pale to blackish, especially in males.

Sometimes the interspaces between punctures of the head are very finely microsculptured and the surfaces especially of the supraclypeal area, clypeus and frons are dull.

Arge elandsbayensis Koch & Goergen, 2010

Arge elandsbayensis Koch & Goergen, 2010: 22. ♀. Type locality: Leipoldtville, Eland's Bay (Western Cape Province, South Africa) (SAMC).

Female (Figs 64A, B)

Head black; apical half of mandible reddish to somewhat darker apically; scape and pedicel black, flagellum dark brown. Thorax black. Legs black; tibiae and tarsi dark brown, basal quarter of hind tibia pale. Wings slightly infuscate; substigmal spot of fore wing obscurely; intercostal area infuscate, stigma brown, costa, subcosta, and rest of venation brown, somewhat paler at base. Abdomen black with very slight blue metallic lustre; posterior margin of tergum 2, terga 3,4 orange with dark brown medially, sterna 3,4 orange.

Head scarcely narrowed behind eyes. Antenna 1.6× as long as maximum head width; flagellum scarcely enlarged towards apex, slightly quadrangular in cross section, interior surface with moderately compressed longitudinal carina, other longitudinal carinae weakly compressed. Eyes slightly converging below. Anterior margin of clypeus shallowly circularly emarginate medially, supraclypeal area nearly flatly rising up to the base of interantennal carinae, interantennal carinae moderately sharply ridged between antennae, conspicuously converging downwards, extending about one third of distance to clypeus.

Vertex and gena moderately densely micropunctate, shiny; frons, supraclypeal area and clypeus more densely punctate with larger punctures, shiny; pubescence white. Mesoscutum sparsely micropunctate, shiny; pubescence similar to that of head. Abdomen shiny; terga 1-5 transversely microsculptured, following terga irregularly micropunctate. Sawsheath: Figs 65A, B. Lancet with about 11 serrulae (Figs 65C, D).

Fig. 64. A-B. *Arge elandsbayensis*, habitus, female (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston).

Length: 6.3-7.0 mm.

Male

Unknown.

Etymology

This species is named after its type locality Eland's Bay on the Atlantic Ocean, in the neighbourhood of Leipoldtville (Western Cape Province).

Distribution

South Africa (Western Cape Province) (Fig. 175).

Host plant

Unknown.

Ecology and habitat

The habitats are located in the Sand Plain Fynbos vegetation type (Fynbos Biome) of the winter rainfall area. The flight season is not well known. Very few adults have been collected from September to October.

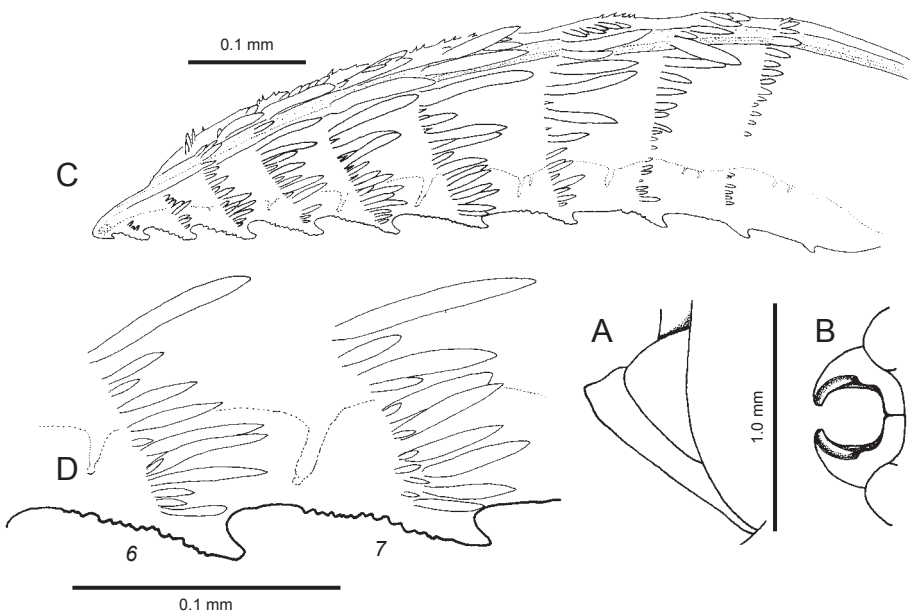

Fig. 65. A-D. *Arge elandsbayensis*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 6-7.

Remarks

Arge elandsbayensis belongs to the *A. capensis* species group (Koch & Liston 2012a).

Variability is visible in the colouration of the abdomen. Terga 3-5 can be entirely yellowish brown; also terga 6-8 can be broadly yellowish brown laterally. Additionally, the blue metallic lustre is more or less conspicuously visible.

With its yellowish-brown coloured zone on the abdomen, *A. elandsbayensis* could be confused with *Arge zona* (Enslin, 1911), but the pronotum and the mesoscutum of *A. zona* are nearly entirely orange. Furthermore, in *A. zona* terga 3-5 are entirely and terga 8-10 are medially broadly yellowish coloured.

Arge zona is also a member of the *A. capensis* species group (Koch & Liston 2012a), however *A. zona* is known from Eastern Cape Province, and does not occur in the area here discussed.

***Arge furvipes* Konow, 1907**

Arge furvipes Konow, 1907b: 308. ♂♀. Type locality: Caput b. sp. [Caput Bonae Spei] (Cape of Good Hope, Western Cape Province, South Africa) (SDEI).

Hylotoma pallidiventris Enslin, 1911: 661. ♂. Type locality: Oudtshorn, Kapland (Western Cape Province, South Africa) (TMSA).

Hylotoma sternalis Enslin, 1911: 659. ♀. Type locality: Oudtshorn, Kapland (Western Cape Province, South Africa) (TMSA).

Female

Head and antenna black: apical half of mandible reddish to somewhat darker apically. Thorax black with the following yellow: propleuron, pronotum, postspiracular sclerite, narrow lateral margin of lateral lobe of mesoscutum, tegula, dorsal half of mesopleuron, anepimeron, posterior margin of katepimeron and metapleuron. Legs yellow with following black; coxae, trochanters, base of fore femur, mid and hind femur except for broad apices, apex of mid tibia, apical quarter of hind tibia, tarsomeres black-ringed apically. Wings slightly flavescent-hyaline throughout; fore wing with small infuscate substigmal spot; intercostal area yellow, stigma brown, costa and subcosta yellow becoming brown to blackish at extreme apex adjacent to stigma, rest of venation yellow to light brown in apical half.

Abdomen yellow; tergum1 with two blackish medial spots, terga 6,7 with small black medial spot, sawsheath with black apex.

Head parallel-sided behind eyes. Antenna 1.5× as long as maximum head width; flagellum slightly enlarged towards apex, quadrangular in cross section, ventral surface with moderately compressed longitudinal carina, other longitudinal carinae

weakly compressed. Eyes slightly converging below. Anterior margin of clypeus conspicuously circularly emarginated medially, supraclypeal area rounded up to the base of interantennal carinae, interantennal carinae sharply ridged between antennae, slightly converging downwards, extending about nearly half way to clypeus.

Vertex and gena nearly impunctate, shiny; frons, supraclypeal area and clypeus moderately densely punctate, shiny; pubescence light yellow. Mesoscutum smooth and shiny; pubescence similar to that on head. Abdomen shiny; terga 1-5 nearly smooth. Sawsheath: Figs 66A, B. Lancet with about 14 serrulae (Figs 66C, B).

Length: 7.2-8.3 mm.

Male (Figs 67A, B)

Colouration somewhat different to that of female. Flagellum dark brown. On thorax only pronotum except for its ventral angle, postspiracular sclerite and tegula yellow. Legs yellow; fore femur black with yellow apex, mid and hind femur black with narrow yellow apically. Abdomen yellow with tergum 1 black, tergum 2 broadly black medially, tergum 3 with small black medial spot, terga 4-7 with black markings continuously broadened towards apex, sternum 2 blackish.

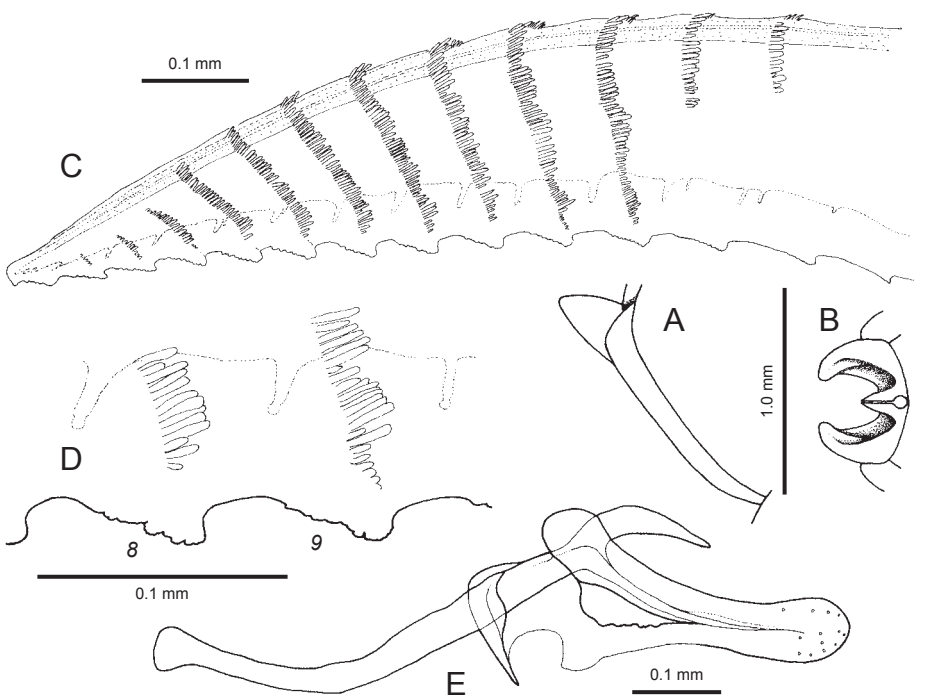

Fig. 66. A-E. *Arge furvipes*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 8-9. **E**. Penis valve (left, lateral aspect).

Antenna 2.1× as long as maximum head width; flagellum not enlarged towards apex, flattened apically, triangular in cross section, interior surface with conspicuously compressed longitudinal carina, the other longitudinal carinae weaker.

Other features as for female. Genitalia: Fig. 66E.

Length: 6.8-8.2 mm.

Etymology

From Latin; *furvus* (deep black), *pes* (feet).

Distribution

South Africa (Western Cape Province) (Fig. 174).

Host plants

Unknown.

Ecology and habitat

The habitats of *A. furvipes* are located in the Coastal Fynbos of the winter rainfall zone. The flight season is not well known. A few adults have been collected from November to March.

Remarks

Variability is apparent in the pattern of colouration. In females terga 1-8 may be more or less blackish marked medially. In males sometimes the dorsal surface of the abdomen is nearly entirely black, only narrowly yellow-margined laterally and tergum 8 yellow with blackish medial spot. Additionally, the yellow dorsal half of the mesopleuron may be more or less reduced to a large spot at the dorso-anterior margin, and the black colouration of femora may be more extensive.

Fig. 67. A-B. *Arge furvipes*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Arge hereroensis Koch & Goergen, 2010

Arge hereroensis Koch & Goergen, 2010: 29. ♀. Type locality: Witvlei, Namibia (NNIC).

Female (Figs 68A, B)

Head yellow, ocelli very narrowly margined with blackish; mandible with dark reddish apex; antenna dark brown with yellow scape. Thorax yellow with the following black: apical half of median lobe including median suture, lateral half and a small spot of lateral lobe adjacent to apex of median lobe of mesoscutum, mesoscutellum, metanotum, mesosternum. Legs yellow; apical spot on fore femur brown, mid and hind femur broadly blackish ringed apically, apex of mid tibia narrowly, hind tibia broadly blackish ringed, tarsomeres 4,5 of mid tarsus brown, tarsomeres 1-3 of hind tarsus broadly blackish ringed apically, tarsomeres 4,5 entirely black. Wings hyaline; fore wing with large flavescent-hyaline substigmal spot; intercostal area flavescent-hyaline, stigma brown, costa, subcosta and venation yellow. Abdomen yellow; terga 5-7 with blackish medial spot.

Head very slightly enlarged behind eyes. Antenna 1.7× as long as maximum head width; flagellum scarcely enlarged towards apex, slightly quadrangular in cross section, interior surface with moderately compressed longitudinal carina, other longitudinal carinae weakly compressed. Eyes scarcely converging below. Anterior margin of clypeus shallowly, triangularly emarginated medially, supraclypeal area flatly rounded up to the base of interantennal carinae, interantennal carinae sharply ridged between antennae, conspicuously converging downwards, very short and ending somewhat below the ventral margin of toruli.

Vertex and gena conspicuously punctate, frons except for the scarcely punctate interantennal area, supraclypeal area and clypeus rugosely sculptured, subshiny;

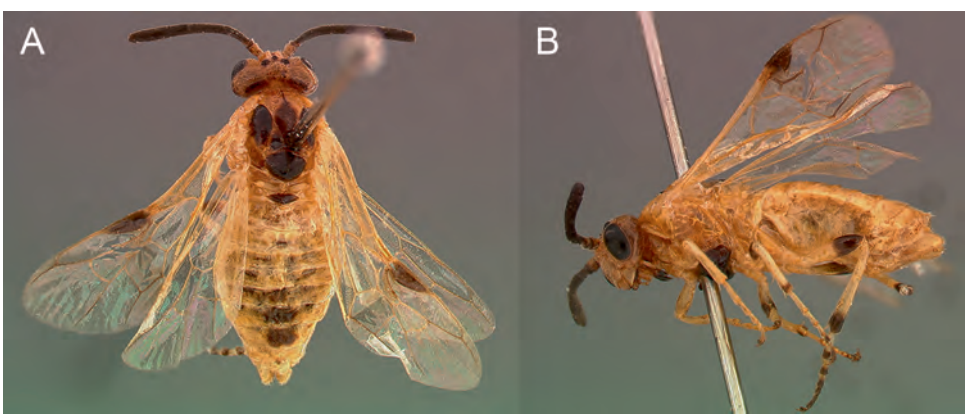

Fig. 68. A-B. *Arge hereroensis*, habitus, female (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

pubescence yellowish. Lateral lobes of mesoscutum nearly impunctate, shiny; median lobe shallowly, rugosely microsculptured; pubescence similar to that on head. Abdomen shiny; tergum1 with irregular transverse microsculpture, following terga smooth and shiny. Sawsheath: Figs 69A, B. Lancet with about 14 serrulae (Figs 69C, D).

Length: 8.7 mm.

Male

Unknown.

Etymology

This species is named after the Hereroland in Namibia, the landscape around Witvlei, the type locality.

Distribution

Namibia (Omaheke Region) (Fig. 172).

Host plant

Unknown.

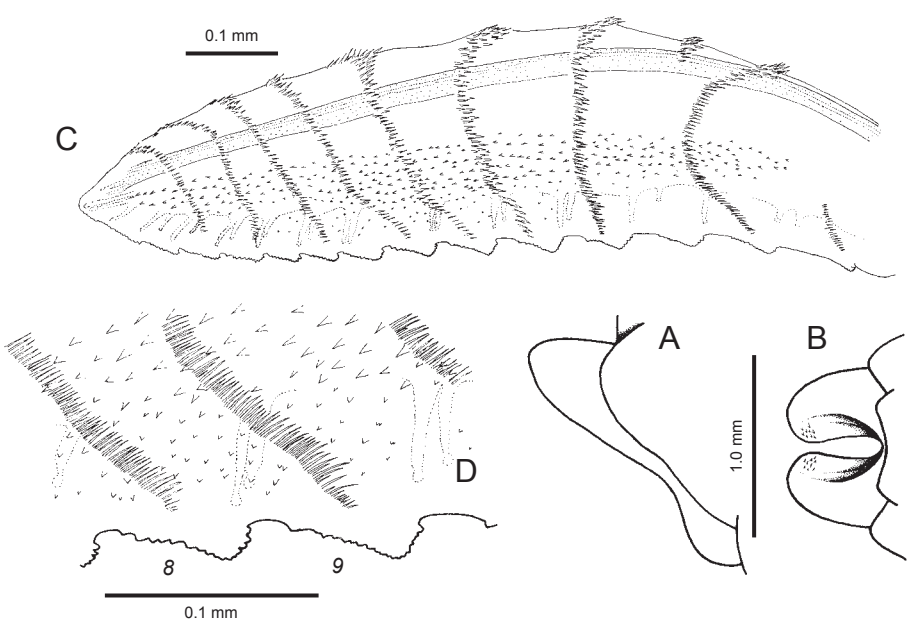

Fig. 69. A-D. *Arge hereroensis*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 8-9.

Ecology and habitat

The habitat of *A. hereroensis* is characterized by short, open grassland, and belongs to the Thornbush Savanna Biome. The flight season is not well known, with only one female collected in March.

Remarks

Arge hereroensis belongs to the *Arge aesculapii* species group (Pasteels 1953a, Koch & Goergen 2010).

In colouration this species is similar to *Arge meyi*, which is known from the Brandberg Massif in western Namibia. *Arge meyi* may be separated by a large black spot on vertex which comprises the postocellar and interocellar area including the margin of front ocellus, the black colour of the median lobe is more extensive, whereas the mesoscutellum is entirely yellow. The antenna of *A. meyi* is shorter (1.1× as maximum head width) and conspicuously enlarged towards the apex. *Arge meyi* differs mostly by the shape of lancet, with its much flattened serrulae, without distinct anterior subbasal teeth. Furthermore, the ventral half of the lancet of *A. hereroensis* is uniformly covered with thorn-like setae.

Arge iota Pasteels, 1953

Arge iota Pasteels, 1953a: 8, 37. ♂. Type locality: Gaberones [Gaborone], Bechualand [Bechuanaland, Botswana] (MNHN).

Male (Figs 70A, B)

Head black; apical half of mandible yellow becoming dark reddish apically; antenna dark brown. Thorax black; pronotum yellow with blackish irregular markings on margins, tegula yellow to blackish, katepimeron with narrow yellow posterior margin, metapleuron yellow with irregular blackish markings. Legs yellow except for following black: fore and mid coxa, hind coxa with black lateral spot at base,

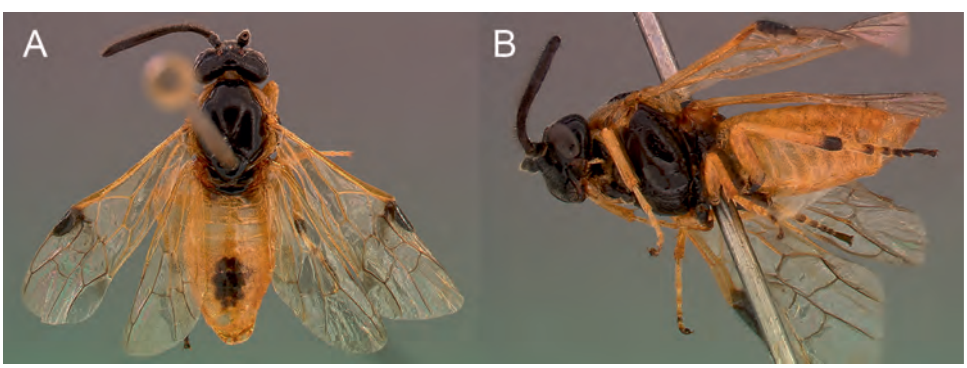

Fig. 70. A-B. *Arge iota*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

fore trochanter blackish, apex of hind tibia, tarsomere 4 of mid tarsus blackish, basitarsomere and tarsomere 2 of hind leg blackish ringed apically, tarsomeres 3-5 entirely black. Wings sharply bicoloured with flavescent-hyaline basal half and infuscate apical half; fore wing with small smoky substigmal spot; intercostal area flavescent, stigma black, costa, subcosta and basal half of venation yellow, rest of venation blackish. Abdomen yellow; tergum1 with two small blackish medial spots, terga 5-8 with black patches medially, various widths, all together resulting in a large medio-apical spot.

Head very slightly enlarged behind eyes. Antenna 1.5× as long as maximum head width; flagellum not enlarged towards apex, and quadrangular in cross section, interior surface with compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes very slightly converging below. Anterior margin of clypeus shallowly circularly emarginate, supraclypeal area flatly protruding up to start of interantennal carinae, interantennal carinae sharply ridged between antennae, converging downwards, extending about one third way to clypeus.

Vertex and gena moderately densely micropunctate, shiny; frons and clypeus densely punctate, subshiny, supraclypeal area rugosely sculptured, dull; pubescence whitish. Mesoscutum similarly micropunctate and pubescent like the vertex, shiny. Abdomen smooth and shiny. Genitalia: Fig. 71.

Length: 7.7-8.5 mm.

Female

Unknown.

Etymology

The name *iota* may be derived from either Greek or Latin, and refers to a letter of the alphabet in both languages. Possibly it refers to the shape of the black abdominal markings.

Distribution

Botswana, Namibia (Region: Khomas, Omaheke) (Fig. 171).

Host plant

Unknown.

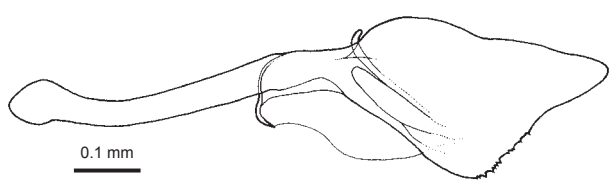

Fig. 71. *Arge iota*. Penis valve (left, lateral aspect).

Ecology and habitat

The species was collected in different habitats of the *Acacia* thornveld and in open grassland belonging to the Thornbush Savanna Biome. The flight season is not well known. Only males have been collected from February to March.

Remarks

Arge iota is very variable in colouration. The large abdominal patch is sometimes reduced to small medial spots on terga 6,7 and the blackish markings on tergum 1 are obscure. The black colouration of the legs may extend so that the coxae are entirely black, the femora predominantly blackish and the apex of mid tibia blackish. The mesepimeron and metapleuron may also be more or less black.

Arge krabbefonteinensis **Koch & Goergen, 2010**

Arge krabbefonteinensis Koch & Goergen, 2010: 30. ♂. Type locality: Krabbefontein (Western Cape Province, South Africa) (MFN).

Male (Figs 72A, B)

Head black; apical half of mandible reddish brown; flagellum dark brown. Thorax black with following yellow; pronotum, except for ventro-lateral angle and anterior margin, postspiracular sclerite, tegula, marking on the dorsal angle of mesopleuron. Legs black. Wings uniformly flavescent-hyaline; substigmal spot of fore wing obscure; costa yellow with apex light brown, subcosta and rest of venation light brown, stigma brown. Abdomen black with blue metallic lustre.

Head parallel behind eyes. Antenna 1.6× as long as maximum head width; flagellum not enlarged towards apex, triangular in cross section and slightly flattened at apex, ventral surface with conspicuously compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes very slightly

Fig. 72. A-B. *Arge krabbefonteinensis*, habitus, male (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

converging below. Anterior margin of clypeus conspicuously circularly emarginate medially, supraclypeal area nearly flatly rising up to base of interantennal carinae, interantennal carinae sharply ridged between antennae, slightly converging downwards, extending about a quarter of distance to clypeus.

Vertex moderately densely micropunctate, shiny, gena, frons and clypeus rather densely punctate, shiny, supraclypeal area very densely punctate, dull; pubescence whitish. Thorax nearly impunctate, shiny; pubescence similar to that on head. Abdomen shiny; terga1, 2 obscurely microsculptured, terga 3, 4 inconspicuously sculptured, following terga shallowly rugose. Genitalia: Figs 73A-C.

Length: 7.5 mm.

Female

Unknown.

Etymology

This species was named after its collection locality, Krabbefontein near Cape Town (Western Cape Province, South Africa).

Distribution

South Africa (Western Cape Province) (Fig. 172).

Host plant

Unknown.

Ecology and habitat

The habitat of *A. krabbefonteinensis* is located in the Coastal Fynbos of the winter rainfall zone. The flight season is not well known. Only one male has been collected in December.

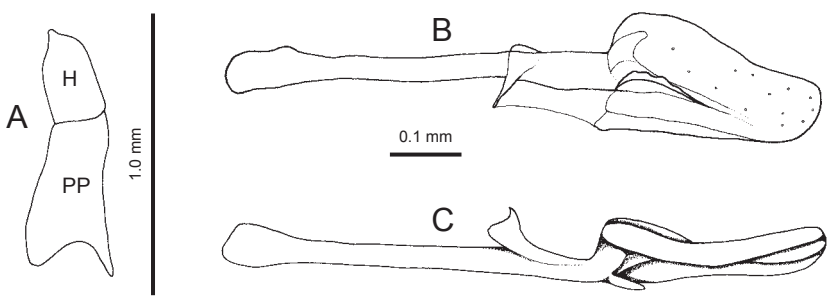

Fig. 73. A-C. *Arge krabbefonteinensis*. **A**. Harpe and parapenis (right, ventral aspect). **B**. Penis valve (left, lateral aspect). **C**. Penis valve (right, dorsal aspect).

Remarks

Arge krabbefonteinensis cannot be assigned to any of the species groups defined by Pasteels (1953a, 1963).

Its colouration comes close to *Arge namaensis*, which is known from the Succulent Karoo biome of Northern Cape Province. *Arge namaensis* is separated by the yellow apex of abdomen and in the conspicuously developed median hollow of tergum 8 (Fig. 84A).

Arge kungveldensis Koch & Eardley, 2011

Arge kungveldensis Koch & Eardley, 2011: 460. ♀. Type locality: Tsumkwe, Kungveld [Northern Kalahari] (Namibia) (TMSA).

Female (Fig. 74A, B)

Head and antenna black, postocellar area dirty yellow, frons and base of clypeus dark brown; labrum with light brown margin; apical half of mandible dark brown. Thorax black with pronotum except for its dark brown ventral part and centre yellow, tegula dark brown, mesoscutellum and metascutellum yellow. Legs dark brown. Wings conspicuously infuscate; substigmal spot of forewing moderately developed; intercostal area slightly darker, stigma blackish, costa brown, somewhat darker apically, subcosta and rest of venation blackish becoming brown apically. Abdomen yellow; terga 1-8 broadly black, tergum 9 black, sterna 6,7 brown with yellow posterior margin, sawsheath black, ventral margin and apex yellow.

Head enlarged behind eyes. Interior margins of eyes nearly parallel. Anterior margin of clypeus circularly emarginated medially, supraclypeal area flatly rounded up to start of interantennal carinae (Fig. 75A), interantennal carinae obtusely ridged

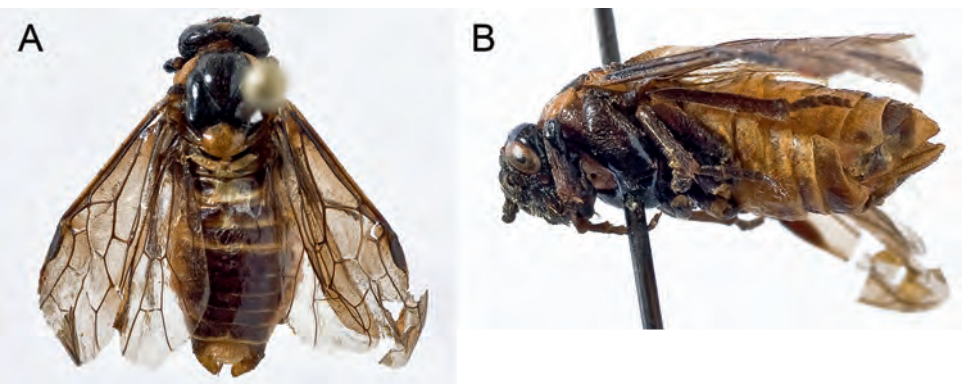

Fig. 74. A-B. *Arge kungveldensis*, habitus, female (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by G. Goergen)

between antennae, scarcely converging downwards, short, extending about a quarter of distance to clypeus.

Vertex and gena very sparsely micropunctate, shiny; frons, supraclypeal area and clypeus moderately densely punctate, shiny; pubescence whitish. Mesoscutum nearly impunctate, shiny; pubescence similar to that on head. Abdomen smooth and shiny; tergum1 transversely microridged. Sawsheath: Figs 75B, C. Lancet with about 22 serrulae (Figs 75D, E).

Length: 9.3 mm.

Male

Unknown.

Etymology

This species is named after its collection locality Kungveld, the former name of the Namibian Bushmanland [Northern Kalahari] in North-East Namibia.

Distribution

Namibia (Otjozondjuba Region) (Fig. 171).

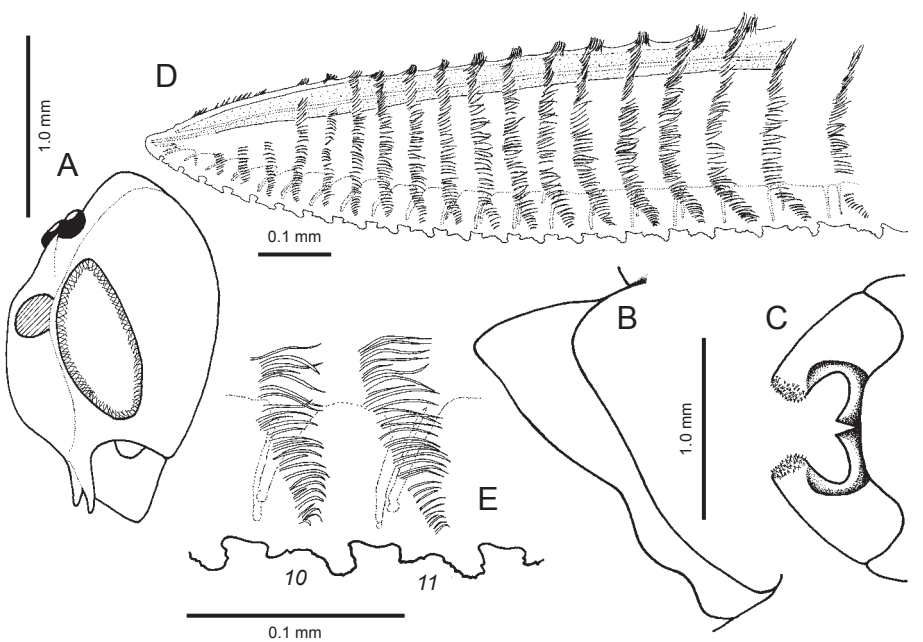

Fig. 75. A-E. *Arge kungveldensis*. **A**. Head (lateral aspect). **B** Sawsheath (lateral aspect). **C**. Sawsheath (dorsal aspect). **D**. Lancet (lateral aspect). **E**. Serrulae 10-11.

Host plant

Unknown.

Ecology and habitat

The so called Kungveld belongs to the Kalahari Desert as part of the Woodland Savanna Biome. Details of the preferred habitat are unknown. In recent years many collecting trips have taken place throughout Northern Kalahari, but no further specimens were found.

The flight season is not well known, the only known specimen was collected in January.

Remarks

Arge kungveldensis belongs to the *A. mirabilipes* species group (Pasteels 1963) revised by Koch & Eardley (2011). This species group includes also *A. mirabilipes* Pasteels, 1955b, *A. taitaensis* Koch & Eardley, 2011 and *A. gusenleitneri* Koch, 2012.

The species of the *A. mirabilipes* species group are characterized by the combination of a very short hind basitarsomere (a quarter of the tibia length), the slightly medially widened hind tibia (Fig. 74B), and the broad sawsheath that is obtusely pincer-shaped apically (Fig. 75C). Both flagella of the holotype are missing.

***Arge langebergensis* Koch & Goergen, 2010**

Arge langebergensis Koch & Goergen, 2010: 24. ♂♀. Type locality: Montagu (Western Cape Province, South Africa) (SAMC).

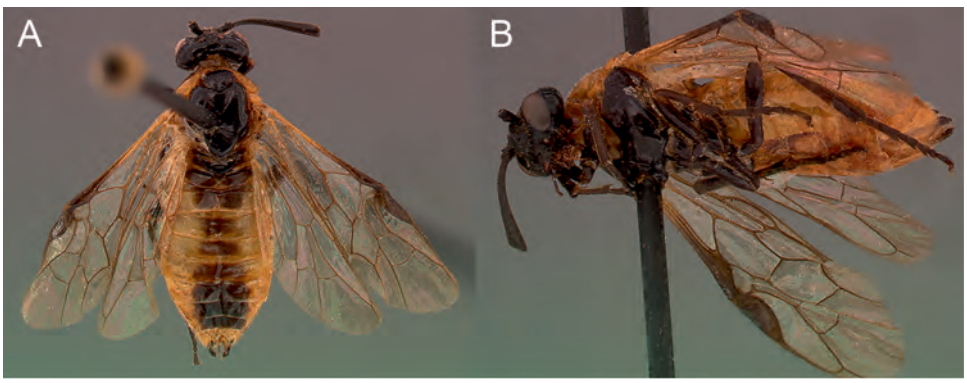

Fig. 76. A-B. *Arge langebergensis*, habitus, female (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Female (Figs 76A, B)

Head and antenna black; apical half of mandible light brown, gradually becoming dark reddish apically. Thorax black with the following yellow: propleuron, except for anterior margin, pronotum, postspiracular sclerite, lateral margin of median lobe and lateral margin of lateral lobe of mesoscutum, tegula, anepimeron, posterior margin of katepimeron, dorsal half of metepimeron. Legs black. Wings slightly infuscate; fore wing with very small smoky substigmal spot; intercostal area flavescent hyaline at base becoming infuscate apically, stigma brown, costa, subcosta and base of veins yellow, becoming light brown to brown apically. Abdomen yellow; tergum1 black, terga 2-8 with black medial patches of various widths, all together forming a broad longitudinal stripe, cerci and apex of sawsheath black.

Head parallel-sided behind eyes. Antenna 1.5× as long as maximum head width; flagellum conspicuously enlarged towards apex, slightly quadrangular in cross section, interior surface with slightly compressed longitudinal carina, gradually disappearing apically, other longitudinal carinae more weakly compressed. Eyes slightly converging below. Anterior margin of clypeus shallowly circularly emarginate medially, supraclypeal area moderately rounded up to the base of interantennal carinae, interantennal carinae sharply ridged between antennae, converging downwards, extending about one third of distance to clypeus.

Vertex and gena very sparsely micropunctate, shiny, supraclypeal area and frons irregularly transversely wrinkled and shiny except for the scarcely sculptured interantennal area and more or less longitudinally wrinkled, shiny, clypeus; pubescence yellowish. Mesoscutum moderately densely micropunctate; pubescence similar to that on head. Abdomen shiny; terga 1-4 with transverse microsculpture, following terga smooth. Sawsheath: (Figs 77A, B). Lancet with about 15 serrulae (Figs 77C, D).

Length: 8.8-9.0 mm.

Male

Colouration similar to that of female. Thorax black with following yellow: pronotum, except for ventro-lateral angle and centre of posterior margin, tegula. Dorsal surface of abdomen except tergum 9 nearly entirely black, only terga 3-6 laterally narrow yellow, sternum 2 blackish.

Antenna 2.0× as long as maximum head width; flagellum not enlarged towards apex, triangular in cross section, interior surface with conspicuously compressed longitudinal carina. Mesoscutum more densely and coarsely punctate. Other features as for female. Genitalia: Fig. 77E.

Length: 6.7-7.3 mm.

Etymology

This species is named after the Langeberg Mountains around the town of Montagu (Western Cape Province, South Africa) its type locality.

Distribution

South Africa (Province: Eastern Cape, Western Cape) (Fig. 175).

Host plant

Unknown.

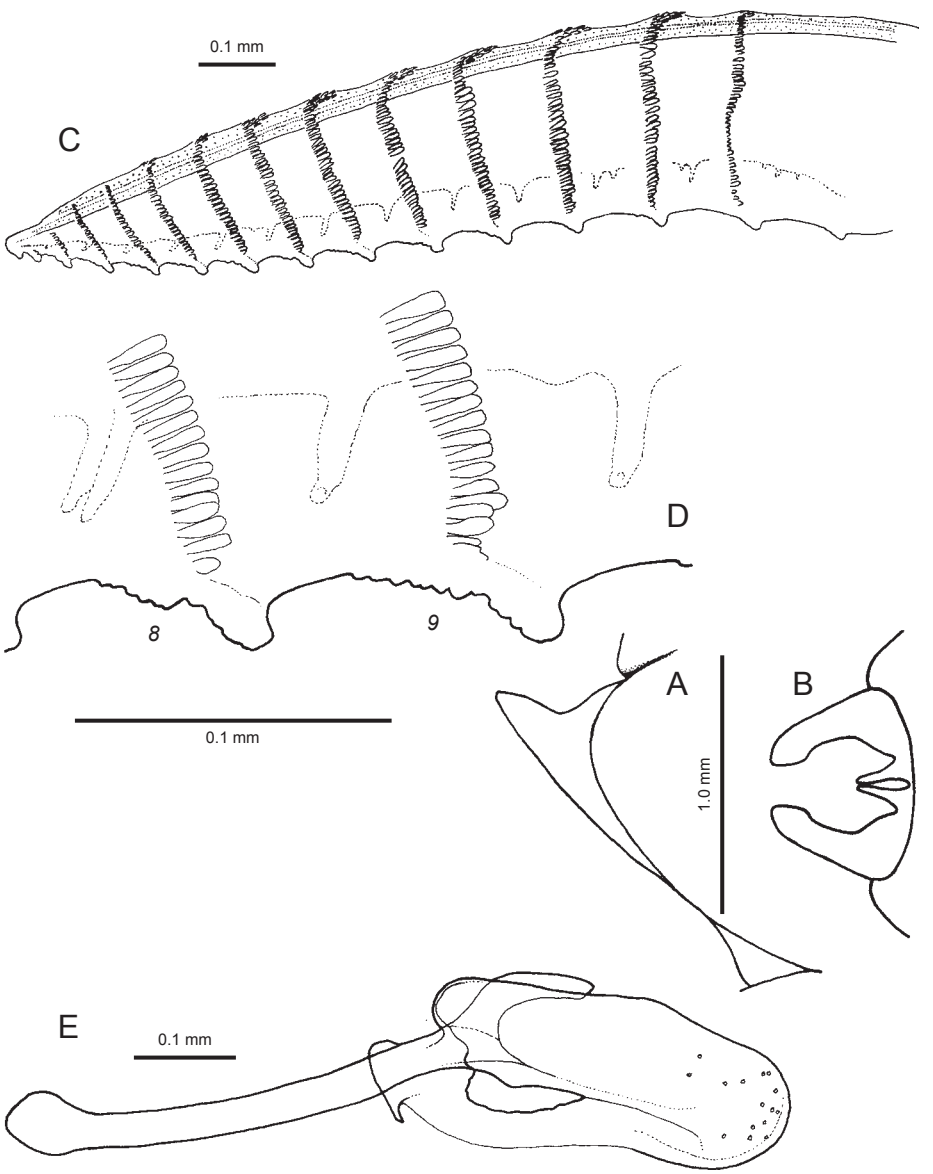

Fig. 77. A-E. *Arge langebergensis*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 8-9. **E**. Penis valve (left, lateral aspect).

Ecology and habitat

Material of this species is about one hundred years old. Details about the habitat are unknown. However, the known localities belong to the Mountain Fynbos of the winter rainfall zone. The flight season is not well known. Specimens have been collected in October and February. No new specimens or locality records have been assimilated.

Remarks

One female differs in having yellowish markings on the dorsal angle of the mesopleuron.

Superficially, *Arge langebergensis* might seem to be a variety of *A. furvipes* or *A. taeniata*. However, with the nearly entirely black coloured mesopleuron the females differ conspicuously from *A. taeniata* and *A. angulifera*. A further clear distinguishing character is the shape of serrulae, which are rounded apically (Fig. 77D). The males of *A. langebergensis* are separated from similarly coloured *A. angulifera* by the black sternum 2, the almost entirely black dorsal surface of the abdomen and the different penis valve (Figs 45E, 77E). Furthermore, in the pattern of colouration *A. langebergensis* resembles *A. montana*. The differences between these two species are discussed under *A. montana*.

Arge meyi Koch, 2006

Arge meyi Koch, 2006a: 117. ♂♀. Type locality: Brandberg Massif, Namibia (NNIC).

Female (Figs 78A, B)

Head yellow, postocellar and interocellar area including margin of front ocellus black; mandible apically dark brown; antenna black, narrow base of scape yellow. Thorax yellow with following black: on mesoscutum, one large medial patch on median lobe adjacent to pronotum, a large lateral-longitudinal stripe and a small

Fig. 78. A-B. *Arge meyi*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

spot near the posterior margin of lateral lobe, posterior downturned portion of lateral lobe, mesosternum. Legs yellow; dorsal surface of hind coxa and narrow apex of hind femur, hind tibia apically, mid and hind tarsi blackish. Wings subhyaline; fore wing with a slight smoky substigmal spot; intercostal area flavescent-hyaline, costa entirely yellow, subcosta brown, stigma and rest of venation blackish. Abdomen yellow with blackish narrow anterior margin on tergum1, terga 5-8 with small blackish medial spot.

Head very slightly enlarged behind eyes. Antenna 1.3× as long as maximum head width; flagellum conspicuously enlarged towards apex, quadrangular in cross section, interior surface with slightly compressed longitudinal carina, disappearing apically, other longitudinal carinae more weakly compressed. Eyes slightly

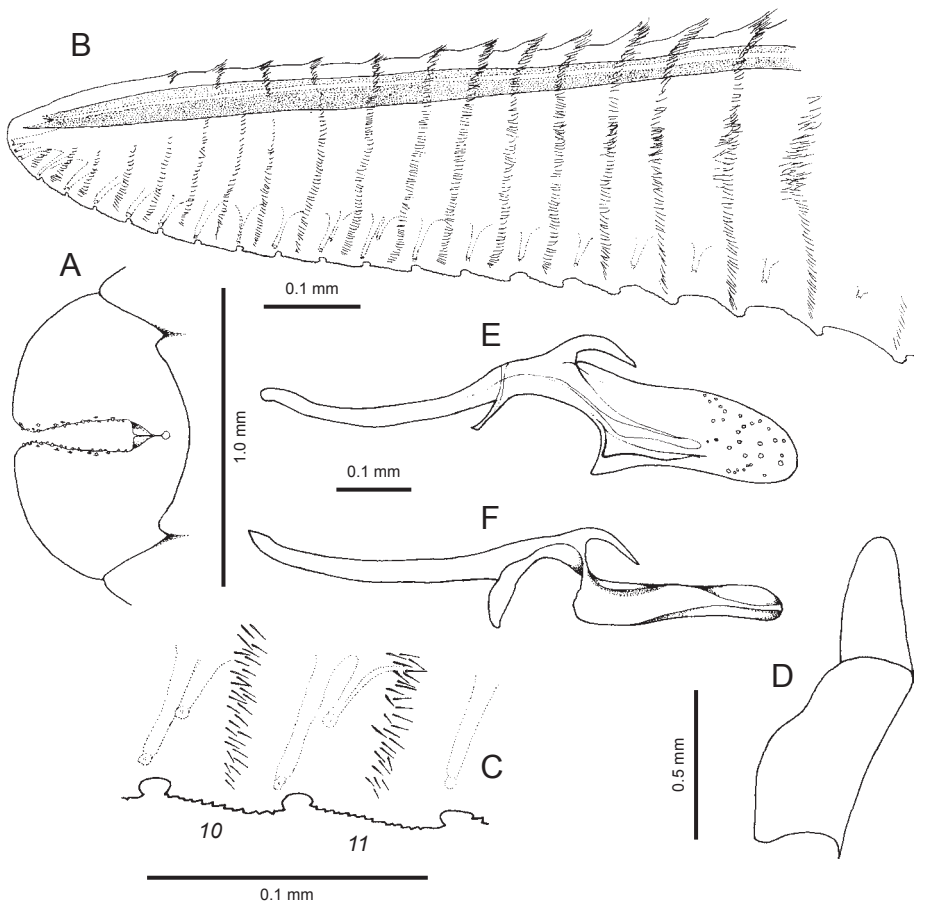

Fig. 79. A-F. *Arge meyi*. **A**. Sawsheath (dorsal aspect). **B**. Lancet. **C**. Serrulae 10-11. **D**. Harpe and parapenis (right, ventral aspect). **E**. Penis valve (left, lateral aspect). **F**. Penis valve (right, ventral aspect).

converging below. Anterior margin of clypeus with triangular medial excision to about one third of its median length. Supraclypeal area rounded and protruding up to base of interantennal carinae, interantennal carinae obtusely ridged between antennae, slightly converging downwards, extending about one quarter of distance to clypeus.

Vertex and gena scattered micropunctate, shiny, frons, supraclypeal area and clypeus moderately densely punctate, shiny; pubescence yellowish. Mesoscutum nearly impunctate, shiny; pubescence similar to that on head. Abdomen shiny; tergum 1 irregularly transversely microsculptured, following terga smooth. Sawsheath: Fig. 79A. Lancet with about 19 serrulae (Figs 79B, C).

Length: 7.0-7.5 mm.

Male

Head black, frons, gena brownish yellow; clypeus and labrum yellow, mandible yellow with apex dark brown; flagellum brown, narrow base of scape yellow. Thorax black; pronotum yellow with black medial marking, tegula yellow, mesoscutellum brownish yellow with black at base. Legs yellow, coxae, mid and hind trochanters black, narrow apex of hind femur, hind tibia apically, and hind tarsus blackish, distal tarsomeres of mid tarsus brownish. Costa of fore wing brown. Abdomen yellow; terga 1,2,5-7 broadly black, terga 3,4 with narrow blackish transverse markings, tergum 8 with black medial spot.

Antenna 1.5× as long as maximum head width, flagellum slightly enlarged towards apex, interior surface with sharply compressed longitudinal carina. Other features as for female. Genitalia: Figs 79D-F.

Length: 6.0-6.5 mm.

Etymology

This species was named after Dr. Wolfram Mey, Curator of Lepidoptera at the Museum für Naturkunde, Berlin, Germany.

Distribution

Namibia (Erongo Region) (Fig. 171).

Host plant

In 2002 the material was collected selectively by using a sweep-net on Rock Commiphora (*Commiphora saxicola* Engler), Burseraceae. This bush or small tree is endemic to the south-west African semi-desert vegetation type, occurring on stony hills and rocky mountain slopes in the fringes of the Namib. Therefore, if *A. meyi* is monophagous on this plant, it seems likely that the sawfly is also endemic to this region.

Ecology and habitat

The Brandberg Massif is an isolated mountain range in western Namibia on the eastern edge of the Namib Desert, located in the Nama Karoo Biome (Fig. 16). The type locality “Mason Shelter” (1,800 m) is a more or less flat open plain, dissected by some small river beds and fringed by rocky hills with huge boulders and rock slabs (Fig. 80).

The flight season is not well known, all specimens were collected in March.

Remarks

The colour pattern is variable in this species. In females, the black markings on the abdomen may be extended, with a small spot on tergum 5, and sometimes the ventral surface of the hind coxa is blackish. In males, the black on the abdomen may either reduced to tergum 1 and median spots on terga 5-8 or extended to broad markings on terga 1,2,4-7 and median spots on terga 3,8.

According to Koch (2006a) *Arge meyi* is similar to *A. aesculapii* Forsius, 1925, known from Botswana, South Africa and Zimbabwe. *Arge aesculapii* differs mostly by the bicoloured, sharply contrasted fore wings with flavescent hyaline basal and blackish infuscate apical halves and the entirely black mesonotum including the mesoscutellar appendage. Furthermore, *A. aesculapii* is characterized by the

Fig. 80. The so called “Mason Shelter” on the Brandberg Massif (western Namibia) is the habitat of *Arge meyi*, *Pampsilota brandbergensis* and *Xenapates damaraensis.* (Photo by W. Mey)

black apical half of the postocellar area, as well as the black apical third of mid and hind femora, and the apices of the mid and hind tibiae. Additionally, in *A. aesculapii* the inside of the sheath is covered with bristle-like hairs apically and longer hairs in the basal half.

Arge montana Koch & Goergen, 2010

Arge montana Koch & Goergen, 2010: 26. ♂♀. Type locality: Great Winterhoek Mountains, Tulbagh, Cape Province (Western Cape Province, South Africa) (SAMC).

Female (Figs 81A, B)

Head black; apical half of mandible light brown, gradually becoming dark brown apically; flagellum dark brown. Thorax black with the following yellow: propleuron, except for anterior margin, pronotum, postspiracular sclerite, lateral margin of lateral lobe of mesoscutum, posterior downturned portion of lateral lobe, tegula, anepimeron, posterior margin of katepimeron, metapleuron; only metepisternum black margined. Legs black. Wings very slightly infuscate; fore wing with very small smoky substigmal spot; intercostal area infuscate, stigma dark brown, costa dark brown with yellow close to base, subcosta yellow with apical half dark brown, rest of veins narrow yellow at base, becoming light brown to brown apically. Abdomen yellow; tergum 1 with two large black medial spots, terga 2-8 with black spot medially various widths, all together resulting in a narrow longitudinal stripe, cerci and apex of sawsheath black.

Head slightly enlarged behind eyes. Antenna 1.6× as long as maximum head width; flagellum moderately enlarged and somewhat flattened towards apex, slightly quadrangular in cross section, interior surface with conspicuously compressed longitudinal carina, other longitudinal carinae more weakly compressed.

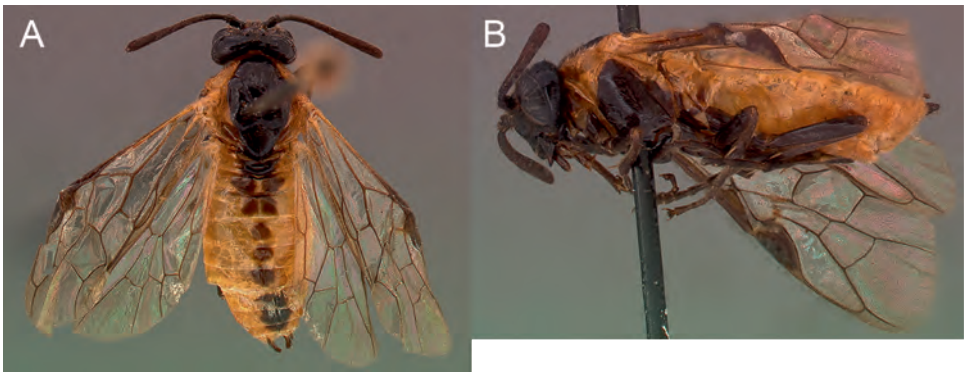

Fig. 81. A-B. *Arge montana*, habitus, female (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Eyes slightly converging below. Anterior margin of clypeus shallowly, triangularly emarginated. Supraclypeal area flatly rounded up to base of interantennal carinae, interantennal carinae sharply ridged between antennae, conspicuously converging downwards, extending about one third distance to clypeus.

Dorsal half of gena nearly impunctate, shiny, ventral half longitudinally wrinkled, dull; vertex, frons, supraclypeal area and clypeus more densely punctate, latter rugose laterally, shiny; pubescence light brown. Mesoscutum scarcely punctate and shiny, pubescence similar to that on head. Abdomen shiny; terga with transverse microsculpture. Sawsheath: Figs 82A, B. Lancet with about 17 serrulae (Figs 82C, D).

Length: 9.2 mm.

Male

Colouration similar to that of female. Thorax black with following parts yellow: pronotum, except for ventro-lateral angle and centre of posterior margin, tegula.

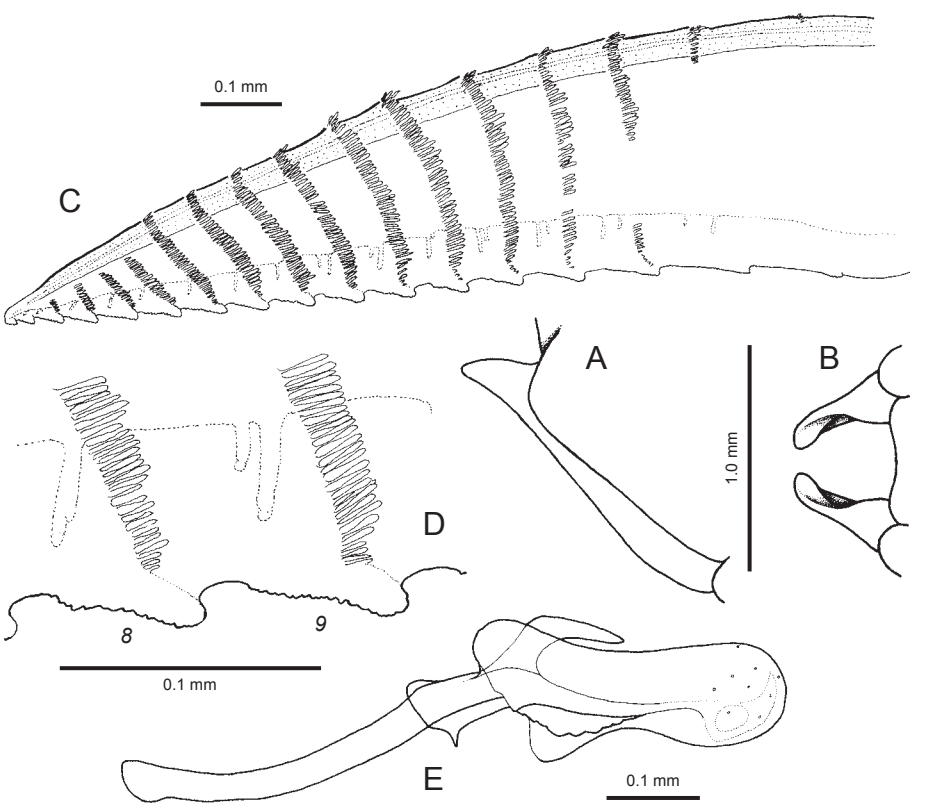

Fig. 82. A-E. *Arge montana*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 8-9. **E**. Penis valve (left, lateral aspect).

Tergum 1 entirely black, except for postero-lateral angle, following terga with black medial markings of various widths.

Antenna 2.0× as long as maximum head width; flagellum not enlarged towards apex, slightly flattened, ventral surface with conspicuously compressed longitudinal carina. Mesonotum more densely and coarsely punctate. Other features as for female. Genitalia: Fig. 82E.

Length: 7.3 mm.

Etymology

The name of this species refers to its montane origins in the Great Winterhoek Mountains (Western Cape Province).

Distribution

South Africa (Western Cape Province) (Fig. 175).

Host plant

Unknown.

Ecology and habitat

The habitat belongs to the Mountain Fynbos vegetation type of the winter rainfall zone.

The flight season is not well known; specimens have been collected in November.

Remarks

In colouration pattern this species resembles *A. langebergensis.* In *A. langebergensis* the antenna is shorter and more enlarged apically. In *A. montana* the head is conspicuously enlarged behind the eyes. The serrulae of the lancet are more flattened, and in lateral view the penis valve is more compressed than that of *A. langebergensis* (Fig. 77E).

Arge namaensis Koch & Goergen, 2010

Arge namaensis Koch & Goergen, 2010: 32. ♂. Type locality: Klein Namaland, Steinkopf (Northern Cape Province, South Africa) (MFN).

Male (Figs 83A, B)

Head black with slight blue metallic lustre; labrum dark brown, apical half of mandible light brown, gradually becoming dark brown apically; flagellum dark brown. Thorax black with slight blue metallic lustre; pronotum yellow with black ventro-lateral angle and narrow median part, tegula yellow. Legs black. Wings

slightly infuscate throughout; substigmal spot of fore wing obscurely; intercostal area negligibly more infuscate, costa and subcosta dark brown, stigma and rest of venation brown. Abdomen black with blue metallic lustre; tergum 8 with broad yellow median patch, sternum 8 light brown, sternum 9 yellow.

Head parallel-sided behind eyes. Antenna 1.7× as long as head maximum width; flagellum not enlarged towards apex, triangular in cross section and slightly flattened at apex, interior surface with conspicuously compressed longitudinal carina, gradually disappearing apically, other longitudinal carinae more weakly compressed. Eyes slightly converging below. Anterior margin of clypeus shallowly triangularly emarginate medially, supraclypeal area very flatly rounded up to start of interantennal carinae, interantennal carinae sharply ridged between antennae, scarcely converging downwards, short and extending about one quarter of way to clypeus.

Vertex and gena moderately densely micropunctate, shiny; frons and supraclypeal area more densely punctate, shiny; clypeus irregularly punctate, shiny; pubescence whitish. Mesoscutum shiny with scattered, irregular, shallow punctures; pubescence similar to that on head. Abdomen dull; terga 1-5 with irregular transverse microsculpture, following terga sparsely sculptured, tergum 8 with large median hollow (Fig. 84A). Genitalia: Figs 84B-D.

Length: 6.2-7.2 mm.

Female

Unknown.

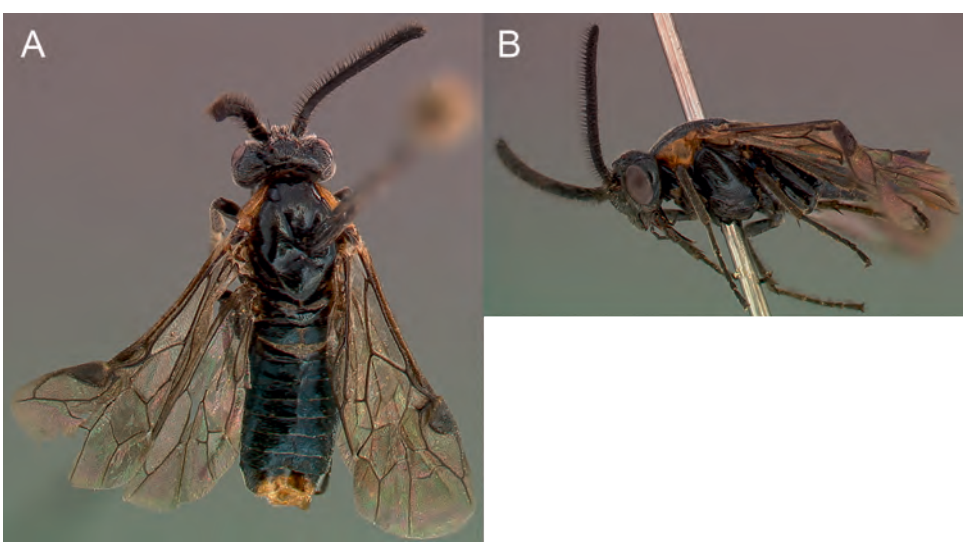

Fig. 83. A-B. *Arge namaensis*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Etymology

This species was named after the Namaland, the area around Steinkopf (Northern Cape Province, South Africa), its collection locality.

Distribution

South Africa (Northern Cape Province, Western Cape Province) (Fig. 172).

Host plant

Unknown.

Ecology and habitat

The habitats are located in the Succulent Karoo Biome and the Fynbos Biome, especially in the Renosterveld vegetation type and West Coast Strandveld vegetation type (Fig. 56) dominated by *Euphorbia* spp. (Euphorbiaceae) and *Rhus* spp. (Anacardiaceae). Both biomes belong to the winter rainfall zone. The flight season is not well known; the species has been recorded from June to August.

Remarks

Arge namaensis belongs to the *A. capensis* species group (Koch & Liston 2012a).

The anterior margin of the pronotum is not always completely black coloured, sometimes the interior margin of tegula is blackish spotted and tergum 7 has a narrow yellow margin on the apex. Furthermore, the blue metallic lustre is more or less distinctly visible on the head and thorax, whereas on the abdomen this lustre is always conspicuously developed.

The differential diagnosis of the similarly coloured *A. krabbefonteinensis* is discussed under that species.

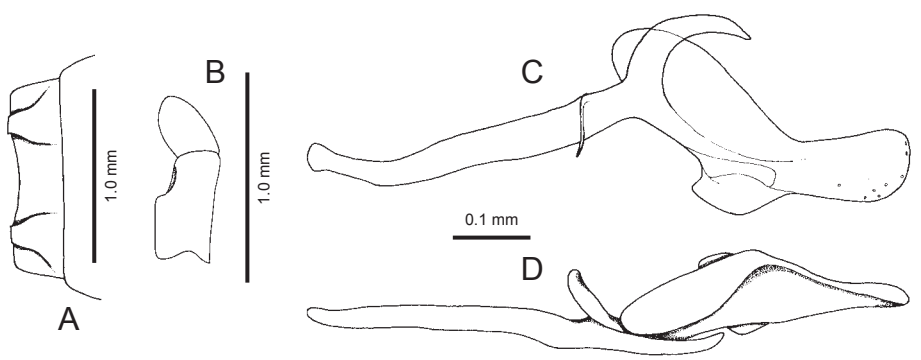

Fig. 84. A-D. *Arge namaensis*. **A**. Tergum 8. **B**. Harpe and parapenis (right, ventral aspect). **C**. Penis valve (left, lateral aspect). **D**. Penis valve (right, dorsal aspect).

Arge rufocyanea (Enslin, 1911)

Hylotoma rufocyanea Enslin, 1911: 663. ♀. Type locality: Capstadt [Cape Town], Capland (Western Cape Province, South Africa] (TMSA).

Female (Figs 85A, B)

Head black with very slight blue metallic lustre; apical half of mandible apically light reddish to dark reddish; flagellum dark brown. Thorax orange with following black: propleuron, a very narrow antero-lateral margin of pronotum, a small patch in apical angle of median lobe of mesoscutum adjacent to lateral lobe and mesoscutellum, metascutellum, the posterior margin of katepimeron and metapleuron. Legs black. Wings slightly infuscate throughout; fore wing with indistinct smoky substigmal spot, intercostal area somewhat darker; stigma, costa, subcosta and venation blackish. Abdomen black with blue metallic lustre; terga 8-10 and sawsheath orange.

Head parallel behind eyes. Antenna 1.5× as long as maximum head width; flagellum slightly enlarged towards apex, and quadrangular in cross section, interior surface with conspicuously compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes converging below. Anterior margin of clypeus shallowly circularly emarginate, supraclypeal area very flatly rounded up to base of interantennal carinae, interantennal carinae moderately ridged between antennae, converging downwards, short, extending about one third of way to clypeus.

Vertex and gena moderately densely micropunctate, shiny; frons, supraclypeal area and clypeus somewhat more densely punctate, shiny; pubescence light brown. Mesoscutum nearly impunctate, shiny; pubescence yellowish. Abdomen irregularly transversely microsculptured, shiny. Sawsheath: Figs 86A, B. Lancet with about 15 serrulae (Figs 86B, C).

Length: 7.7-7.8 mm.

Fig. 85. A-B. *Arge rufocyanea*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Male

Unknown.

Etymology

The name alludes to the colouration of the body: *rufo* (red) and *cyanea* (blue).

Distribution

South Africa (Western Cape Province) (Fig. 174).

Host plant

Unknown.

Ecology and habitat

The habitat belongs to the Coastal Fynbos vegetation type of the winter rainfall zone. Only two specimens are known from Cape Town and the surrounding area collected more than 100 years ago. The flight season is not well known, the species was recorded in October and November.

Remarks

In the course of the revision of the *Arge capensis* species group (Koch & Liston 2012a), *A. rufocyanea* (Enslin) was recognized as a valid species and removed from synonymy with *A. capensis* (Klug).

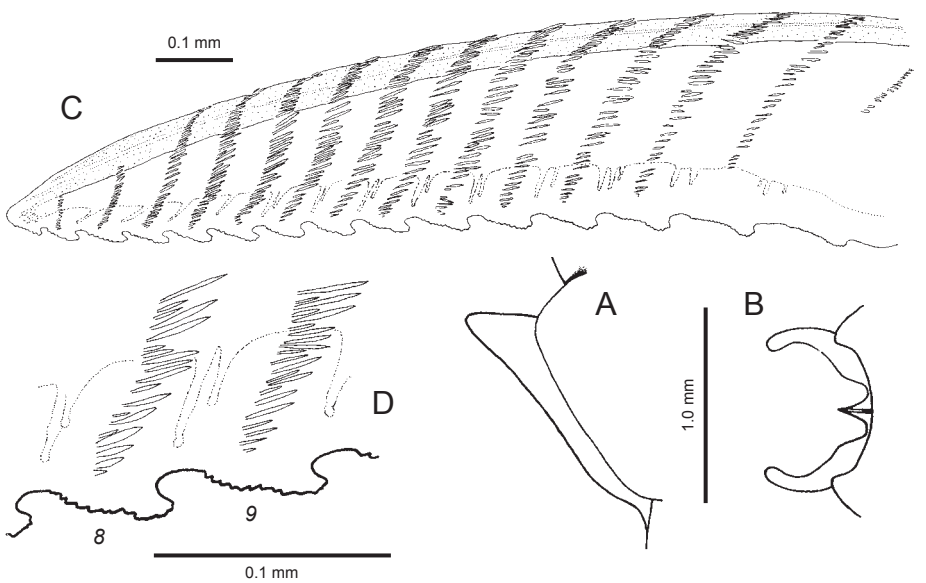

Fig. 86. A-D. *Arge rufocyanea*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 8-9.

Arge rufocyanea belongs to the *A. capensis* species group by Koch & Liston (2012a). It is very similarly coloured to *A. capensis*, and differs especially in the uniformly cigar-shaped trichoid sensilla on the lateral surface of the lancet, which are long and filiform in the latter species.

***Arge sjoestedti* Konow, 1907**

Arge sjoestedti Konow, 1907b: 307. ♀. Type locality: Kaffraria (Eastern Cape Province, South Africa) (SDEI).

Female (Figs 87A, B)

Head yellow, vertex black; mandible apically dark brown; antenna black. Thorax yellow with following black: propleuron, narrow anterior margin and centre of pronotum, postspiracular sclerite, mesoscutum except for narrow lateral margin of median and lateral lobe, mesopleuron, mesosternum, katepimeron, metepisternum. Legs black. Wings flavescent-hyaline, in apical half slightly darker; fore wing with a smoky substigmal spot; intercostal area flavescent, stigma blackish, costa and subcosta entirely yellow, rest of venation bicoloured with yellow in basal and dark brown in apical half. Abdomen yellow; terga1-8 broadly black with slight blue metallic lustre.

Head conspicuously enlarged behind eyes. Antenna as long as maximum head width; flagellum conspicuously enlarged towards apex, quadrangular in cross section, interior surface with conspicuously compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes not converging below. Anterior margin of clypeus shallowly emarginate, supraclypeal area rounded and protruding up to base of interantennal carinae, interantennal carinae very obtusely ridged between antennae, slightly converging and later diverging downwards, extending about one quarter of way to clypeus.

Fig. 87. A-B. *Arge sjoestedti*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Vertex and gena moderately densely micropunctate, shiny, frons densely punctate, shiny, supraclypeal area and clypeus rugosely sculptured, subshiny; pubescence whitish. Mesoscutum obscurely micropunctate, shiny; pubescence similar to that on head. Abdomen irregularly transversely microsculptured, shiny. Sawsheath: Figs 88A, B. Lancet with about 35 serrulae (Figs 88C, D).

Length: 11.3-13.0 mm.

Male

Unknown.

Etymology

The species was named after the Swedish naturalist Professor Dr. Y. Sjoestedt (1866-1948), who undertook several expeditions to Africa.

Distribution

Namibia (Region: Otjozondjupa, Outjo), South Africa (Province: Eastern Cape, Limpopo, Northern Cape) (Fig. 174).

Host plant

Unknown.

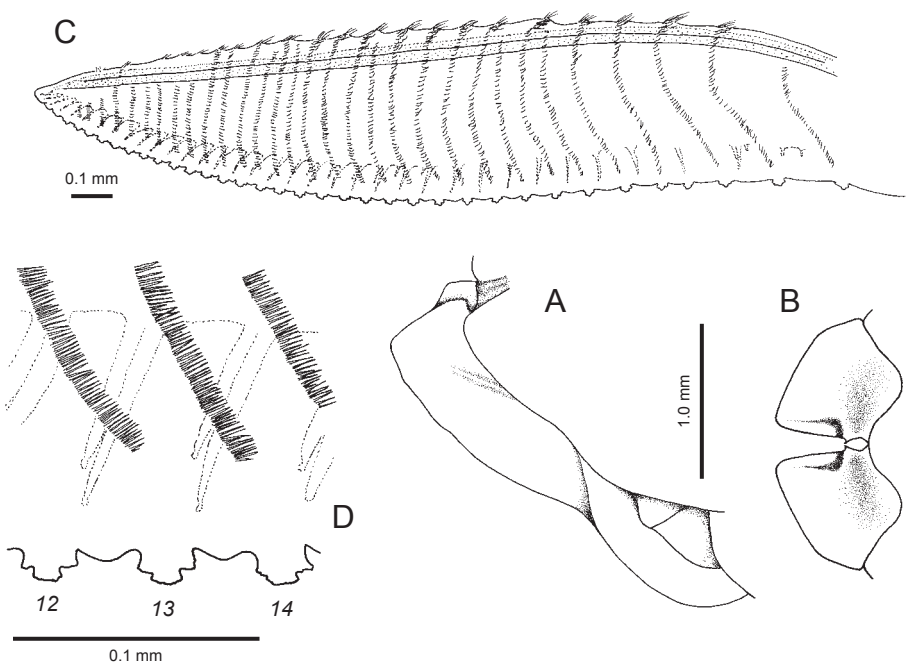

Fig. 88. A-D. *Arge sjoestedti*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 12-14.

Ecology and habitat

All specimens were collected in habitats of the Thornbush Savanna Biome and the Succulent Karoo Biome. The flight season seems to be between January and March.

Remarks

Arge sjoestedti belongs in the *A. sugillata* species group (Pasteels 1953a).

By its colouration and the strongly enlarged head behind the eyes this species is clearly distinguished from all other included *Arge* species from the study region.

Sometimes the black or blackish markings are much more extensive and include the frons, the supraclypeal area, the complete thorax and the ventral surface of abdomen. On the other hand in the pale form the lateral lobe of mesoscutum may be more or less yellow.

***Arge speciosa* (Klug, 1834)**

Hylotoma speciosa Klug, 1834: 233. ♀. Type locality: Pr. b. sp. [Promontorium Bonae Spei] [Cape of Good Hope], Capland (Western Cape Province, South Africa) (MFN).

Hylotoma urania W.F. Kirby, 1882: 75. ♀. Type locality: Natal, [KwaZulu-Natal Province], South Africa (BMNH).

Female (Figs 89A, B)

Head and antenna black with conspicuous blue metallic lustre; apical half of mandible reddish to dark reddish apically. Thorax black with conspicuous blue metallic lustre. Legs black with blue metallic lustre; tibiae and tarsi yellow except for blackish tarsomeres 5. Wings bicoloured, flavescent basally and slightly infuscate

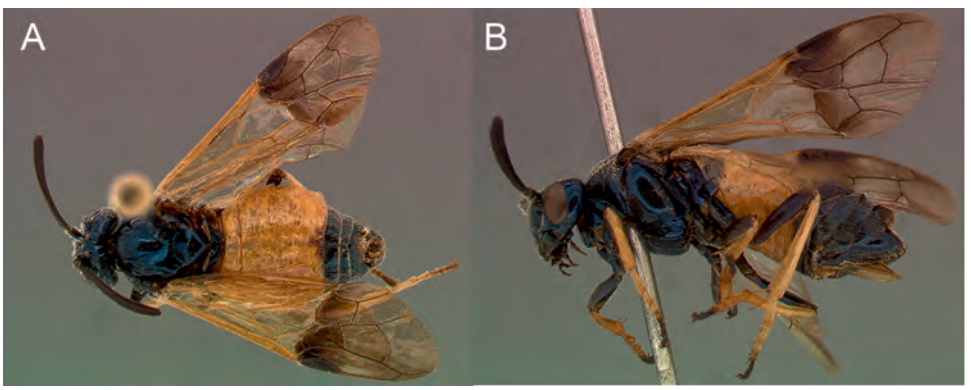

Fig. 89. A-B. *Arge speciosa*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

apically separated by a transverse fuscous stripe below the black stigma; stigma blackish, costa and subcosta entirely yellow, rest of venation yellow in basal and light brown in apical half. Abdomen yellow; terga 1,7-10, sterna 6,7 black and sawsheath black with blue metallic lustre.

Head slightly enlarged behind eyes. Antenna 1.3× as long as maximum head width; flagellum conspicuously enlarged towards apex, quadrangular in cross section, ventral surface with conspicuously compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes not converging below. Anterior margin of clypeus circularly excised medially, supraclypeal area roundly protruding up to start of interantennal carinae, interantennal carinae moderately ridged between antennae, conspicuously converging downwards and later diverging, extending nearly half way to clypeus.

Vertex and gena moderately densely micropunctate, shiny; frons and clypeus densely punctate, shiny; supraclypeal area rugosely sculptured, subshiny; pubescence whitish. Mesoscutum moderately densely shallowly punctate, shiny; pubescence similar to that on head. Abdomen irregularly microsculptured, shiny. Sawsheath: Figs 90A, B. Lancet with about 20 serrulae (Figs 90C, D).

Length: 11.2-11.7 mm.

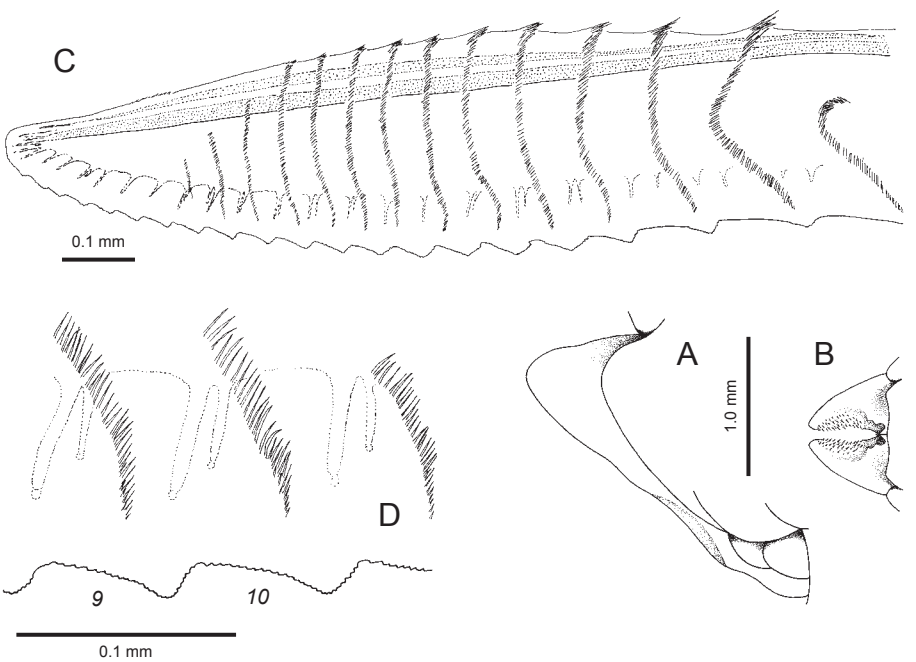

Fig. 90. A-D. *Arge speciosa*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 9-10.

Male

Unknown.

Etymology

The Latin adjective *speciosa* means “beautiful” or “splendid”.

Distribution

South Africa (Province: KwaZulu-Natal, Mpumalanga, Western Cape) (Fig. 175).

Host plant

Unknown.

Ecology and habitat

The type locality belongs to the Coastal Fynbos vegetation type of the winter rainfall zone, but the material collected later is from the Indian Ocean Coastal Belt Biome (Mucina & Rutherford 2006) of the summer rainfall zone. No information is available on the preferred habitats of *A. speciosa*.

In the KwaZulu-Natal Province the species was recorded from October to December and in April.

Remarks

Arge speciosa belongs to the *A. sugillata* species group (Pasteels 1953a).

Comparing the locus typicus “Cape of Good Hope” with the other material from KwaZulu-Natal Province (Indian Ocean Coastal Belt Biome), it seems possible that the published type locality is incorrect, because the flora of the Cape of Good Hope belongs to the Fynbos Biome, which is very distinct to the flora of the Indian Ocean Coastal Belt Biome.

Arge speciosa is well characterized by its black femora, the entirely yellow tibiae, the transverse fuscous stripe of the fore wing and the conspicuous blue metallic lustre of all black body parts.

Sometimes the black colouration of the abdomen is more extensive on tergum 2, with a medial spot to tergum 5 and the following terga entirely black.

Arge spei (Enslin, 1911)

Hylotoma spei ENSLIN, 1911: 657. ♂. Type locality: Bethel, W. Capland (Western Cape Province, South Africa) (MFN).

Male (Figs 91A, B)

Head black; labrum brown, basal half of mandible yellow becoming reddish brown

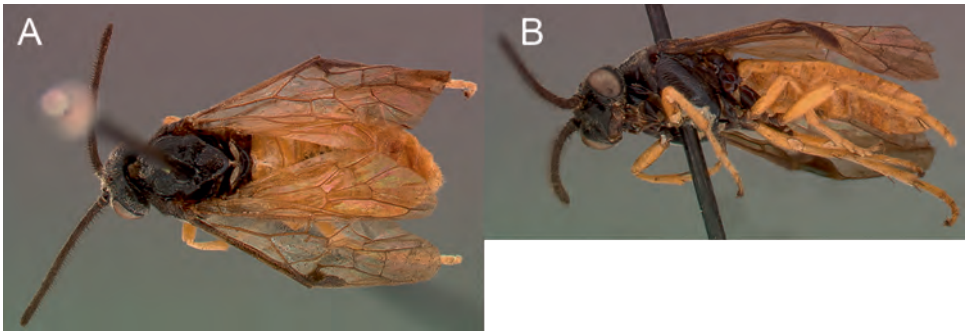

Fig. 91. A-B. *Arge spei*, habitus, male (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

apically; scape and pedicel blackish, flagellum brown. Thorax black. Legs yellow; coxae and trochanters black. Wings very slightly infuscate throughout; substigmal spot of fore wing very small; intercostal area conspicuously infuscate, costa blackish, stigma and subcosta dark brown, rest of venation light brown. Abdomen yellow.

Head slightly narrowed behind eyes. Antenna 2.0× as long as maximum haed width of head; flagellum not enlarged towards apex, triangular in cross section, slightly flattened towards apex, ventral surface with conspicuously compressed longitudinal carina, dorsal and outer surface with weaker longitudinal carinae. Eyes slightly converging below. Anterior margin of clypeus very shallowly emarginate medially; supraclypeal area nearly flatly rising up to start of interantennal carinae, interantennal carinae sharply ridged between antennae, very slightly diverging downwards, short, extending about one quarter of way to clypeus.

Vertex and gena with scattered micropunctures, shiny; frons and intercarinal area more densely micropunctate, shiny; clypeus, supraclypeal area densely punctate with larger punctures, shiny; pubescence whitish. Mesoscutum very sparsely micropunctate, shiny; pubescence similar to that on head. Abdomen scarcely microsculptured, shiny. Genitalia: Figs 92A, B.

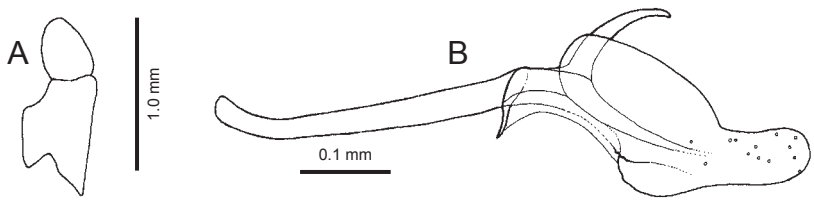

Fig. 92. A-B. *Arge spei*. **A**. Harpe and parapenis (right, ventral aspect). **B**. Penis valve (left, lateral aspect).

Length. 8.2 mm.

Female

Unknown.

Etymology

This species was named after the Latin name “Promontorium Bonae Spei” for the Cape of Good Hope.

Distribution

South Africa (Western Cape Province) (Fig. 170).

Host plant

Unknown.

Ecology and habitat

The type locality belongs to Mountain Fynbos of the winter rainfall zone. The flight season is unknown; the sampling date is not documented (Koch 2013).

Remarks

Arge spei belongs to the *A. annulipes* species group (Pasteels 1953a).

This species is only known from the holotype collected more than 100 years ago (Enslin 1911).

Arge spei is distinguished from the similarly coloured *A. annulipes* by its entirely yellow tibiae and tarsi, the nearly flat supraclypeal area, as well as the downwards slightly diverging interantennal carinae. Furthermore, in *A. annulipes* the dorsal surface of antenna is more or less pale and the metepimeron is partly yellow. The shape of the penis valve of *A. spei* is conspicuously different from *A. annulipes* (Fig. 48E)

Arge stuhlmanni (Kohl, 1893)

Hylotoma stuhlmanni Kohl, 1893: 189. ♀. Type locality: Mossambique [Mozambique] [ZMUH].

Female (Figs 93A, B)

Head and antenna black; apical half of mandible dark reddish becoming blackish apically. Thorax yellow; mesoscutum except for very narrow lateral margin of lateral lobe, mesoscutellum, metascutellum, mesosternum, and narrow ventral part of mesopleuron black. Legs yellow with apical tarsomere of fore leg and tarsus of middle leg blackish, apex of hind tibia and hind tarsus black. Wings subhyaline with apical half very slightly infuscate; fore wing with a small smoky substigmal

spot; intercostal area of fore wing flavescent hyaline, blackish infuscate apically, stigma and venation in apical half blackish, costa and subcosta yellow with more or less blackish apex , venation in basal half more or less yellowish. Abdomen yellow; two medial spots on terga 1,2 and one medial spot on terga 3,5-7 blackish.

Head parallel-sided behind eyes. Antenna 1.6× as long as maximum head width; flagellum slightly enlarged towards apex, and slightly quadrangular in cross section, inner surface with conspicuously compressed longitudinal carina, the other longitudinal carinae weaker. Eyes very slightly converging below. Anterior margin of clypeus shallowly, circularly emarginate medially, supraclypeal area very flatly rounded up to start of interantennal carinae, interantennal carinae ridged between antennae, converging downwards, extending about one third distance to clypeus.

Vertex and gena shining, nearly impunctate; frons and clypeus with scattered, shallow punctures, shiny; supraclypeal area very densely punctate and subshiny; pubescence whitish. Mesoscutum sparsely micropunctate, shiny; pubescence similar to that on head. Abdomen irregularly microsculptured, shiny. Sawsheath: Fig. 94A. Lancet with about 17 serrulae (Figs 94B, C).

Length: 5.5-7.5 mm.

Male

Head and antenna black; apical half of mandible dark reddish becoming blackish apically. Thorax black with pronotum except for black median marking and tegula yellow. Legs yellow with coxae, trochanters, and bases of femora narrowly black, apex of hind tibia broadly black ringed, hind tarsus black, apical tarsomere of fore leg and distal tarsomeres of middle leg blackish. Abdomen yellow with terga 1,2,5-7 broadly and terga 3,4 narrowly black.

Head slightly narrowed behind eyes. Antenna 2.1× as long as maximum head width; flagellum not enlarged towards apex, ventral carina more sharply compressed than in female. Other features as for female. Genitalia: Figs 94D, E.

Length: 5.5-6.5 mm.

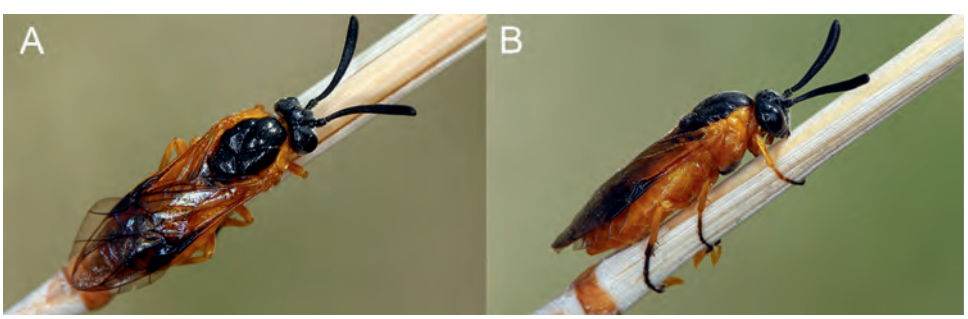

Fig. 93. A-B. *Arge stuhlmanni*, habitus, female. alive. **A**. female, dorsal aspect. **B**. female, lateral aspect. (Photos by J. Deckert)

Etymology

This species was named after Franz Ludwig Stuhlmann (1863-1928), a lieutenant of the German Protectorate Force in Africa who sampled insects, amongst other organisms, especially in East Africa.

Distribution

Botswana, Malawi, Mozambique, Namibia (Region: Caprivi, Erongo, Komas, Kunene, Okavango, Otjozondjupa) (Fig. 175) South Africa (Provinc: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga), Swaziland, Tanzania, Zambia, Zimbabwe; detailed distribution is presented by Koch (2005c).

Host plant

Unknown.

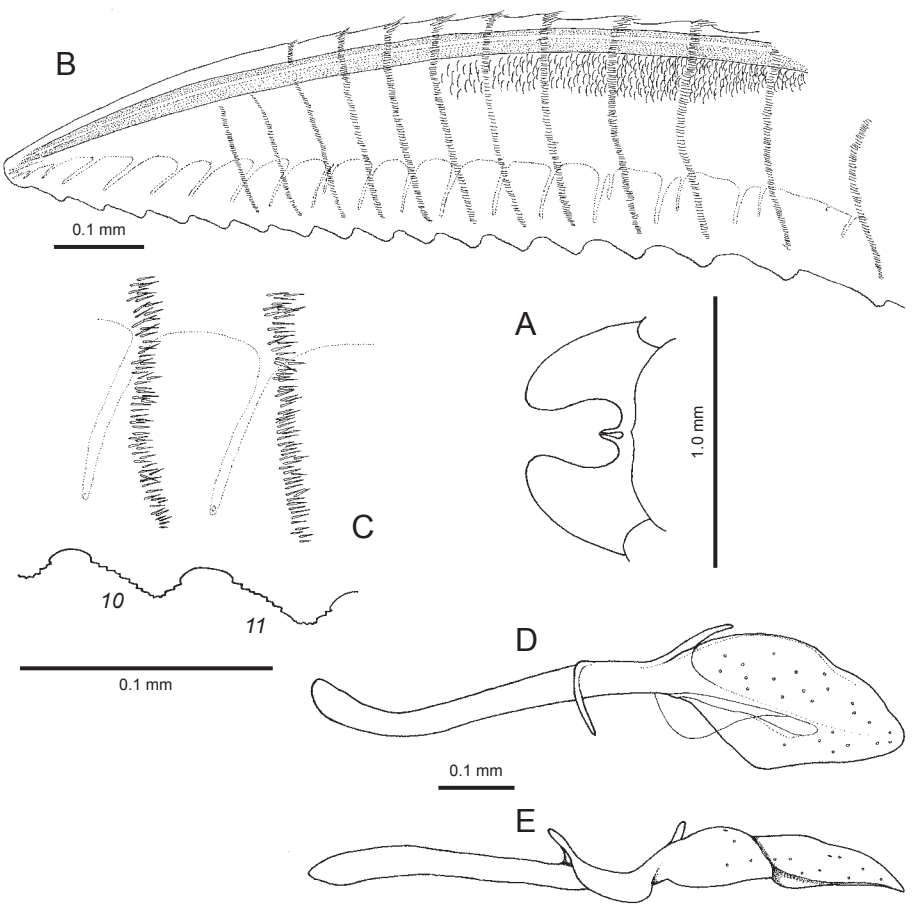

Fig. 94. A-E. *Arge stuhlmanni*: **A**. Sawsheath (dorsal aspect). **B**. Lancet. **C**. Serrulae 10-11. **D**. Penis valve (left, lateral aspect). **E**. Penis valve (left, dorsal aspect).

Ecology and habitat

Arge stuhlmanni often lives in the same habitat as *A. deckerti* (see the latter species). The Namibian habitats are located in the Woodland Savanna Biome and the Thornbush Savanna Biome (Fig. 95). The flight season in Namibia is from December to April.

Remarks

The holotype of *A. stuhlmanni* was deposited in the ZMUH and was destroyed in World War II.

Arge stuhlmanni is very similarly coloured to *A. deckerti*, but *A. deckerti* differs usually by the entirely yellow costa and subcosta of fore wing (Fig. 60).

As in *A. deckerti*, the colour pattern varies. The colouration of the costa and subcosta varies from a black apical half to blackish at extreme apex adjacent to the stigma (Figs 93A, B). Some females have a narrow black posterior margin of mesopleuron. In very few females the mesopleura may be almost entirely black. The black colouration on the upper surface of the abdomen may be reduced or sometimes entirely absent, or is extended similarly to that of *A. deckerti*. The hind femora of males may be entirely yellow.

Fig. 95. The habitat of *Arge stuhlmanni* on the farm “Wilsonfontein” in the Nama Karoo Biome between Windhoek and Swakopmund (Namibia). (Photo by J. Deckert)

Arge taeniata (Klug, 1834). Pelargonium sawfly

Hylotoma taeniata Klug, 1834: 233. ♀. Type locality: Capland, Pr. b. sp. [Promontorium bonae spei] [Cape of Good Hope] (Western Cape Province, South Africa) (MFN).

Athalia pelargonii Skaife, 1954: 312. ♀. Type locality: Houtbay, Cape Province (Western Cape Province, South Africa) (BMNH).

Pelargonium sawfly is the approved common name.

Female (Figs 96A, B)

Head and antenna black; apical half of mandible dark reddish to blackish apically. Thorax orange with the following black: a broad longitudinal stripe on mesoscutum and mesoscutellum, metascutellum, ventral half of mesopleuron, mesosternum, katepimeron, metapleuron. Legs black with very slight blue metallic lustre. Wings slightly infuscate throughout; substigmal spot of fore wing negligible; intercostal area flavescent-hyaline; costa and subcosta yellow, blackish at extreme apex adjacent to dark brown stigma; rest of venation yellow to light brown in apical half.

Abdomen yellow, tergum 1,2 with two blackish medial spots, terga 6,7 with small black medial spot, following terga with medial spots in various widths, sawsheath with black apex.

Head very slightly enlarged behind eyes. Antenna 1.2× as long as maximum head width; flagellum conspicuously enlarged towards apex and looks truncate apically, quadrangular in cross section, ventral surface with moderately compressed longitudinal carina, other longitudinal carinae weakly compressed. Eyes converging below. Anterior margin of clypeus conspicuously triangularly emarginate medially, supraclypeal flatly rounded up to base of interantennal carinae, interantennal

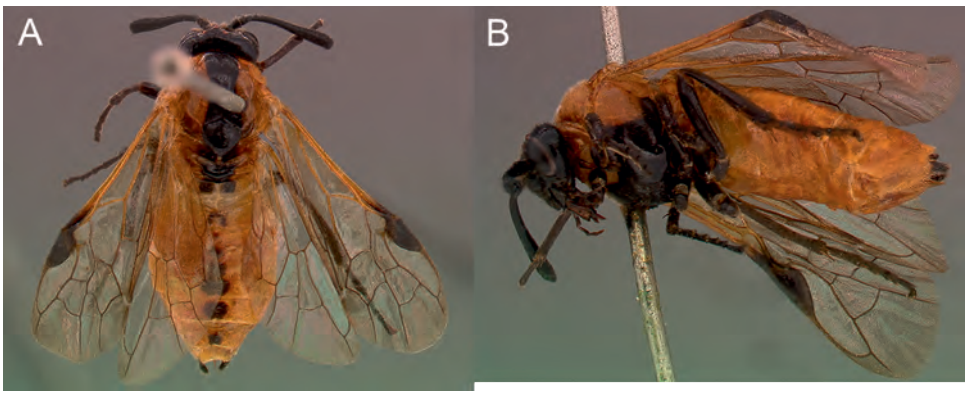

Fig. 96. A-B. *Arge taeniata*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

carinae moderately sharply ridged between antennae, obscurely converging downward, extending about a quarter of way to clypeus.

Vertex and gena nearly impunctate, shiny; frons sparsely micropunctate, shiny, supraclypeal area moderately densely punctate, shiny, clypeus rugosely sculptured, subshiny; pubescence light yellow. Mesoscutum very shallowly punctate, shiny; pubescence similar to that on head. Abdomen obscurely microsculptured, shiny. Sawsheath: Figs 97A, B. Lancet with about 15 serrulae (Figs 97C, D)

Length: 7.2-8.3 mm.

Male

Unknown.

Etymology

The Latin adjective *taeniata* means “banded”, and probably refers to the colour pattern of the thorax.

Distribution

South Africa (KwaZulu-Natal Province, Western Cape Province) (Fig. 170).

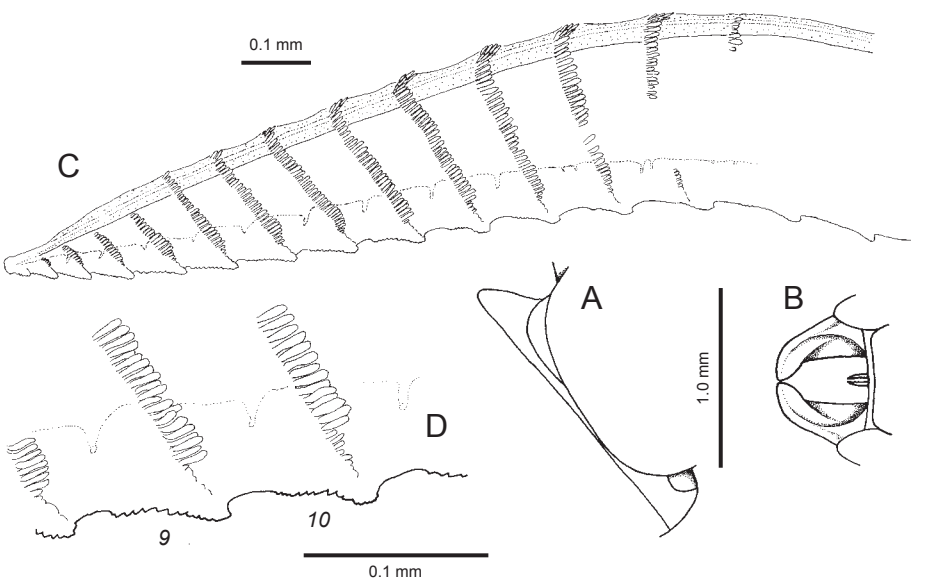

Fig. 97. A-D. *Arge taeniata*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 9-10.

Host plant

Pelargonium L'Héritier de Brutelle ex Aiton (Geraniaceae) (Skaife 1954, Prinsloo 1985).

Ecology and habitat

The known localities belong to the Coastal Fynbos vegetation type of the winter rainfall zone. One female was sampled in the Grassland Biome of KwaZulu-Natal Province, which is situated in the summer rainfall zone.

The flight season is not well known. Single specimens have been recorded in February, April, May, August and December.

Remarks

Arge taeniata belongs to the *A. annulipes* species group (Pasteels 1953).

Most of the material seen was collected in the wider area of Cape Town. So far the record of one female from Escourt (KwaZulu-Natal Province) in 1894 seems to be unusual.

Arge taeniata is characterized among other things by a narrow black longitudinal stripe on the dorsal surface of abdomen. Sometimes on terga 2-4 this stripe is interrupted.

Skaife (1954) misidentified this species as belonging to *Athalia*, which led him to conclude that it was the new species *Athalia pelargonii*.

Arge vannoorti Koch & Liston, 2012

Arge vannoorti Koch & Liston, 2012b: 178. ♂. Type locality: West Coast Fossil Park, Western Cape Province, South Africa (SAMC).

Male (Figs 98A, B)

Head black with blue metallic lustre; apical half of mandible light brown becoming reddish brown towards apex; antenna black. Thorax black with blue metallic lustre; pronotum extensively orange laterally, tegula orange. Legs black. Wings slightly infuscate; fore wing with a small smoky substigmal spot; intercostal area somewhat darker, stigma, costa, subcosta and rest of venation dark brown. Abdomen black with blue metallic lustre.

Head very slightly enlarged behind eyes. Antenna 1.9× long as maximum head width; flagellum not enlarged towards apex, triangular in cross section, ventral surface with strongly compressed and sharp longitudinal carina, other longitudinal carinae more weakly compressed. Eyes converging below. Anterior margin of clypeus circularly emarginate, supraclypeal area flatly rising up to base of

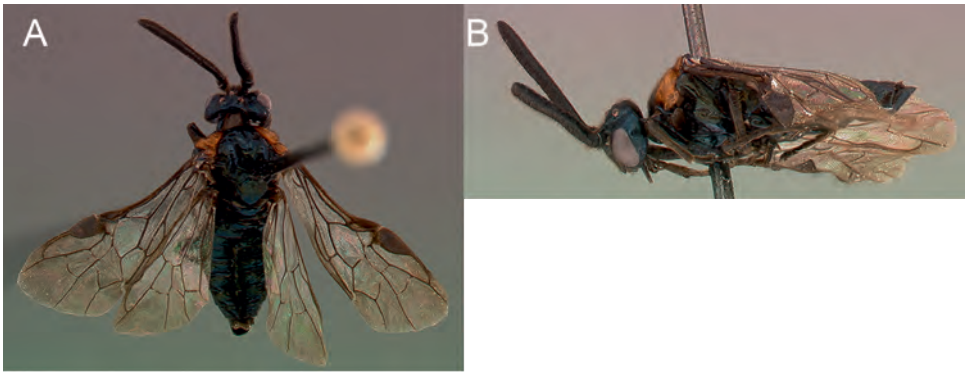

Fig. 98. A-B. *Arge vannoorti*, habitus, male (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

interantennal carinae, interantennal carinae sharply ridged between antennae, slightly converging downward, extending nearly half way to clypeus.

Head rather densely micropunctate, subshiny, postocellar area nearly impunctate, shiny; pubescence brown. Thorax nearly impunctate, shiny; pubescence similar to that on head. Abdomen irregularly microsculptured, subshiny. Genitalia (Figs 99A, B).

Length: 5.7-6.4 mm.

Female

Unknown.

Etymology

This species was named after Dr. Simon van Noort, the curator of Entomology at the Iziko South African Museum, Cape Town, South Africa.

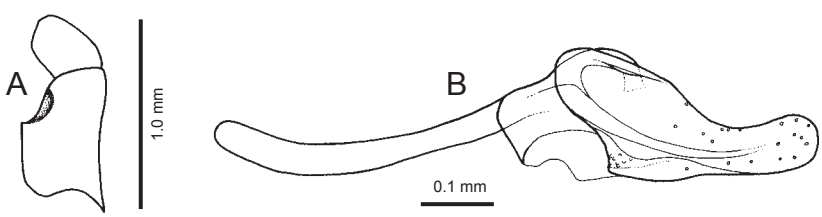

Fig. 99. A-B. *Arge vannoorti*. **A**. Harpe and parapenis (right, ventral aspect). **B**. Penis valve (left, lateral aspect).

Distribution

South Africa (Western Cape Province) (Fig. 170).

Host plant

Unknown.

Ecology and habitat

The habitat belongs to the winter rainfall zone and is characterized as Sand Plain Fynbos vegetation type (Fynbos Biome).

The flight season is not well known, the specimens were collected in September.

Remarks

Arge vannoorti is placed in the *Arge capensis* species group (Koch & Liston 2012a) and is distinguished from the other species of the group by the restriction of the orange colouration to the pronotum and tegulae. In the other species the orange colouration extends partly to the mesonotum, mesopleuron and mesosternum.

In the shape of the penis valve *A. vannoorti* is similar to *A. capensis*. Apart from colouration, *A. capensis* differs in the following characters: antennae 1.8× long as head maximum width; supraclypeal area flatly rounded; interantennal carinae scarcely converging downwards, extending about a third of the way to clypeus, and intercarinal area conspicuously broader than in *A. vannoorti.*

***Arge whiteheadi* Koch & Goergen, 2010**

Arge whiteheadi Koch & Goergen, 2010: 28. ♀. Type locality: Stellenbosch (Western Cape Province, South Africa) (SAMC).

Female (Figs 100A, B)

Head black with slight blue metallic lustre; mandible reddish brown with blackish basal half; flagellum dark brown. Thorax orange with the following being black with blue metallic lustre: lateral markings of anterior margin of pronotum, a medial longitudinal stripe becoming broader apically on median lobe of mesoscutum, mesoscutellum except for two lateral spots, mesoscutellar appendage, propleuron, prosternum, mesosternum, ventral part of mesopleuron, katepimeron, metapleuron. Legs black with slight blue metallic lustre. Wings slightly infuscate; fore wing with a small smoky substigmal spot; intercostal area infuscate, stigma brown, costa, subcosta, and rest of venation brown with dark brown at base. Abdomen black with conspicuous blue metallic lustre.

Head parallel behind eyes. Antenna 1.4× as long as maximum head width; flagellum slightly enlarged towards apex and quadrangular in cross section, somewhat flattened toward apex, interior surface with moderately compressed longitudinal

carina, other longitudinal carinae more weakly compressed. Eyes converging below. Anterior margin of clypeus shallowly circularly emarginate, supraclypeal area flatly rising up to base of interantennal carinae, interantennal carinae sharply ridged between antennae, converging downwards, and extending one quarter of distance to clypeus.

Vertex and gena moderately densely micropunctate, shiny; frons, supraclypeal area and clypeus more densely punctate with larger punctures, shiny; pubescence yellowish. Mesoscutum very sparsely micropunctate, shiny; pubescence similar to head. Abdomen shiny, terga 1-4 transversely microsculptured, following terga irregularly punctate. Sawsheath: Figs 101A, B. Lancet with about 15 serrulae (Figs 101C, D).

Length: 7.2 mm.

Male

Unknown.

Etymology

This species was named after the late Dr. Vincent Booth Whitehead (1921 – 2005), the former Head of the Entomology department at the Iziko South African Museum, Cape Town.

Distribution

South Africa (Western Cape Province) (Fig. 172).

Fig. 100. A-B. *Arge whiteheadi*, habitus, female (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Host plant

Unknown.

Ecology and habitat

The collection locality belongs to the Mountain Fynbos vegetation type of the winter rainfall zone.

This species was collected in 1897, but remained undetected in the collection of the Iziko South African Museum, Cape Town. Despite many efforts, it has not been possible to collect more recent material. Probably, this species has become extinct as a consequence of changed land use (urbanization of rural areas as well as agricultural and forestry land use; Figs 2-6) and the associated destruction of natural habitats. This is especially true of the Greater Cape Town area, to which Stellenbosch belongs.

Remarks

Arge whiteheadi belongs to the *A. capensis* species group (Koch & Liston 2012a), and is similarly coloured to *A. capensis*. *Arge capensis* differs distinctly in the nearly entirely orange thorax and the yellow apex of the abdomen, as well as in the nearly uniform and filiform trichoid sensilla of the lancet (Figs 55C, D).

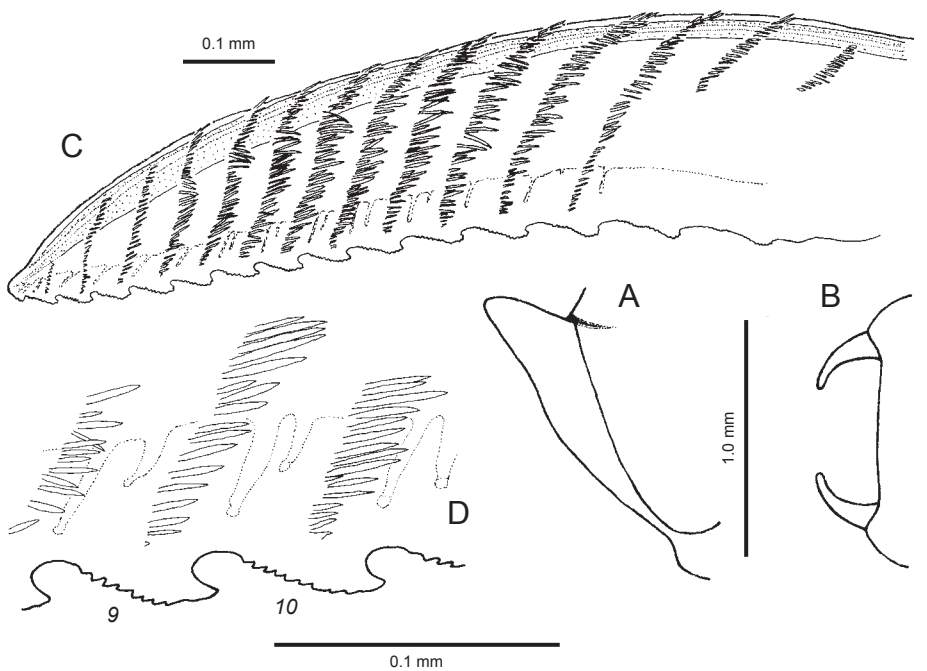

Fig. 101. A-D. *Arge whiteheadi*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 9-10.

Genus *Pampsilota* Konow, 1899

Pampsilota Konow, 1899: 76. Type species: *Pampsilota afer* Konow, 1899, designated by Rohwer, 1911. http://www.waspweb.org/Tenthredinoidea/Argidae/Athermantinae/Pampsilota/index.htm

Description

Antenna 3-segmented (Fig. 40A), scape and pedicel short, flagellum very long and unsegmented. Clypeus not clearly separated by an epistomal suture from the supraclypeal area (Fig. 103A). Hind tibia without preapical spine; tarsal claws simple (Fig. 44E). Fore wing with radial crossvein (2r) absent and crossvein 2r-m present, with basal anal cell (1A) closed and anal cell (2A) long petiolate (1A) (Fig. 41N); radial cell of hind wing (R1) closed, with anal cell (A) and two middle cells (Rs and M) present (Fig. 41N). Tergum 1 with a more or less narrow and deep median split.

The colouration of the species is black with more or less blue metallic lustre and with yellowish markings. The size ranges from 5.0 to 15.0 mm in length.

Host plants

Nothing is known about their host plants.

Remarks

According to Taeger *et al*. (2010) three species of *Pampsilota* are distributed in the East Palaearctic and the Oriental Region as well as five valid species are known for the Afrotropical Region.

The absence of the preapical spine on the hind tibia distinguishes species of the genus *Pampsilota* from *Arge* species. The following two known southern African species are currently classified as *Pampsilota* species, despite their relatively small size compared to the West African type species *P. afer* (length 14.0 to 15.0mm), because it is not possible to find any significant morphological differences warranting the placement of these species in a separate genus. However, a revision of the genus *Pampsilota* may possibly provide evidence that the Namibian species do not belong in this genus.

Pampsilota brandbergensis Koch, 2006

Pampsilota brandbergensis Koch, 2006a: 120. ♂. Type locality: Brandberg Massif, Namibia (NNIC).

Male (Figs 102A, B)

Head black; apical half of mandible brown becoming dark reddish apically; flagellum dark brown. Thorax black; pronotum and tegula yellow. Legs black; anterior surface of fore tibia brownish yellow, posterior surface brown. Wings subhyaline; fore wing

Fig. 102. A-B. *Pampsilota brandbergensis*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

with slightly infuscate substigmal spot; costa and stigma light brown, subcosta and rest of venation brown. Abdomen black; terga 3-5 yellow with medio-apical blackish spot on tergum 5, terga 2,6 yellow laterally, terga 7-9 with very slight metallic lustre; sterna 3-6 yellow with medio-apical blackish marking, sternum 9 (subgenital plate) with yellow apical half.

Head narrowed behind eyes. Antenna 2.0× as long as maximum head width; flagellum scarcely enlarged towards apex, triangular in cross section, somewhat flattened apically, interior surface with sharply compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes slightly converging below. Anterior margin of the clypeus shallowly circularly emarginate (Fig. 103A), supraclypeal area flatly rising up to base of interantennal carinae, interantennal carinae sharply ridged, scarcely converging downwards, extending about one third way to clypeus.

Vertex, frons and clypeus impunctate, shiny; gena with micropunctures, shiny; pubescence whitish. Mesoscutum nearly impunctate, shiny; pubescence similar to that on head. Abdomen shiny; terga 1-3 with irregular microsculpture, posterior margin of tergum 8 with large triangular membranous medial depression. Genitalia: as in Figs 103B-D.

Length: 5.5-6.0 mm.

Female

Unknown.

Etymology

This species is named after its collection locality, the Brandberg Massif in Namibia.

Distribution

Namibia (Erongo Region) (Fig. 176).

Ecology and habitat

The Brandberg Massif (Fig. 16) is located in the Nama Karoo Biome (for further details see *Arge meyi* and Fig. 80). The flight season is not well known, the specimens were sampled in March.

Remarks

Variability in colour pattern is scarcely noticeable. Tergum 5 may be entirely yellow and the pronotum may have a small ventro-lateral blackish spot.

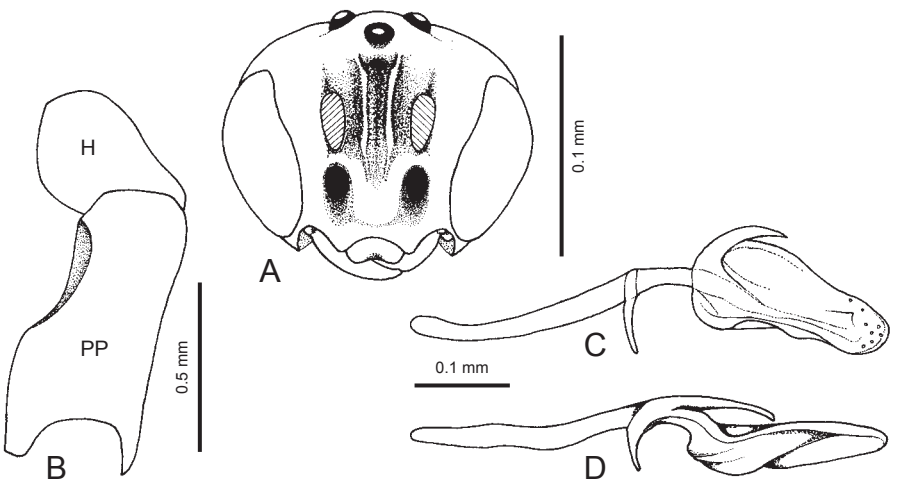

Fig. 103. A-D. *Pampsilota brandbergensis*. **A**. Head (frontal aspect). **B**. Harpe and parapenis (right, ventral aspect). **C**. Penis valve (left, lateral aspect). **D**. Penis valve (right, ventral aspect).

Pampsilota luederitzensis Koch, 2006

Pampsilota luederitzensis Koch, 2006b: 224. ♀. Type locality: Scorpion Hills, Lüderitz, Namibia (NNIC).

Female

Head and antenna black; apical half of mandible brown, gradually becoming blackish apically. Thorax black. Legs black; tibiae whitish, apically slightly brownish, tarsi brownish. Wings hyaline; fore wing with very small, slightly infuscate substigmal spot; intercostal area slightly flavescent-hyaline, costa light brown with basal half

white, stigma, subcosta and rest of venation light brown. Abdomen yellowish brown; terga 1,2 black, terga 3-5 with small light brown medial spot, tergum 5 additionally with light brown posterior margin, terga 6,7 brown; ventral surface of abdomen brown with yellow longitudinal medial strip.

Head parallel-sided behind eyes. Antenna 1.6× as long as maximum head width; flagellum scarcely enlarged towards apex, quadrangular in cross section, somewhat flattened toward apex, ventral surface with moderately compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes slightly converging downwards. Anterior margin of clypeus shallowly circularly emarginate medially, supraclypeal area roundly protruding up to start of interantennal carinae, interantennal carinae sharply ridged between antennae, converging downwards, extending about one third of way to clypeus.

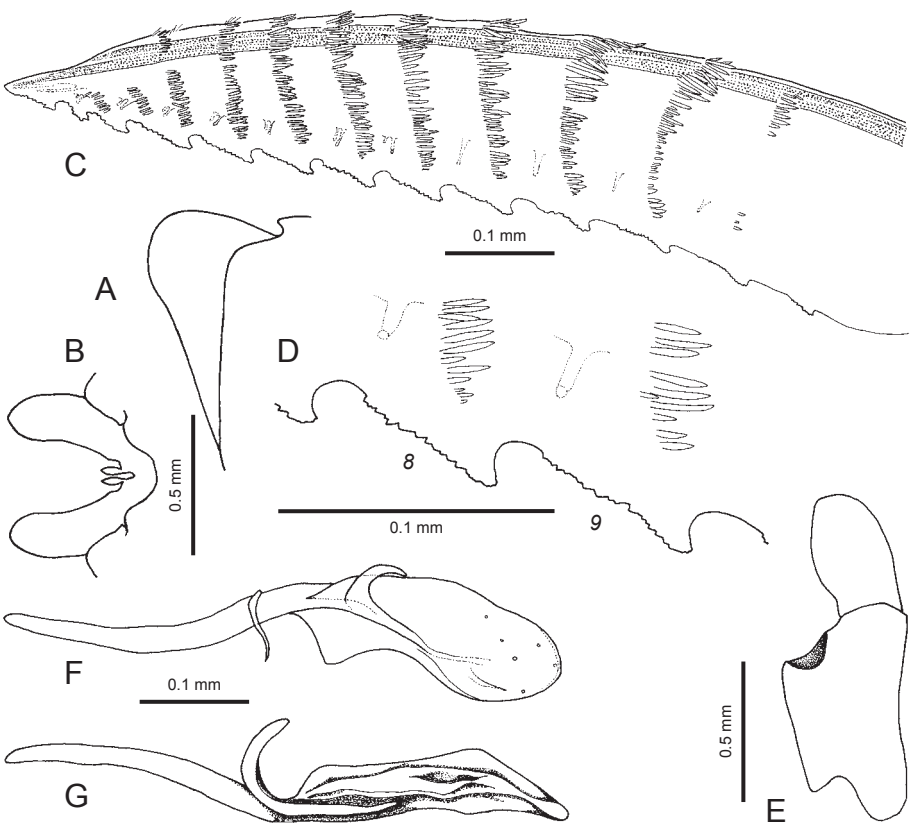

Fig. 104. A-G. *Pampsilota luederitzensis*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Lancet. **D**. Serrulae 8-9. **E**. Harpe and parapenis (right, ventral aspect). **F**. Penis valve (left, lateral aspect). **G**. Penis valve (right, dorsal aspect).

Vertex, frons, gena, clypeus and supraclypeal area sparsely micropunctate, shiny. Pubescence whitish. Mesoscutum nearly impunctate, shiny; pubescence similar to that on head; lateral lobe of mesoscutum with narrow glabrous strip. Sawsheath: Figs 104A, B. Lancet with about 13 serrulae (Figs 104C, D).

Length: 6.0 mm.

Male (Fig. 105A)

Generally colouration similar to that of female. Head and mesoscutum with slight metallic lustre; anterior margin of labrum brownish, apex of mandible dark brown. Tarsi light brown. Costa of fore wing almost entirely whitish. Abdomen blackish, tergum 3 yellowish with light brown median spot, terga 4,7 light brown, distal terga yellow; sterna 7,9 yellow.

Antenna 1.7× as long as maximum head width; apex of flagellum flattened, interior surface with sharply compressed longitudinal carina. Other features as for female. Genitalia: Figs 104E-G.

Length: 5.3 mm.

Fig. 105. *Pampsilota luederitzensis*, habitus, male. Dorsal aspect.
(Photo by A.D. Liston)

Etymology

The species is named after Lüderitz, the district where the specimens were collected.

Distribution

Namibia (Karas Region) (Fig. 176).

Ecology and habitat

Pampsilota luederitzensis seems to be endemic to the Succulent Karoo Biome of the winter rainfall zone. The collection localities Scorpion Hills and Rosh Pinah (Fig. 106) are considered by Burke (2004) and Mendelsohn *et al*. (2002) as hotspots of plant endemism and plant diversity. The flight season is not well known, the specimens were sampled in August.

Remarks

Pampsilota luederitzensis is the second known species of this genus in the Namibian sawfly fauna together with *P. brandbergensis* Koch, 2006a.

The yellow pronotum, the entirely yellow terga and the entirely black legs of *P. brandbergensis* immediately distinguish this species from *P. luederitzensis*.

Fig. 106. Scorpion Hills near Rosh Pinah in the Succulent Karoo Biome (southern Namibia), the habitat of *Pampsilota luederitzensis* and *Triarge karooensis*. (Photo by F. Koch)

Genus *Triarge* Forsius, 1931

Triarge Forsius, 1931: 19. Type species: *Triarge plumbea* Forsius, 1931, by original designation. http://www.waspweb.org/Tenthredinoidea/Argidae/Arginae/Triarge/index.htm

Description

Antenna 3-segmented (Fig. 40A), scape and pedicel short, flagellum very long and unsegmented, in females subclavate segment. Clypeus not clearly separated by an epistomal suture from the supraclypeal area (Fig. 107B); interantennal area with a pair of more or less sharply ridged interantennal carinae (Fig. 107B). Hind tibia with a preapical spine (Fig. 40C); tarsal claws simple (Fig. 44E). Fore wing with radial crossvein (2r) absent, crossvein 2r-m absent, thus there are three cells (1R1, a long 2Rs, 3Rs), anal cell (2A) long petiolate (1A), basal cell (1A) nearly closed (Fig. 41L); hind wing with closed, appendiculated radial cell (R1), with anal cell (A) and with two middle cells (Rs and M) present (Fig. 41L). Tergum 1 with narrow, deep median split. Sawsheath in dorsal view conspicuously forcipated.

The colouration of the species is completely black, sometimes with a slight blue metallic lustre (with a single exception, *T. flavoapicalis* that has a yellow abdominal apex).

Ranging from 5.0 to 7.5 mm in length.

Host plants

Nothing is known about their host plants.

Remarks

The species of the genus *Triarge* are known only from the winter rainfall zone of southern Africa, and inhabit very small ranges. Their habitats belong to the Succulent Karoo Biome and Fynbos Biome. In total 9 species are known, which were revised by Koch (2006b, 2010a). *Triarge* species are distinguished from *Arge* by possessing the radial cell 1R1 and the long radial sector 2Rs (1Rs fused with 2Rs; Fig. 41L), as well as in their nearly entirely black colouration.

Differentiation of the females, based on the combination of both the shape of the serrulae and the shape of the sawsheath, is clearly easier than for the males. The genitalia of the males show only a few distinct interspecific differences. Not all of the *Triarge* species are imaged, because they do not differ externally to any considerable extent.

Triarge citrusdalensis Koch, 2006

Triarge citrusdalensis Koch, 2006b: 227. ♀. Type locality: Citrusdal Distr[ict] (Western Cape Province, South Africa) (SAMC).

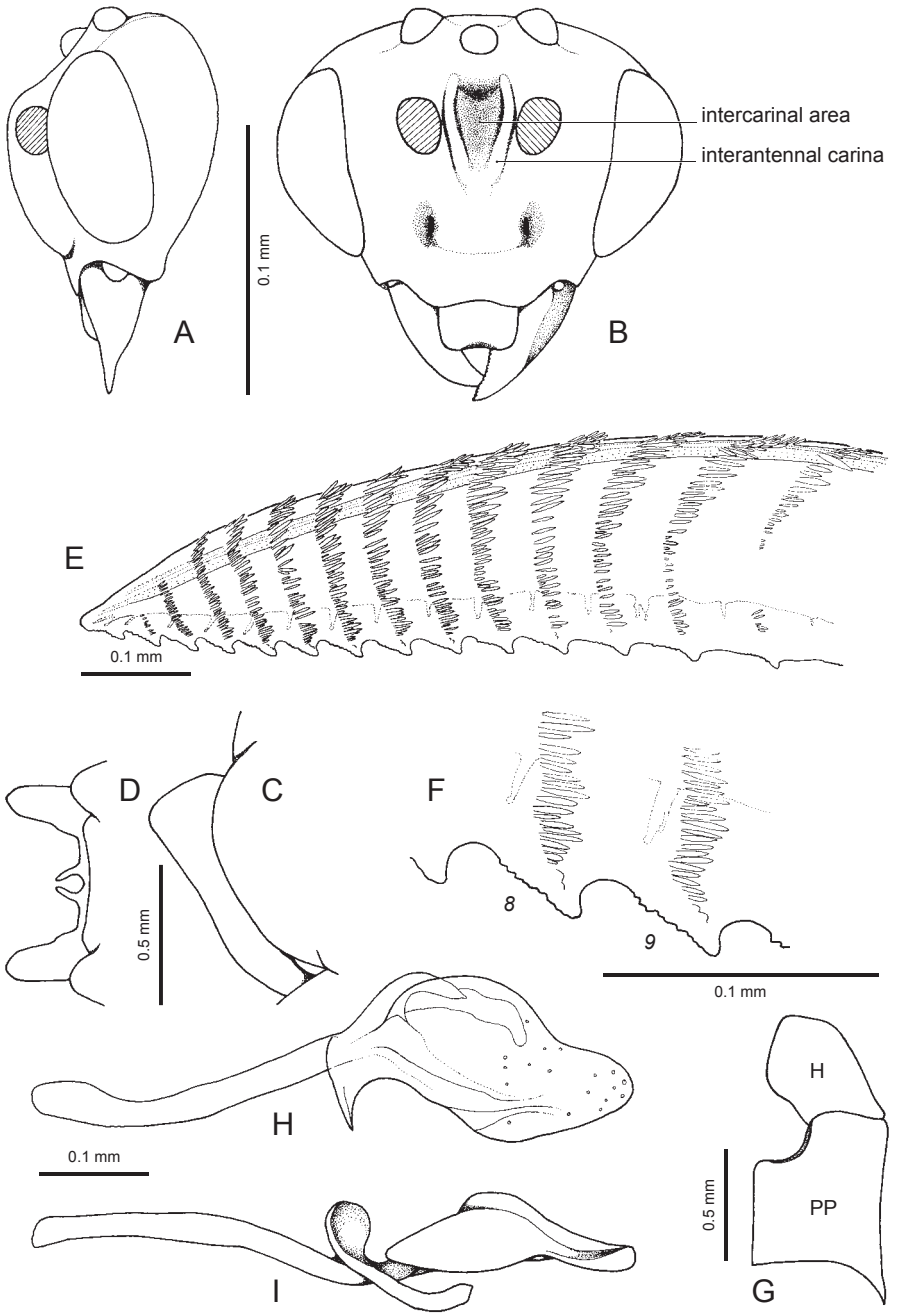

Fig. 107. A-I. *Triarge citrusdalensis*. **A**. Head of female (lateral aspect). **B**. Head (frontal aspect). **C**. Sawsheath (lateral aspect). **D**. Sawsheath (dorsal aspect). **E**. Lancet. **F**. Serrulae 8-9. **G**. Harpe and parapenis (right, ventral aspect). **H**. Penis valve (left, lateral aspect). **I**. Penis valve (right, dorsal aspect).

Female

Head and antenna black; apical half of mandible light reddish brown. Thorax black. Legs black; apices of femora very narrowly light brown, fore tibia light brown, basal third of mid and hind tibia light brown gradually becoming brown apically. Wings very slightly infuscate; fore wing with very small, slightly infuscate substigmal spot; costa, stigma, subcosta, and rest of venation brown. Abdomen black with slight blue metallic lustre.

Head slightly narrowed behind eyes. Antenna 1.5× as long as maximum head width; flagellum very slightly enlarged towards apex, and quadrangular in cross section, ventral surface with moderately compressed longitudinal carina, gradually disappearing apically, other longitudinal carinae more weakly compressed. Eyes very slightly converging downwards, anterior margin of clypeus shallowly circularly emarginate, supraclypeal area roundly protruding up to start of interantennal carinae (Fig. 107A), interantennal carinae sharply ridged between antennae, extending about one quarter of way to clypeus (Fig. 107B).

Vertex, frons, gena, clypeus, and supraclypeal area with scattered micropunctures, shiny; pubescence whitish. Mesoscutum scarcely micropunctate, shiny, and pubescent similarly to head. Abdomen shiny, terga with transverse microsculpture. Sawsheath: Figs 107C, D. Lancet with about 15 serrulae (Figs 107E, F).

Length: 7.0 mm.

Male (Figs 108A, B)

Colouration generally similar to that of female. Tibiae brown, basal third of mid and hind tibia and anterior surface of hind tibia downward to apex somewhat paler. Head slightly narrowed behind eyes. Antenna 2.5× as long as maximum head width; third antennomere not enlarged towards apex, ventral surface with conspicuously compressed longitudinal carina. Head and thorax more micropunctate than in female. Other features as for female. Genitalia: Figs 107G-I.

Length: 6.5 mm.

Etymology

This species is named after its collection locality, Citrusdal.

Distribution

South Africa (Western Cape Province) (Fig. 177).

Ecology and habitat

The habitat is located in the Mountain Fynbos vegetation type of the winter rainfall zone. The flight season is not well known, only a few specimens were collected from September to November.

Remarks

In its morphological structures and sculpture, especially in the head *T. citrusdalensis* could be confused with *T. nigra*, but in dorsal view the apices of sawsheath of *T. citrusdalensis* are more swollen (Figs 107D, 119D) and the serrulae are rounded at the anterior edge, whereas in *T. nigra* the serrulae are pointed on the anterior edge with one additional subbasal tooth (Fig. 119F). Furthermore the tibiae of *T. nigra* are darker. The shape of serrulae in *T. citrusdalensis* is most similar to *T. winterhoekensis*. However, in dorsal view the serrulae are flatter in *T. winterhoekensis* (Figs 122E, F), the shape of its sawsheath (Figs 122C, D) is distinctly distinguishable, and the legs are almost entirely black.

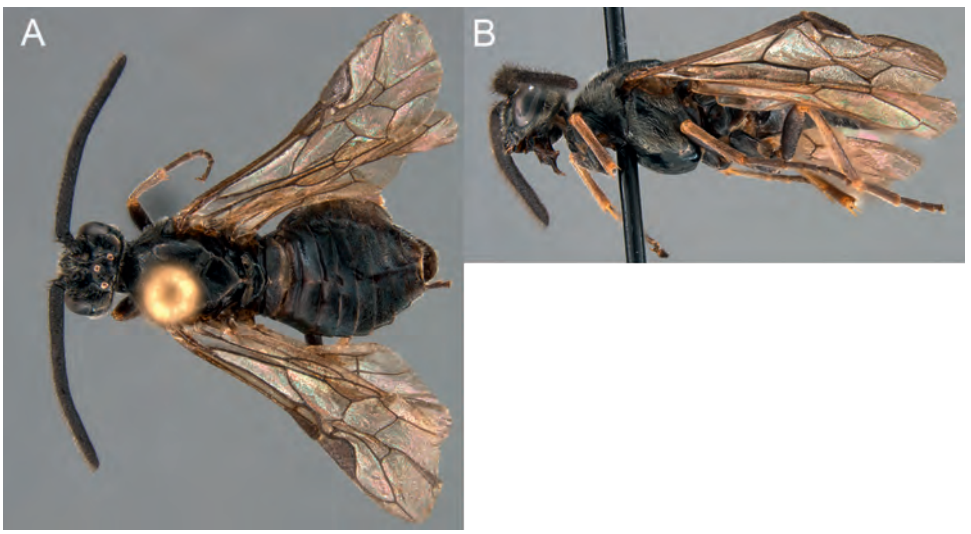

Fig. 108. A-B. *Triarge citrusdalensis*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Triarge driehoekensis Koch, 2010

Triarge driehoekensis Koch, 2010a: 99. ♀. Type locality: Driehoek, Cederberg, Western Cape Province, South Africa (SAMC).

Female (Figs 109A, B)

Head and antenna black; apical half of mandible light brown gradually becoming dark reddish apically. Thorax black. Legs black; apices of femora very narrowly light brown, anterior surface of fore and hind tibia light brown, basal third of hind tibia light brown, anterior surface downwards to the preapical spine dirty whitish. Wings hyaline, apical half very slightly infuscate; fore wing with very small, smoky

substigmal spot; costa, stigma, subcosta and rest of venation black. Abdomen black.

Head scarcely narrowed behind eyes. Antenna 1.5× as long as maximum head width; flagellum very slightly enlarged towards apex, triangular in cross section, ventral surface with moderately compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes slightly converging downwards. Anterior margin of clypeus very shallowly emarginate, supraclypeal area very gently rounded up to start of interantennal carinae (Fig. 110A), interantennal carinae sharply ridged between antennae, converging downwards, extending about one third of way to clypeus (Fig. 110B).

Vertex, frons, gena and clypeus with scattered micropunctures, shiny; supraclypeal area slightly shallowly rugosely sculptured, shiny; pubescence whitish. Mesoscutum scarcely micropunctate, shiny and pubescence similar to head. Abdomen shiny; terga irregularly microsculptured. Sawsheath: Figs 110C, D. Lancet with about 14 serrulae (Figs 110E, F).

Length: 6.7 mm.

Male

Unknown.

Etymology

This species was named after its collection locality, Driehoek, an area in the central Cederberg Mountains.

Distribution

South Africa (Western Cape Province) (Fig. 177).

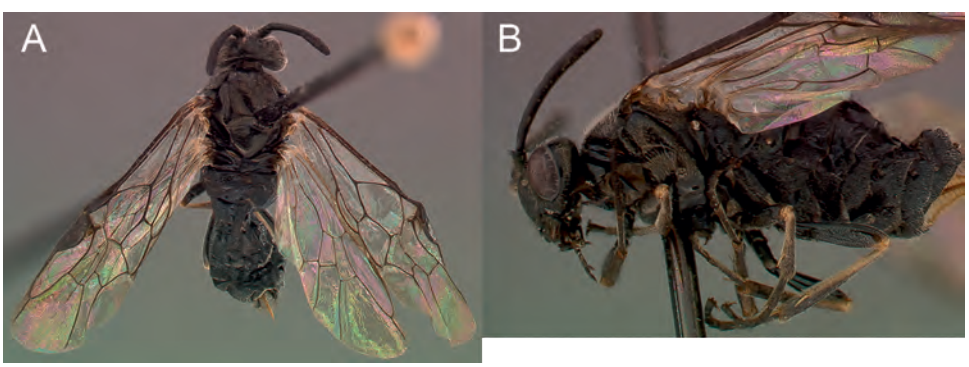

Fig. 109. A-B. *Triarge driehoekensis*, habitus, female (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Ecology and habitat

The collection locality (Fig. 111) belongs to the Mountain Fynbos vegetation type of the winter rainfall zone. The flight season is not well known. The species is only represented by the holotype, which was collected in September.

Remarks

In its morphological structures and sculpture *T. driehoekensis* could be confused with *T. namaquensis*, but in lateral view the sawsheath of *T. namaquaensis* is narrowly rounded at the apex (Fig. 116C), and in dorsal view the sawsheath is more broadly forcipated (Fig. 116D). Furthermore, the serrulae of *T. namaquaensis* are flat and hook-like (Figs 116E, F).

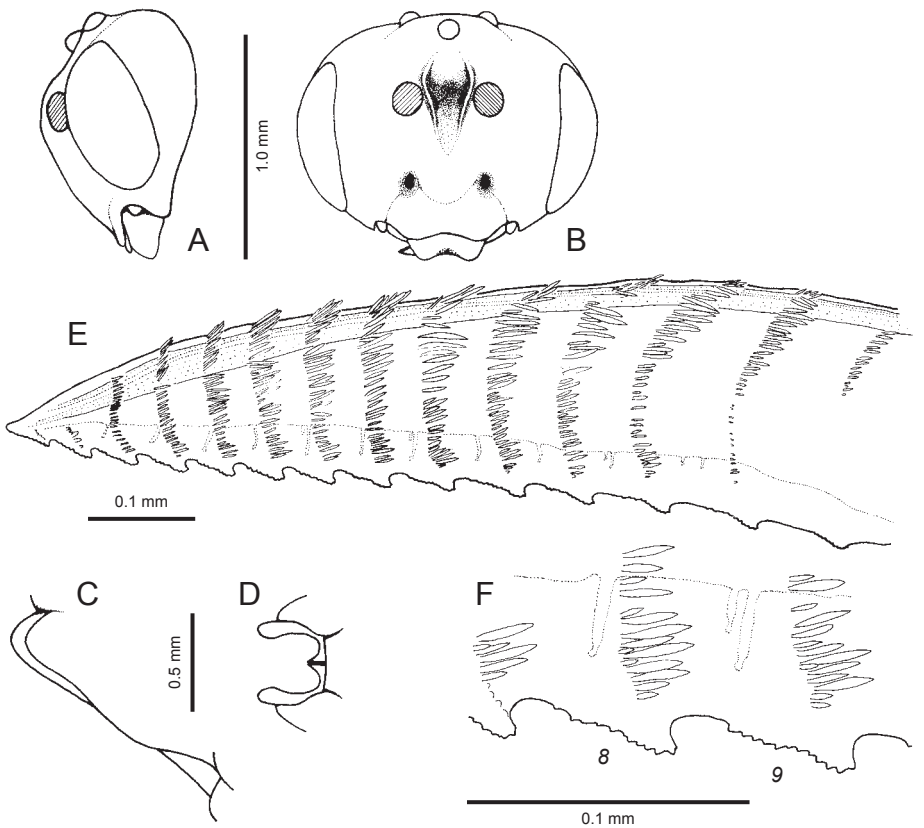

Fig. 110. A-F. *Triarge driehoekensis*. **A**. Head of female (lateral aspect). **B**. Head (frontal aspect). **C**. Sawsheath (lateral aspect). **D**. Sawsheath (dorsal aspect). **E**. Lancet. **F**. Serrulae 8-9.

Fig. 111. The landscape of Driehoek in the Cederberg Mountains (Western Cape Province); the habitat of *Triarge driehoekensis*. (Photo by F. Koch)

Triarge flavoapicalis Koch, 2006

Triarge flavoapicalis Koch, 2006b: 226, 228. ♀. Type locality: Bowesdorp, Namaqualand (Northern Cape Province, South Africa) (SAMC).

Female

Head black with slightly copper lustre; labrum brown, apical half of mandible light brown gradually becoming dark reddish apically; antenna black. Thorax black. Legs black; apices of femora very narrowly light brown, basal half of fore tibia light brown becoming dark brown apically, basal third of mid and hind tibia yellowish becoming dark brown apically, anterior surface of hind tibia yellowish downwards to the preapical spine. Wings slightly flavescent-hyaline throughout; fore wing with very small, slightly infuscate substigmal spot; costa yellowish, stigma, subcosta and rest of venation light brown. Abdomen black; tergum 8 laterally, terga 9,10 and sawsheath yellow.

Head narrowed behind eyes. Eyes converging below. Anterior margin of clypeus shallowly circularly emarginate, supraclypeal area roundly protruding up to base

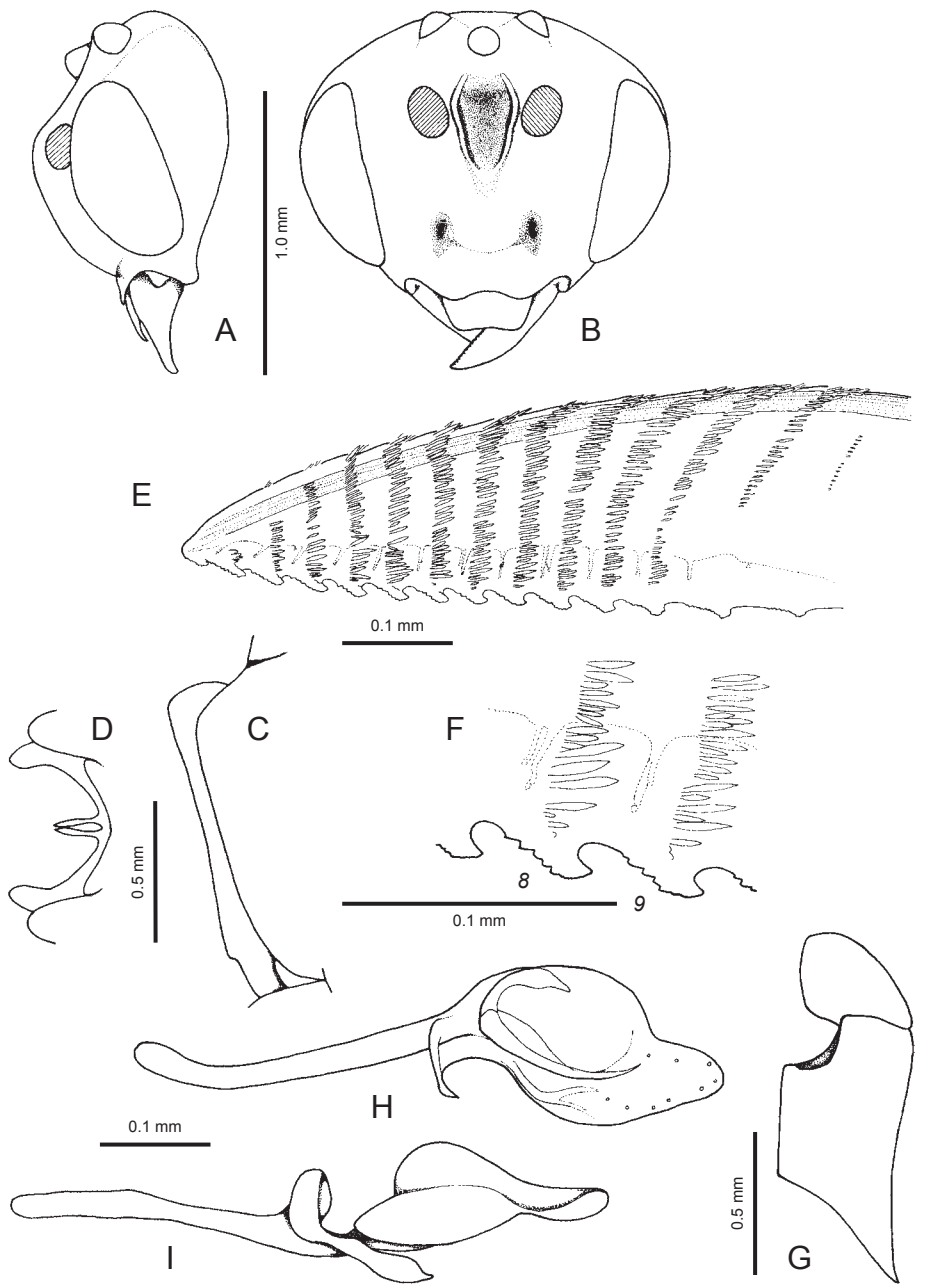

Fig. 112. A-I. *Triarge flavoapicalis*. **A**. Head of female (lateral aspect). **B**. Head (frontal aspect). **C**. Sawsheath (lateral aspect). **D**. Sawsheath (dorsal aspect). **E**. Lancet. **F**. Serrulae 8-9. **G**. Harpe and parapenis (right, ventral aspect). **H**. Penis valve (left, lateral aspect). **I**. Penis valve (right, dorsal aspect).

of interantennal carinae (Fig. 112A), interantennal carinae sharply ridged between antennae, converging downwards, extending about half way to clypeus (Fig. 112B). Vertex, frons, gena, clypeus and supraclypeal area scarcely punctate, shiny; pubescence whitish. Mesoscutum nearly impunctate, shiny; pubescence similar to that on head. Abdomen shiny; terga with transverse microsculpture. Sawsheath: Figs 112C, D. Lancet with about 14 serrulae (Figs 112E, F).

Length: 6.3 mm.

Male (Figs 113A, B)

Colouration generally similar to that of female. Tibiae pale yellow, hind tibia becoming darker apically, tarsi brown. Tergum 8, sterna 5,6 medio-apically and sterna 7-9 entirely yellow. Antenna 2.2× as long as maximum head width; flagellum not enlarged towards apex, triangular in cross section, interior surface with distinctly compressed longitudinal carina, apex slightly flattened. Other features as for female. Genitalia: Figs 112G-I.

Length: 6.3 mm.

Etymology

The name of this species refers to the yellow apex of the abdomen.

Distribution

South Africa (Northern Cape Province) (Fig. 176).

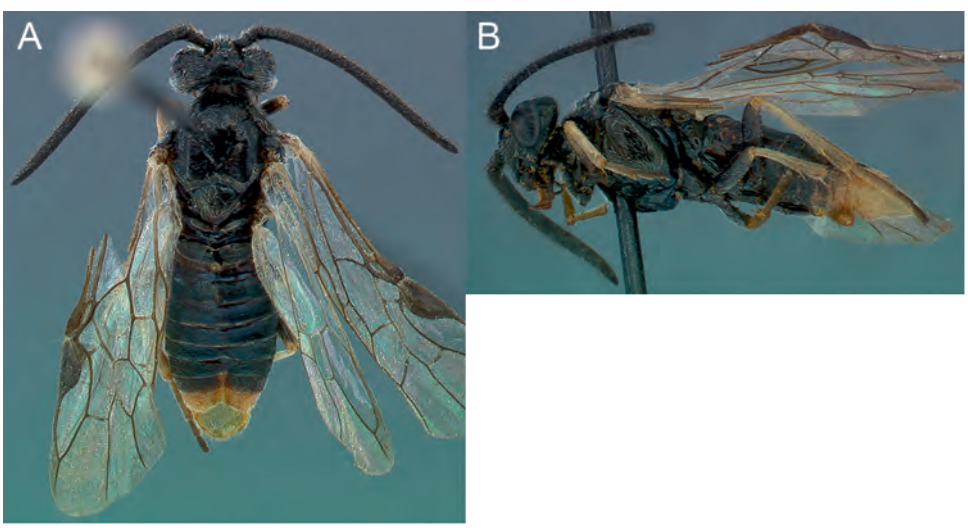

Fig. 113. A-B. *Triarge flavoapicalis*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Ecology and habitat

The collection locality belongs to the Succulent Karoo Biome of the winter rainfall zone. The flight season is not well known, only single records exist from September.

Remarks

Triarge flavoapicalis differs conspicuously from the other known species of this genus in its yellow apex of the abdomen. The antennae of the female are missing and therefore not described.

Triarge karooensis Koch, 2006

Triarge karooensis Koch, 2006b: 226, 229. ♀. Type locality: Scorpion Hill, Lüderitz, Namibia (NNIC).

Female

Head and antenna black; apical half of mandible light brown, gradually becoming dark reddish apically. Thorax black. Legs black; apices of femora very narrowly light brown, basal half of tibiae yellowish, gradually becoming brown apically, anterior surface of hind tibia dirty whitish, downwards from the preapical spine brown. Wings subhyaline; fore wing with very small, infuscate substigmal spot; costa, stigma, subcosta and rest of venation brown. Abdomen black.

Head slightly narrowed behind eyes. Antenna 1.4× as long as maximum head width; flagellum very slightly enlarged towards apex, triangular in cross section, ventral surface with moderately compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes very slightly converging downward. Anterior margin of clypeus very shallowly circularly emarginate, supraclypeal area flatly rising up to base of interantennal carinae (Fig. 114A), interantennal carinae sharply ridged between antennae, converging downwards, ending about one third distance to clypeus (Fig. 114B).

Vertex, frons, gena, clypeus, and supraclypeal area nearly impunctate, shiny; pubescence white. Mesoscutum micropunctate and pubescent similarly to head. Abdomen moderately shiny; terga with transverse microsculpture. Sawsheath: Figs 114C, D. Lancet about 13 serrulae (Figs 114E, F).

Length: 6.3 mm.

Male

Unknown.

Etymology

The species is named after the Succulent Karoo Biome of its habitat.

Distribution

Namibia (Karas Region) (Fig. 177).

Ecology and habitat

The habitat of the holotype is located in the Succulent Karoo Biome of the winter rainfall zone. The holotype was found in August.

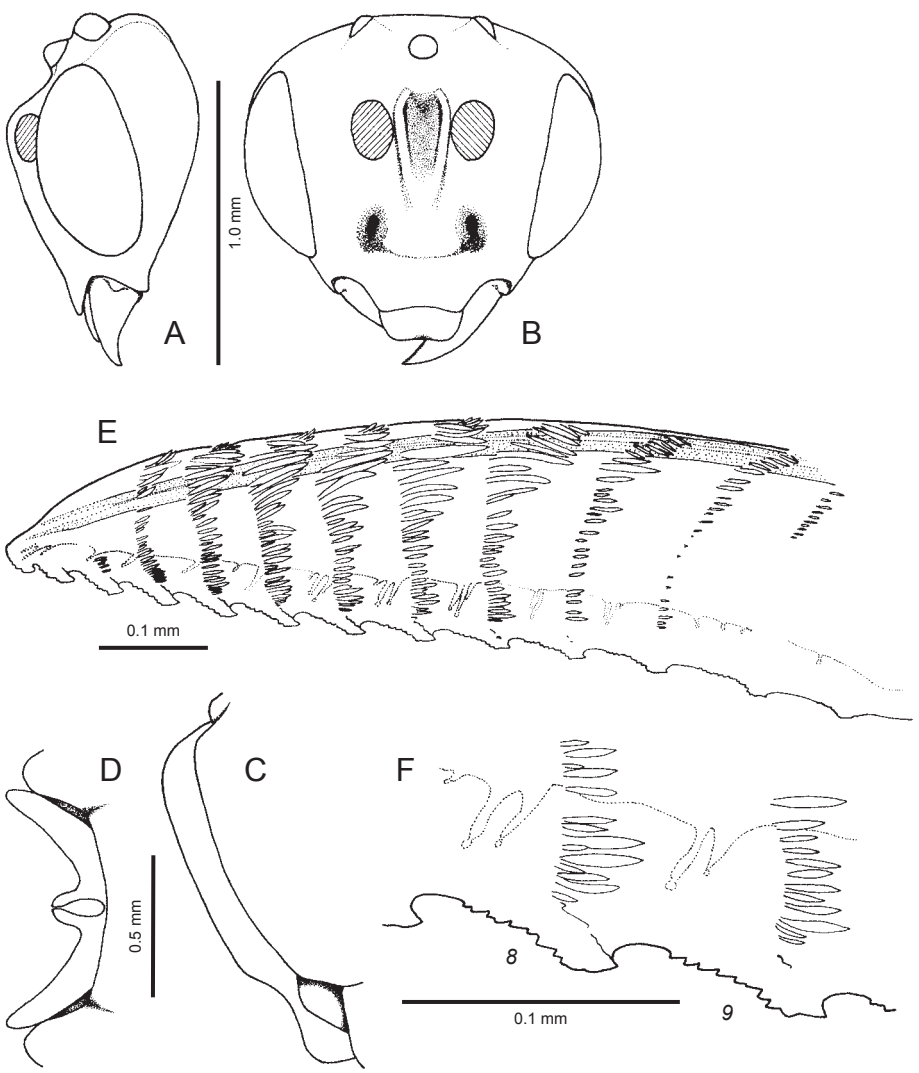

Fig. 114. A-F. *Triarge karooensis*. **A**. Head of female (lateral aspect). **B**. Head (frontal aspect). **C**. Sawsheath (lateral aspect). **D**. Sawsheath (dorsal aspect). **E**. Lancet. **F**. Serrulae 8-9.

Remarks

In dorsal view the apical gap of the forcipated sheath is very wide, similar to *T. mosselbayensis* (Fig. 115D). The tibiae of *T. karooensis* are more or less yellowish whereas in *T. mosselbayensis* the tibiae are black. Further differences between both species are discussed under *T. mosselbayensis*.

Triarge mosselbayensis Koch, 2006

Triarge mosselbayensis Koch, 2006b: 226, 231. ♀. Type locality: Mossel Bay, Western Cape Province, South Africa (UZMT).

Female

Head and antenna black; apical half of mandible reddish brown. Thorax black. Legs black; apices of femora very narrowly light brown. Wings hyaline; apical half slightly greyish-hyaline infused; fore wing with very small, slightly infuscate substigmal spot; costa, stigma, subcosta, and rest of venation brown. Abdomen black.

Head slightly narrowed behind eyes. Antenna 1.6× as long as maximum head width; flagellum very slightly enlarged towards apex, triangular in cross section, ventral surface with moderately compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes converging downwards. Anterior margin of clypeus very shallowly circularly emarginate, supraclypeal area nearly flatly rising up to start of interantennal carinae (Fig. 115A), interantennal carinae sharply ridged between antennae, converging downwards, extending about one third way to clypeus (Fig. 115B).

Vertex, frons, gena, clypeus and supraclypeal area nearly impunctate, shiny; pubescence greyish. Mesoscutum nearly impunctate, shiny, with pubescence similar to head. Abdomen moderately shiny; terga with distinctly contiguous micropunctures. Sawsheath: Figs 115C, D. Lancet with about 15 serrulae (Figs 115E, F).

Length: 6.0 mm.

Male

Colouration similar to that of female, except for brown tibiae. Other features as for female. Genitalia: Figs 115G-I.

Length: 6.0 mm.

Etymology

This species is named after its collection locality, Mossel Bay, Western Cape Province.

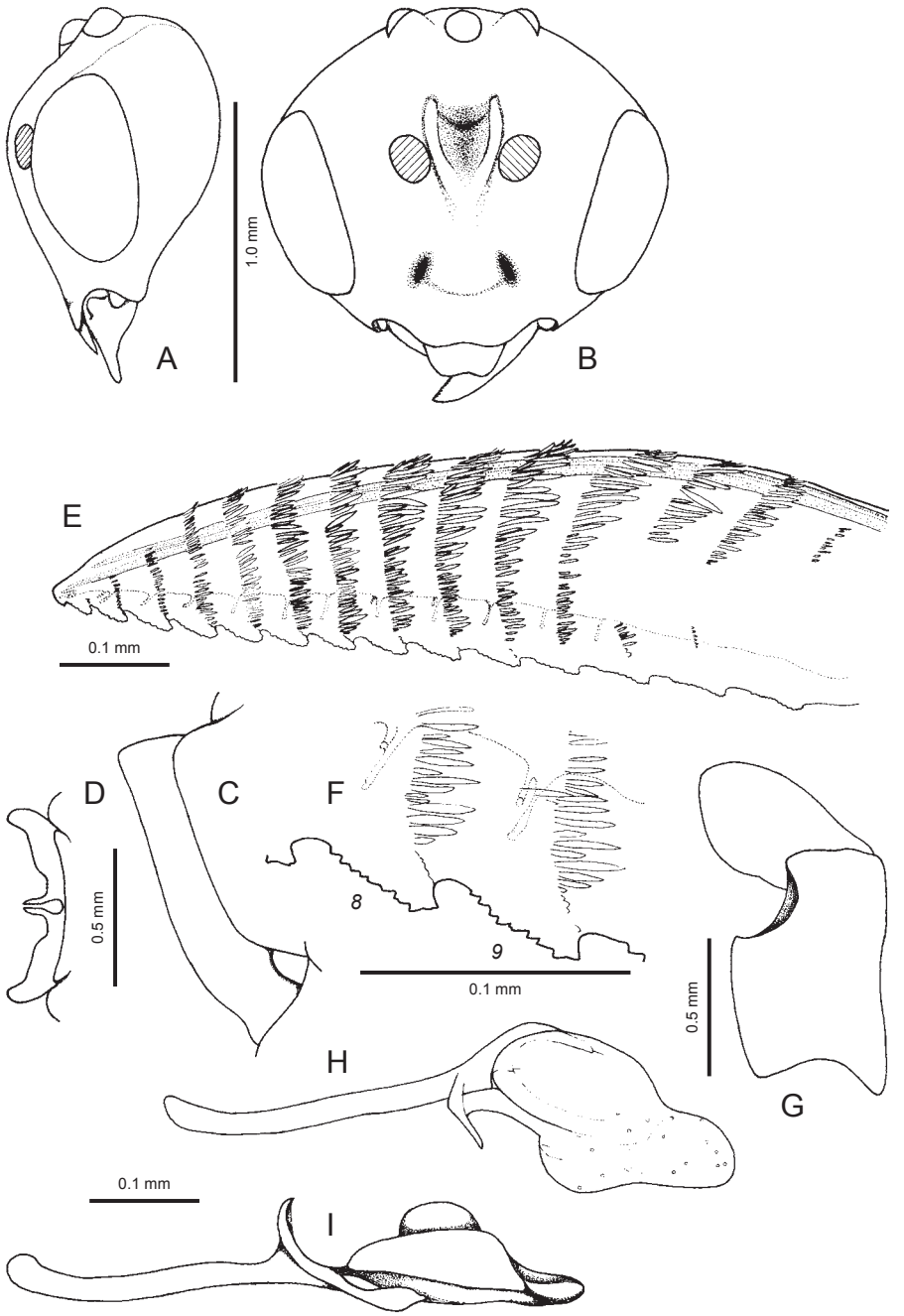

Fig. 115. A-I. *Triarge mosselbayensis*: **A**. Head of female (lateral aspect). **B**. Head (frontal aspect). **C**. Sawsheath (lateral aspect). **D**. Sawsheath (dorsal aspect). **E**. Lancet. **F**. Serrulae 8-9. **G**. Harpe and parapenis (right, ventral aspect). **H**. Penis valve (left, lateral aspect). **I**. Penis valve (right, dorsal aspect).

Distribution

South Africa (Western Cape Province) (Fig. 177).

Ecology and habitat

The habitat of this species belongs to the Coastal Fynbos vegetion type of the winter rainfall zone. The flight season is poorly known, only two records are known from the type locality in May and August.

Remarks

The holotype and paratype of *T. mosselbayensis* were the paratypes of *T. plumbea*. The differential diagnosis with *T. plumbea* is discussed under the treatment of the latter species. With the nearly flatly arising supraclypeal area and the shape of the sawsheath in dorsal view, *T. mosselbayensis* is similar to *T. karooensis* (Fig. 114D), but differs distinctly in the pointed apex of the sawsheath in lateral view and in the shape of the lancet including the serrulae, which are rather flattened in *T. karooensis* (Figs 114E, F).

Triarge namaquaensis Koch, 2006

Triarge namaquaensis Koch, 2006b: 226, 232. ♀. Type locality: Steinkopf, Kl.[ein] Namaland (Northern Cape Province, South Africa) (MFN).

Female

Head and antenna black; apical half of mandible light brown, gradually becoming dark reddish; flagellum apically dark brown. Thorax black. Legs black; apices of femora very narrowly light brown, basal half of tibiae fuscous, anterior surface of mid and hind tibia dirty whitish, downwards from the preapical spine blackish. Wings subhyaline; fore wing with very small, slightly infuscate substigmal spot; costa light brown, basal half and anterior margin whitish, stigma, subcosta and rest of venation brown. Abdomen black.

Head very slightly enlarged behind eyes. Antenna 1.2× as long as maximum head width; flagellum enlarged towards apex, quadrangular in cross section, ventral surface with slightly compressed longitudinal carina gradually disappearing apically, other longitudinal carinae more weakly compressed. Eyes very slightly converging downwards. Anterior margin of clypeus very shallowly triangularly excised, supraclypeal area very flatly rounded up to base of interantennal carinae (Fig. 116A), interantennal carinae sharply ridged between antennae, and converging downwards, extending about half way to clypeus (Fig. 116B).

Vertex, frons, gena, clypeus, and supraclypeal area sparsely micropunctate, shiny; pubescence white. Mesoscutum micropunctate and pubescence similar to head. Abdomen shiny; terga with transverse microsculpture. Sawsheath: Figs 116C, D. Lancet with about 13 serrulae (Figs 116E, F).

Length: 5.3 mm.

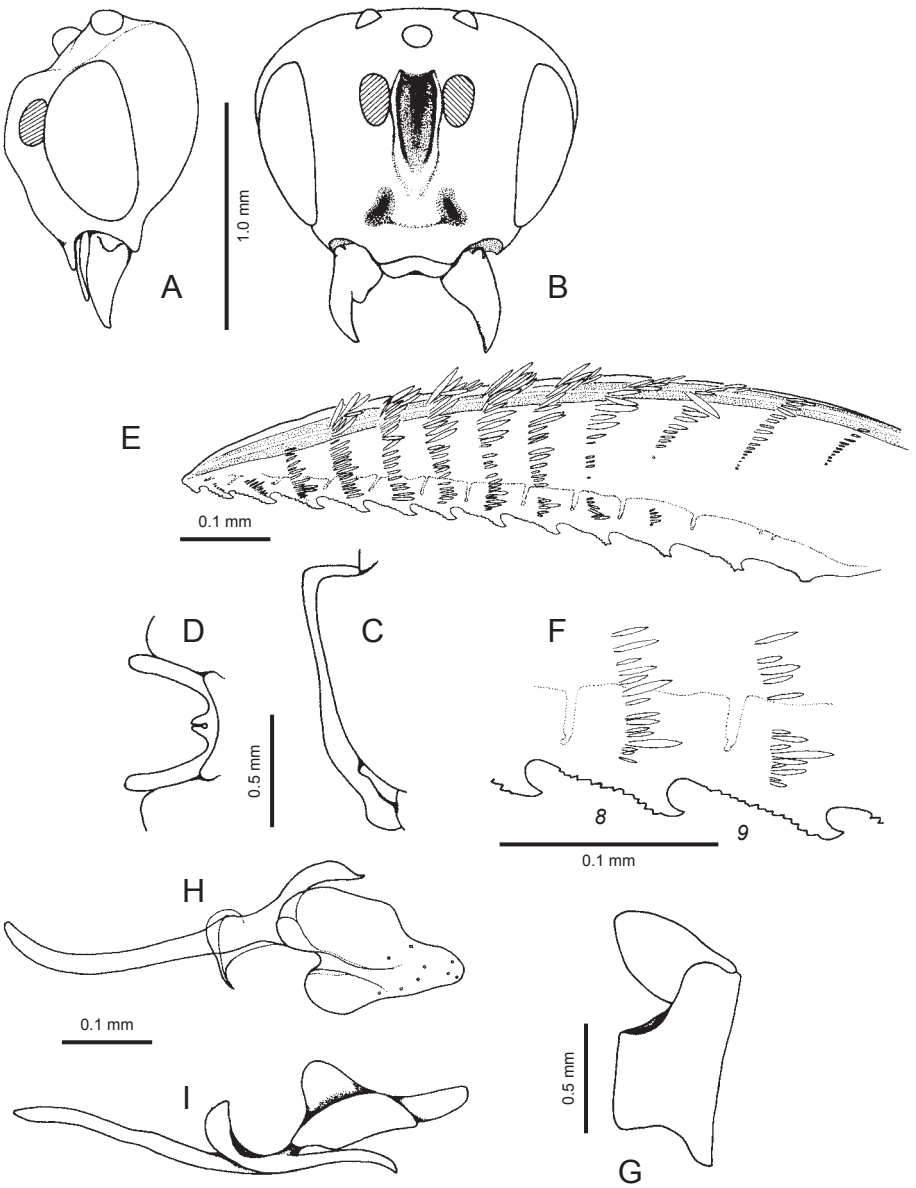

Fig. 116. A-I. *Triarge namaquaensis*. **A**. Head of female (lateral aspect). **B**. Head (frontal aspect). **C**. Sawsheath (lateral aspect). **D**. Sawsheath (dorsal aspect). **E**. Lancet. **F**. Serrulae 8-9. **G**. Harpe and parapenis (right, ventral aspect). **H**. Penis valve (left, lateral aspect). **I**. Penis valve (right, dorsal aspect).

Male

Colouration similar to that of female. Tibiae light brown becoming blackish apically. Wings slightly infuscate; costa, stigma, subcosta, and rest of venation brown. Terga with slight blue metallic lustre.

Head behind eyes slightly narrowed. Antenna 2.0× as long as maximum head width; flagellum not enlarged, somewhat flattened towards apex, ventral carina distinctly compressed. Other features as for female. Genitalia: Figs 116G-I.

Length: 5.0 mm.

Etymology

This species is named after the Namaqualand, the landscape around the locality of its origin.

Distribution

South Africa (Northern Cape Province) (Fig. 177).

Fig. 117. Habitat of *Triarge namaquaensis* (Succulent Karoo Biome) in the centre of the Namaqualand near Kamieskroon (Northern Cape Province). (Photo by F. Koch)

Ecology and habitat

The habitat (Fig. 117) belongs to the Succulent Karoo Biome of the winter rainfall zone. The flight season is not well known. The specimens were collected in June and September.

Remarks

Intraspecific variability of males is visible in the colouration of the sternum 9 which varies from black to light brown. Furthermore, the posterior margin of sternum 9 may be shallowly emarginated medially. The female of *T. namaquaensis* is clearly distinguished from other species in the sharp, hook-like serrulae (Figs 116E, F). The shape of the penis valve is similar to that of *T. mosselbayensis* and the differential diagnosis is given under that species.

Triarge nigra Koch, 2006

Triarge nigra Koch, 2006b: 227, 233. ♀. Type locality: Pakhuis Pass, C[ape]. P[rovince] (Western Cape Province, South Africa) (SAMC).

Female (Figs 118A, B)

Head and antenna black; apical half of mandible dark reddish brown. Thorax black. Legs black; apices of femora very narrowly light brown, basal third of hind tibia light brown. Wings hyaline, in apical half very slightly infuscate; fore wing with very small, slightly infuscate substigmal spot; costa, stigma, subcosta, and rest of venation brown. Abdomen black with slight blue metallic lustre.

Head slightly narrowed behind eyes. Antenna 1.3× as long as maximum head width; flagellum slightly enlarged towards apex, triangular in cross section, ventral

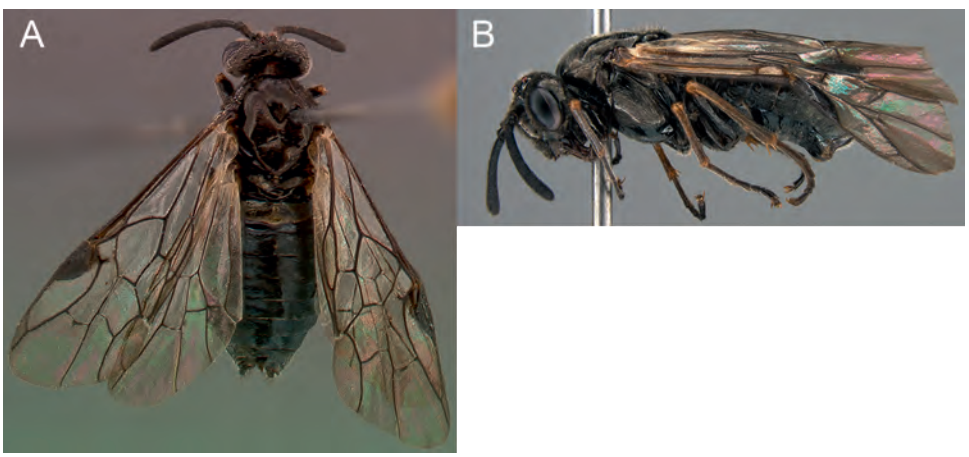

Fig. 118. A-B. *Triarge nigra*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

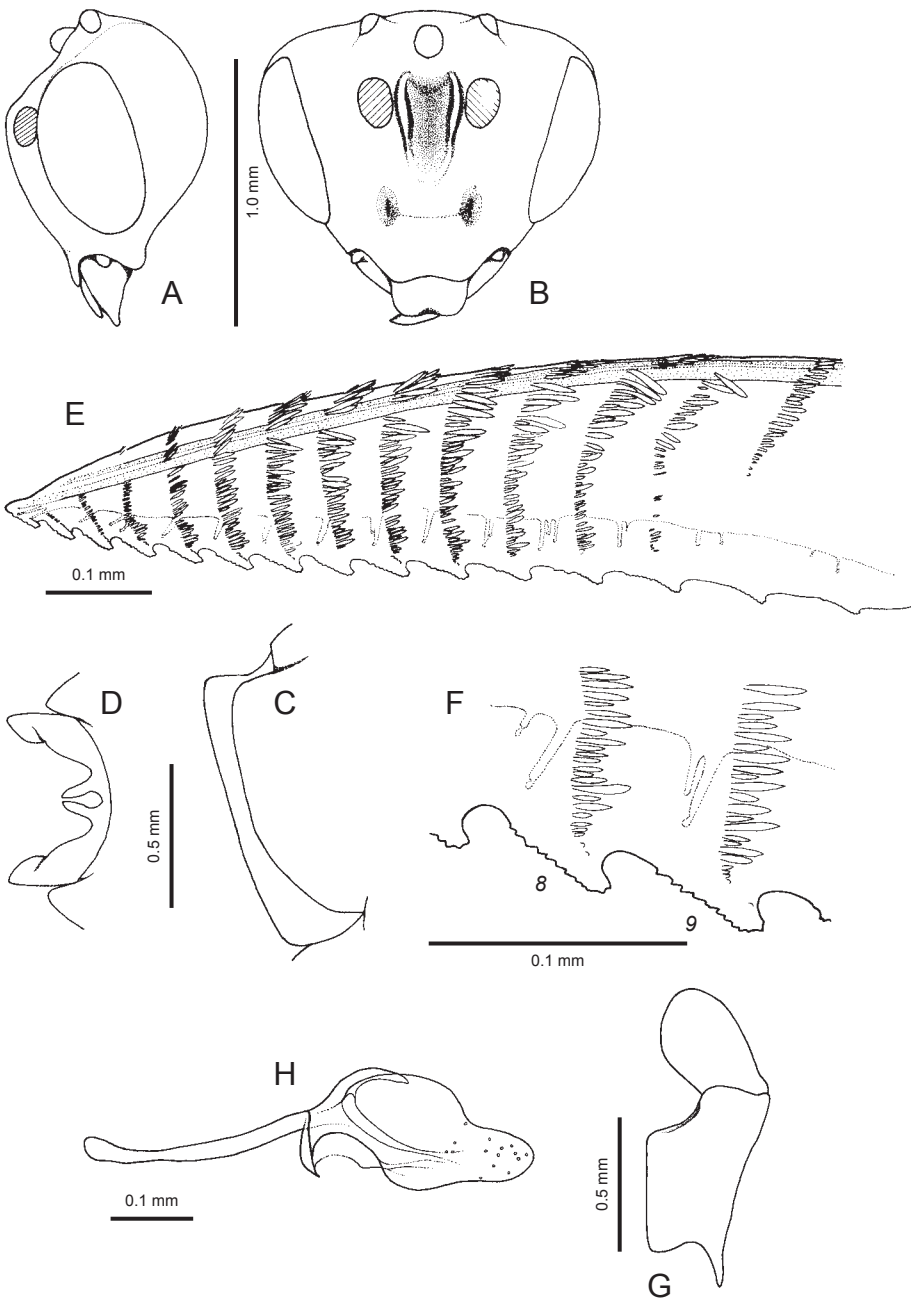

Fig. 119. A-H. *Triarge nigra*. **A**. Head of female (lateral aspect). **B**. Head (frontal aspect). **C**. Sawsheath (lateral aspect). **D**. Sawsheath (dorsal aspect). **E**. Lancet. **F**. Serrulae 8-9. **G**. Parapenis and harpe (right, ventral aspect). **H**. Penis valve (left, lateral aspect).

surface with moderately compressed longitudinal carina, other longitudinal carinae more weakly compressed. Eyes slightly converging downwards. Anterior margin of clypeus very shallowly circularly emarginate, supraclypeal area very flatly rounded up to start of interantennal carinae (Fig. 119A), interantennal carinae sharply ridged between antennae, scarcely converging downwards, extending about one quarter of way to clypeus (Fig. 119B).

Vertex, frons, gena, clypeus, and supraclypeal area scattered micropunctate, shiny; pubescence white. Mesoscutum scarcely micropunctate, shiny, with pubescence similar to head. Abdomen shiny; terga contiguously micropunctate on basal half and with transverse microsculpture on apical half. Sawsheath: Figs 119C, D. Lancet with about 15 serrulae (Figs 119E, F).

Length: 6.8-7.5 mm.

Male

Colouration similar to that of female. Costa, stigma, subcosta, and rest of venation veins dark brown. Terga with slight blue metallic lustre.

Head behind eyes slightly narrowed. Antenna 2.5× as long as maximum head width; flagellum not enlarged, flattened towards apex, ventral carina distinctly compressed. Other features as for female. Genitalia: Figs 119G, H.

Fig. 120. The habitat (Sandstone Fynbos) of *Triarge nigra* in the Cederberg Mountains near Clanwilliam (Western Cape Province). (Photo by F. Koch)

Length: 5.5 mm.

Etymology

The specific name refers to the almost entirely black body of the imago.

Distribution

South Africa (Western Cape Province) (Fig. 176).

Ecology and habitat

The habitats are located in the Mountain Fynbos vegetation type of the winter rainfall zone (Fig. 120). The flight season is not well known. The specimens were collected in August and September.

Remarks

In its morphological structures *T. nigra* could be confused with *T. citrusdalensis*. The differential diagnosis is discussed under the latter species.

The shape of serrulae in *T. nigra* is most similar to *T. mosselbayensis* (Figs 115E, F) and *T. plumbea* (Figs 121E, F), but in these species the serrulae are flatter and in dorsal view the shape of their sawsheaths (Figs 115D, 121D) is distinctly different.

The male of this species is described here for the first time.

Triarge plumbea Forsius, 1931

Triarge plumbea Forsius, 1931: 19. ♀. Type locality: Ceres, Cape Province (Western Cape Province, South Africa) (BMNH).

Female

Head and antenna black; apical half of mandible light brown. Thorax black. Legs black; apices of femora very narrowly light brown, basal third of tibiae light brown, gradually becoming brown apically, anterior surface of hind tibia dirty whitish, downwards from the preapical spine brown. Wings hyaline; apical half slightly flavescent-hyaline infused, fore wing with very small, slightly infuscate substigmal spot; costa, stigma, subcosta, and rest of venation light brown. Abdomen black with slight blue metallic lustre.

Head slightly narrowed behind eyes. Antenna 1.6× as long as maximum head width; flagellum slightly enlarged towards apex, triangular in cross section, ventral surface with moderately compressed longitudinal carina, other longitudinal carinae weaker compressed. Eyes converging downwards. Anterior margin of clypeus shallowly emarginate medially, supraclypeal area very flatly rounded to the point of interantennal carinae (Fig. 121A), interantennal carinae sharply ridged between antennae, converging downwards, ending about half way to clypeus (Fig. 121B).

Vertex, frons, gena, clypeus, and supraclypeal area scattered micropunctate, shiny; pubescence white. Mesoscutum scarcely micropunctate, shiny; pubescence similar to head. Abdomen moderately shiny; terga with distinctly transverse microsculpture. Sawsheath. Figs 121C, D. Lancet with about 15 serrulae (Figs 121E, F).

Length: 6.8 mm.

Male

Unknown.

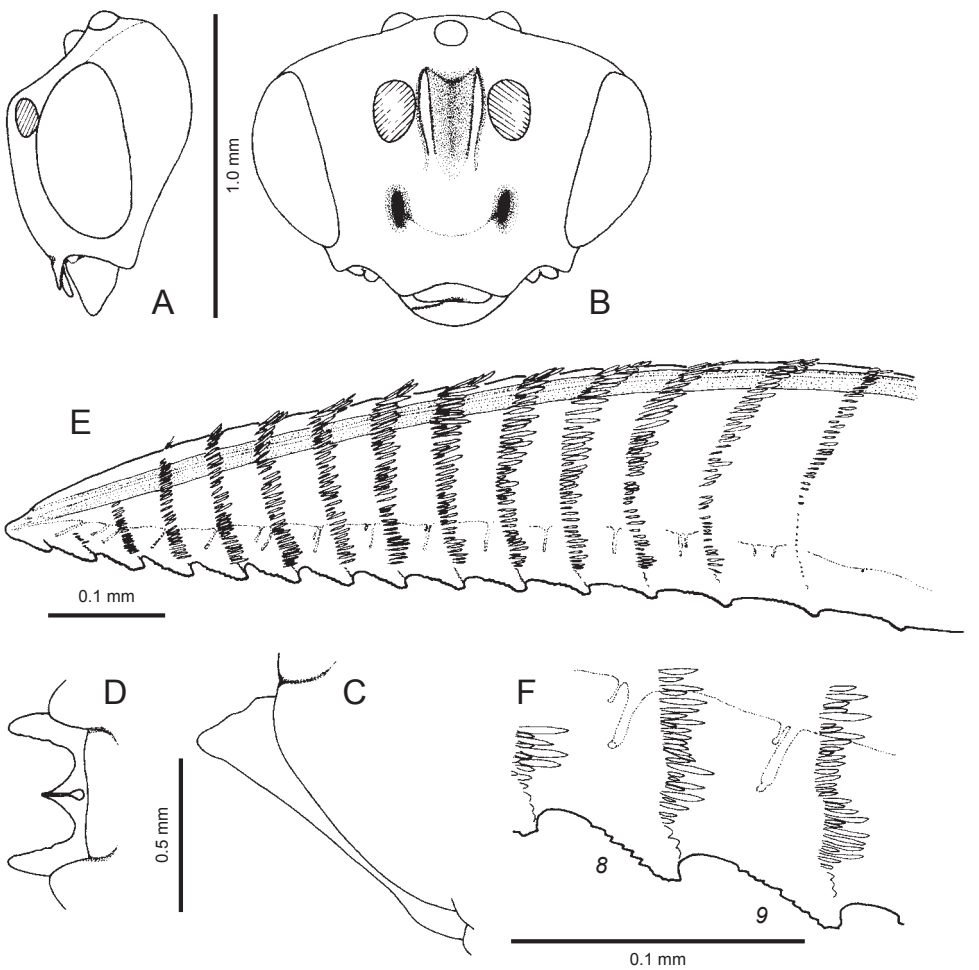

Fig. 121. A-F. *Triarge plumbea*. **A**. Head of female (lateral aspect). **B**. Head (frontal aspect). **C**. Sawsheath (lateral aspect). **D**. Sawsheath (dorsal aspect). **E**. Lancet. **F**. Serrulae 8-9.

Etymology

The Latin adjective *plumbea* means “coloured like lead”, and refers to the body colour.

Distribution

South Africa (Western Cape Province) (Fig. 177).

Ecology and habitat

The type locality belongs to the Mountain Fynbos vegetation type of the winter rainfall zone. The flight season is poorly known, only one specimen has been collected, in November.

Remarks

The paratypes of *T. plumbea* from Mossel Bay belong *T. mosselbayensis* (Koch 2006b).

The apical gap in the sawsheath of *T. mosselbayensis* (Fig. 115D) is conspicuously wider than in *T. plumbea*. The abdomen of *T. mosselbayensis* is contiguously micropunctate and without blue metallic lustre.

Triarge winterhoekensis Koch, 2006

Triarge winterhoekensis Koch, 2006b: 227, 236. ♀. Type locality: Gt.[Great] Winthoek [Winterhoek], Tulbagh (Western Cape Province, South Africa) (SAMC).

Female

Head and antenna black; apical half of mandible dark reddish brown. Thorax black. Legs black; apices of femora very narrowly light brown, tibiae light brown, hind tibia becoming somewhat darker apically. Wings slightly flavescent-hyaline; fore wing with very small, slightly infuscate substigmal spot; costa, stigma, subcosta, and rest of venation light brown. Abdomen black without blue metallic lustre.

Head scarcely narrowed behind eyes. Antenna 1.4× as long as maximum head width; flagellum slightly enlarged towards apex, quadrangular in cross section, ventral surface with moderately compressed longitudinal carina, other longitudinal carinae weaker compressed. Eyes slightly converging downwards. Anterior margin of clypeus very shallowly circularly emarginate, supraclypeal area nearly flatly rising up to start of interantennal carinae (Fig. 122A), interantennal carinae moderately ridged between antennae, scarcely converging downwards, very short, extending at the anterior margin of toruli (Fig. 122B).

Vertex, frons, gena, clypeus, and supraclypeal area scarcely micropunctate, shiny; pubescence white. Mesoscutum scarcely micropunctate, pubescence similar to that on head. Abdomen shiny; terga with transverse microsculpture. Sawsheath: Figs 122C, D. Lancet with about 15 serrulae (Figs 122E, F).

Length: 5.5-6.0 mm.

Male

Unknown.

Etymology

This species is named after its collection locality, Great Winterhoek (shortened on the label).

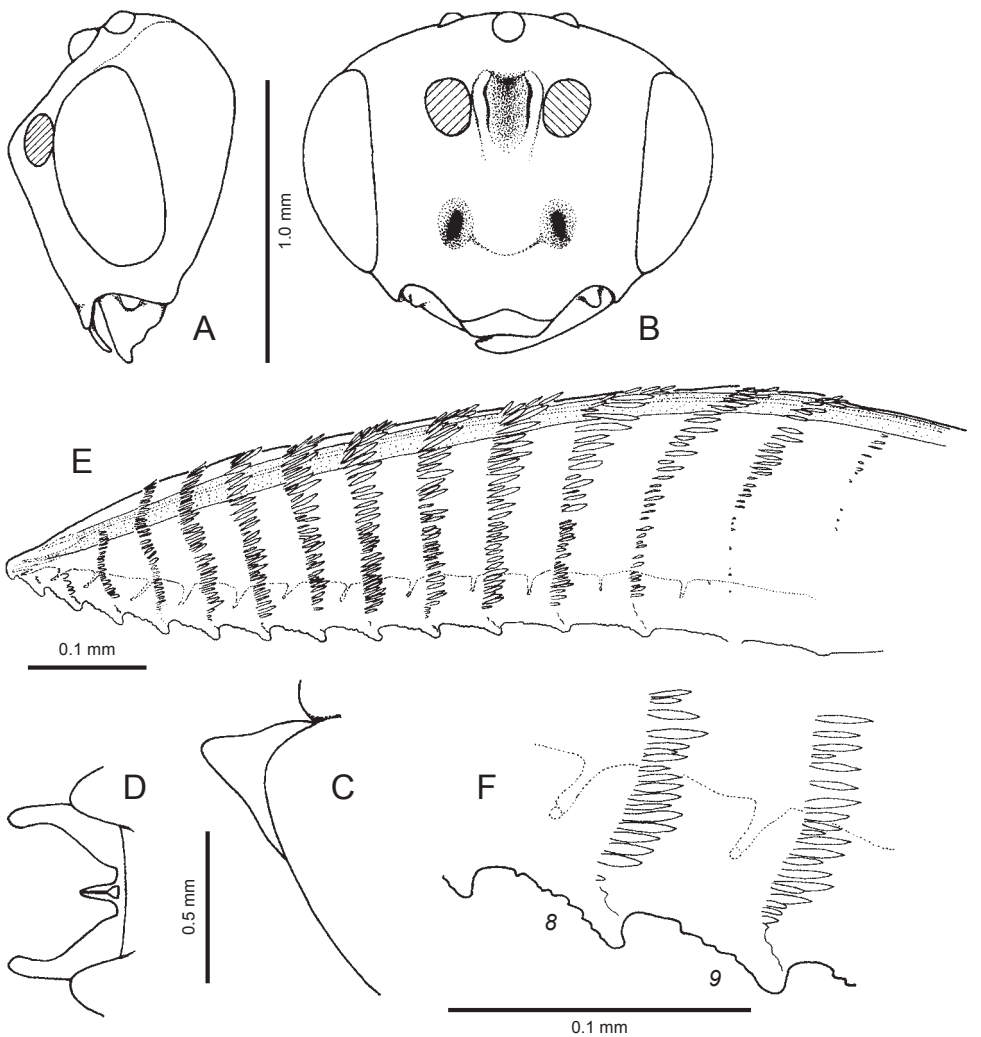

Fig. 122. A-F. *Triarge winterhoekensis*. **A**. Head of female (lateral aspect). **B**. Head (frontal aspect). **C**. Sawsheath (lateral aspect). **D**. Sawsheath (dorsal aspect). **E**. Lancet. **F**. Serrulae 8-9.

Distribution

South Africa (Western Cape Province) (Fig. 176).

Ecology and habitat

The habitat belongs to the Mountain Fynbos vegetation type of the winter rainfall zone. The flight season is not well known, some specimens have been recorded in November.

Remarks

The distinct short interantennal carina and relatively narrowed apical gap of the sawsheath differentiate *Triarge winterhoekensis* from the other known *Triarge* species. The shape of serrulae resembles *T. citrusdalensis* (Figs 107E, F). The differences between these two species are discussed under *T. citrusdalensis*.

Family Tenthredinidae

Subfamily Athaliinae

Genus *Athalia* Leach, 1817

Athalia Leach, 1817: 126. Type species: *Tenthredo spinarum* Fabricius, 1793 [= *Athalia rosae rosae* (Linnaeus, 1758)], by subsequent designation of Curtis (1836). http://www.waspweb.org/Tenthredinoidea/Tenthredinidae/Athaliinae/Athalia/index.htm

Description

Antenna moderately long, 9(10)-12-segmented, apical flagellomere mostly indistinctly separated, distal flagellomeres often slightly broader than long (Figs 123D, 125A, 128A, 130B, C, 134C). Head without especially conspicuous structures, surface smooth and shiny; clypeus separated by epistomal suture from supraclypeal area (Figs 123A-C); clypeus elongate medially and rounded at anterior margin (Fig. 123A) as for *Athalia* "*incomta*" species group, truncated to subtruncated at anterior margin (Fig. 123B) as for *A. himantopus* species group (Koch 2007), or very short medially and conspicuously excised at anterior margin (Fig. 123C) as for *A. vollenhoveni* species group (Koch 2006c); malar space variably developed in female, in male almost linear or absent; frontal area indistinctly limited; lateral furrows of postocellar area indistinct. Tarsal claws simple (Fig. 123E). Fore wing with radial crossvein (2r) present, anal cell with crossvein (a), 2nd and 3rd anal vein (2A+3A) outlined (Fig. 41K); hind wing with closed radial cell (R1), petiolate (1A) anal cell (A) and two middle cells (Rs and M) (Fig. 41K). Tergum 1 with rather wide and deep median split (Fig. 123F).

Head predominantly black; thorax yellowish with black markings or completely black; abdomen entirely yellow or with tergum 1 more or less black.

Ranging from 4.5-9.5 mm in length.

Remarks

The species of the genus *Athalia* are distributed in the Afrotropical, Oriental and Palaearctic Region. Currently 48 valid species are known from the Afrotropical Region: Taeger *et al*. (2010) listed 46 species and additionally Koch (2010b) described two further species for southern Africa. Only two of the species groups have been recently revised: *Athalia vollenhoveni* species group (Koch 2006c), 10 species with excised anterior margin of clypeus (Fig. 123C), and *A. himantopus* species group (Koch 2007), 8 species with truncated or subtruncated anterior margin of clypeus (Fig. 123B).

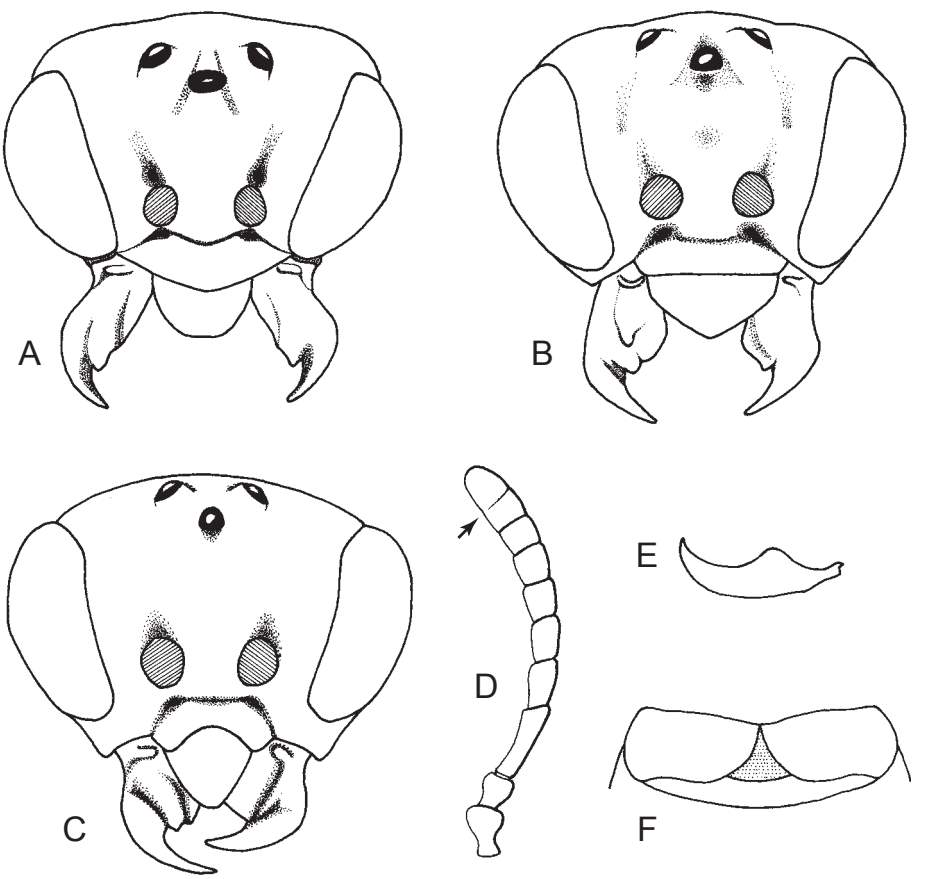

Fig. 123. A-F. *Athalia* spp. Frontal aspect of head: **A**. *Athalia* "*incomta*" species group. **B**. *Athalia himantopus* species group. **C**. *Athalia vollenhoveni* species group. **D**. antenna (apical flagellomere indistinctly separated. arrowed). **E**. tarsal claw. **F**. tergum 1.

Sexual dimorphism of *Athalia* is relatively highly developed. The malar space of the male is conspicuously narrower than in the female. The male usually differs from the female by having a pale clypeus. The thorax of the male is uniformly pubescent, but in the female of several species there is a more or less large glabrous patch on the mesosternum.

For a correct identification of males it is necessary to examine the genitalia, especially the digitus and cuspis. In females the shape of the hypopygium is of importance for their classification.

Host plants

Most information on host plants is from Benson (1962) or based on notes on the labels. For most species reliable details are missing. The larvae of several species feed on different species of Brassicaceae (Benson 1962). Opitz *et al.* (2012) pioneered a new approach to identification of host plants, based on chemicals derived from the host that are sequestered in the adults. These results are discussed under the applicable species in the following treatments.

Adults commonly visit flowers or plants other than the larval hosts (Smith 1989). For example in 2001 *Athalia gessi* Koch, 2003 and *A. mashonensis* Enslin, 1911 were sampled in large numbers on the flowers of the Lemon Bush / Fever tea (*Lippia javanica* (Burman f.) Sprengel) (Verbenaceae) in the Lekgalameetse Nature Reserve, Limpopo Province, South Africa (Koch 2003).

Athalia brevicornis **Benson, 1962**

Athalia brevicornis Benson, 1962: 358, 361. ♂♀. Type locality: Maseru, Basutoland [Lesotho] (BMNH).

Athalia limpopo Benson, 1962: 373, 374, **syn. n.** ♀. Type locality: Delagoa Bay, Mozambique (BMNH).

Fig. 124. A-B. *Athalia brevicornis*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Female (Figs 124A, B)

Head black, supraclypeal area pale; basal half of mandible whitish becoming reddish to dark reddish apically; labrum and clypeus dirty whitish; ventral surface of antenna pale. Thorax yellow with mesoscutum black and basal half of mesoscutellum blackish. Legs yellow; hind tibia and hind tarsomeres black ringed apically. Wings slightly bicoloured with very slightly flavescent-hyaline in basal half and very slightly infuscate apically; intercostal area fuscous, stigma, costa and subcosta dark brown, rest of venation yellow, in apical half somewhat darker. Abdomen entirely yellow with apical half of sawsheath black.

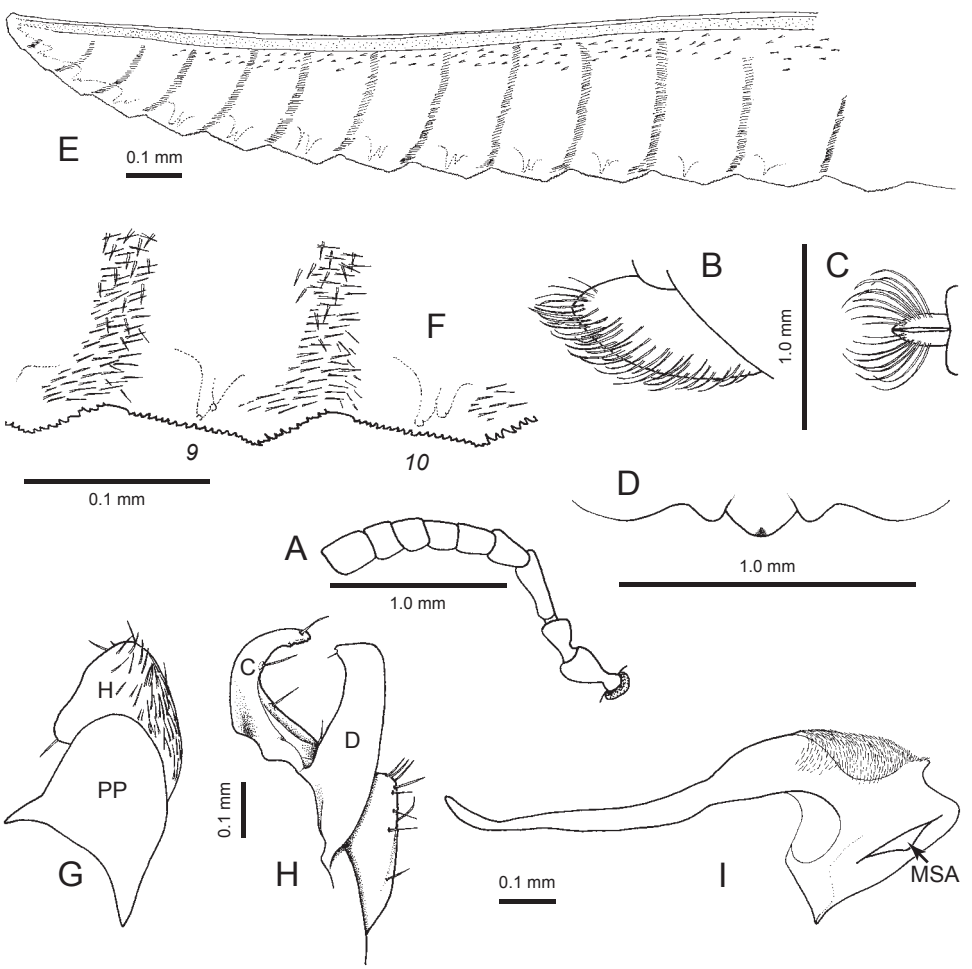

Fig. 125. A-I. *Athalia brevicornis*. **A**. Antenna. **B**. Sawsheath (lateral aspect). **C**. Sawsheath (dorsal aspect). **D**. Hypopygium (posterior margin). **E**. Lancet. **F**. Serrulae 9-10. **G**. Parapenis and harpe (right, ventral aspect). **H**. Cuspis and digitus (left, inner lateral aspect). **I**. Penis valve (left, lateral aspect), MSA (arrowed).

Antenna 1.2× as long as maximum head width, slightly enlarged towards apex, 9-segmented (Fig. 125A). Clypeus elongate medially, anterior margin rounded. Malar space absent.

Head and thorax moderately densely micropunctate, shiny; pubescence on head and mesoscutum whitish. Abdomen smooth and shiny. Sawsheath in lateral view obtusely pointed apically (Fig. 125B), in dorsal view narrowed and pointed apically (Fig. 125C), Hypopygium: Fig. 125D. Lancet with about 14 serrulae (Figs 125E, F).

Length: 5.7-7.5 mm.

Male

Colouration similar to that of female. Antenna 1.2× as long as maximum head width, somewhat more enlarged as in female. Other features as for female. Genitalia: Figs 125G-I.

Length: 4.8-5.7 mm.

Etymology

The Latin adjective *brevicornis* means “short-horned”, with reference to the short antennae.

Fig. 126. The habitat of *Athalia brevicornis* and *A. ustipennis* in the riverine vegetation along the Kunene River in north-western Namibia (Thornbush Savanna Biome). (Photo by F. Koch)

Distribution

Botswana, Lesotho, Malawi, Mozambique, Namibia (Region: Kunene, Okavango, Otjozondjupa) South Africa (Province: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo) (Fig. 178), Zambia, Zimbabwe.

Host plant

Unknown.

Ecology and habitat

The Namibian collection sites are situated in riverine habitats on the Kunene River (Fig. 126), Okavango [Kavango]-River as well as in the Caprivi Strip, which are located in the Thornbush Savanna and Woodland Savanna Biomes. It appears that *A. brevicornis* prefers moist habitats with dense vegetation. The flight season is from December to April.

Remarks

Intraspecific variability of this species is apparent in the colouration of the supraclypeal area and mesoscutellum. The supraclypeal area may be nearly entirely black especially in females. The same applies to the colouration of the mesoscutellum. Furthermore, the costa and subcosta of the fore wing may be basally more or less yellow. Sometimes the bicolouration of the fore wing is faded.

The holotype of *A. limpopo* was examined, and it was not possible to find any differences to *A. brevicornis*, which are relevant for distinguishing them as different species; thus, it is synonymised with *A. brevicornis*.

Athalia incomta **Konow, 1908**

Athalia incomta Konow, 1908: 168. ♂. Type locality: Algoa Bay, Capland (Eastern Cape Province, South Africa) (SDEI).

Athalia xantha Benson, 1962: 364, 365, **syn. n.** ♀. Type locality: Weenan, Natal [KwaZulu-Natal Province], South Africa (BMNH).

Female (Figs 127A, B)

Head black; basal half of mandible whitish becoming reddish to dark reddish apically; clypeus sometimes brown or dirty yellow, labrum whitish; ventral surface of flagellum brownish. Thorax black with following yellow; metascutellum, mesosternum and metapleuron sometimes with blackish spot. Legs yellow; hind tibia with black apex, distal tarsomeres of fore and mid legs as well as hind tarsomeres black ringed apically. Wings sharply bicoloured with flavescent basal half and dark fuscous apical half, intercostal area blackish infuscate; stigma, costa and subcosta black, rest of venation yellow in basal half becoming blackish apically. Abdomen yellow; sawsheath with black apical half.

Antenna length 1.4× as long as maximum head width, 11-12-segmented, flagellomeres 11,12 mostly indistinctly separated (Fig. 128A). Clypeus elongate medially, anterior margin shallowly rounded. Malar space very narrowly developed. Head smooth and shiny, clypeus with scattered, flat punctures, shiny; pubescence greyish-brown. Mesoscutum smooth and shiny; pubescence similar to that on head. Abdomen smooth and shiny, tergum1 slightly microsculptured. Sawsheath in lateral view obtusely pointed apically (Fig. 128B), in dorsal view slightly narrowed and obtusely pointed apically (Fig. 128C). Hypopygium as in Fig. 128D. Lancet with about 16 serrulae (Fig. 128E).

Length: 6,0-8,5 mm.

Male

Colouration similar to that of female. Clypeus whitish. Antenna 1.2× as long as maximum head width. Other features as for female. Genitalia: Figs 128G-H.

Length: 5.5-7.0 mm.

Etymology

The species name is a Latin adjective meaning untidy or unadorned.

Distribution

Botswana, Lesotho, Malawi, Namibia (Otjozondjupa Region), South Africa (Province: Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga) (Fig. 179), Zambia, Zimbabwe, (Democratic Republic of the Congo, Benson 1962).

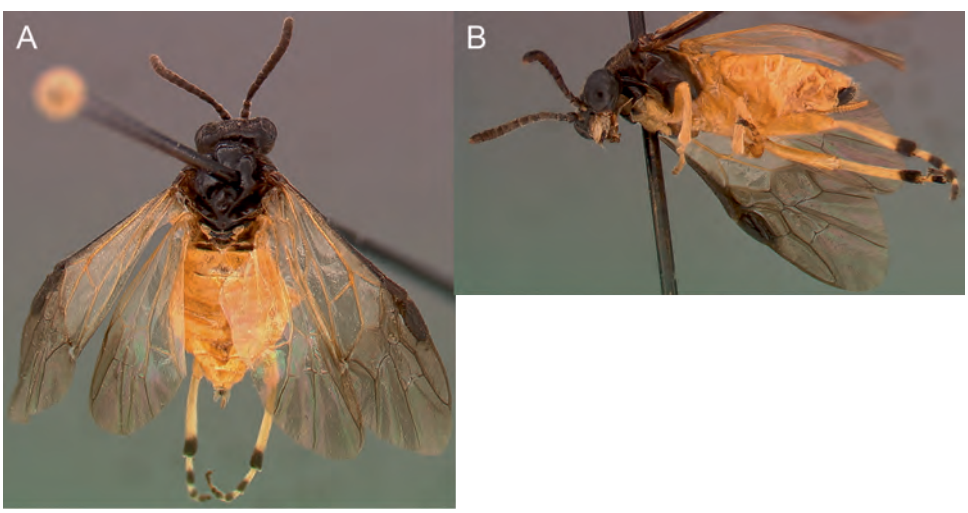

Fig. 127. A-B. *Athalia incomta*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Host plant

Adults were repeatedly observed on *Selago dinteri* Rolfe (Scrophulariaceae, Lamiales) on the plateau of the Waterberg. Based on biochemical analyses Opitz *et al*. (2012) determined plant species of Lamiales as host plants.

Ecology and habitat

Collected at the foot of and slightly higher up the Waterberg Mountain (Namibia) (Thornbush Savanna Biome), and in the Caprivi Strip in the Woodland Savanna Biome. The habitat is moist with dense vegetation (Fig. 24). All specimens were collected in February.

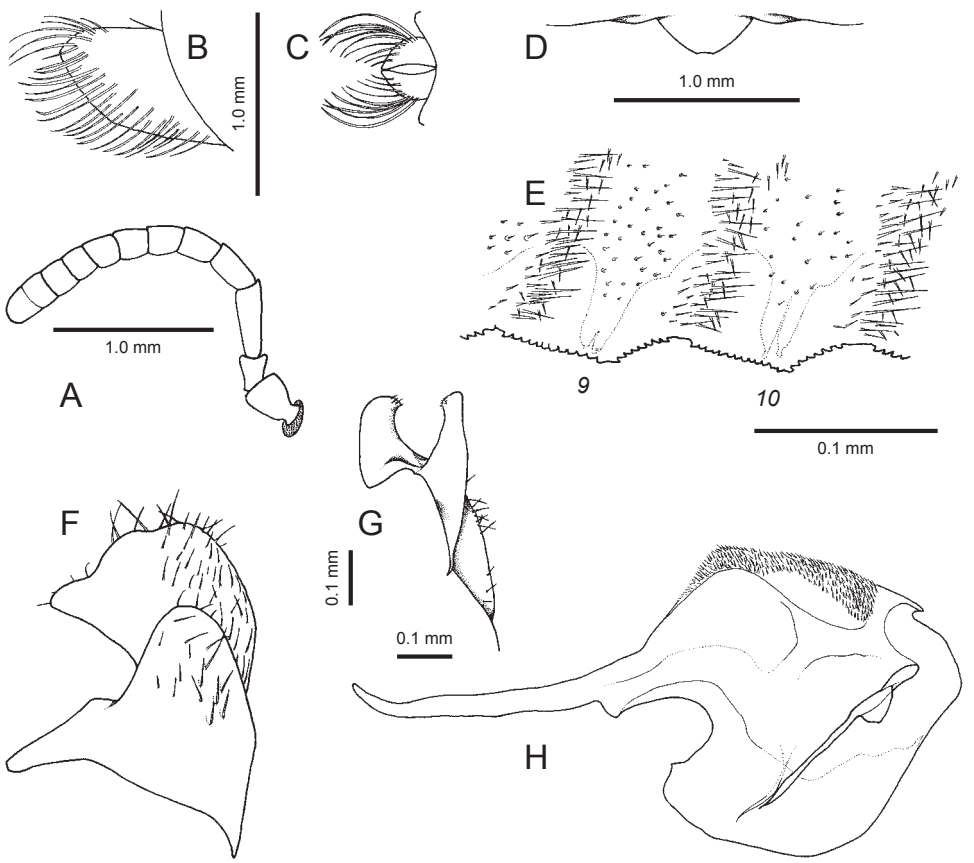

Fig. 128. A-H. *Athalia incomta*. **A**. Antenna. **B**. Sawsheath (lateral aspect). **C**. Sawsheath (dorsal aspect). **D**. Hypopygium (posterior margin). **E**. Serrulae 9-10. **F**. Parapenis and harpe (right, ventral aspect). **G**. Cuspis and digitus (left, inner lateral aspect). **H**. Penis valve (left,lateral aspect).

Remarks

At the first glance *Athalia incomta* is easy to recognize by its pattern of colouration – yellow mesosternum and bicoloured wings. Furthermore *A. incomta* is one of the most abundant sawfly species in southern Africa. In the Eastern provinces of South Africa and Zimbabwe this species is sampled regularly on *Tecomaria capensis* (Thunberg) Spach (Bignoniaceae). In the mountain region of the provinces Limpopo and Mpumalanga adults were collected on *Helichrysum krausii* (Schultz Bipontinus) (Asteraceae).

Prompted by the wide distribution of the species and its association with different plants, sequencing of the mitochondrial COI gene was carried out. Provisionally, it seems that three different species may be involved, but distinct morphological differences have not so far been found.

The holotype of *A. xantha* was examined, and it was not possible to find any differences to *A. incomta*, which are relevant for distinguishing them as different species; thus, it is synonymised with *A. incomta*.

Athalia maraisi Koch, 2010

Athalia maraisi Koch, 2010b: 279. ♂♀. Type locality: Okaputa, Grootfontein, Namibia (NNIC).

Fig. 129. A-B. *Athalia maraisi*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Female (Figs 129A, B)

Head black, narrow ventral angle of gena and malar space yellow; mandible yellow becoming brown to black apically; clypeus and labrum yellow; ventral surface of flagellum and scape light brown. Thorax yellow with following black: dorsal part of propleuron, pronotom medially, mesonotum, dorso-lateral margin of mesopleuron. Legs yellow; hind tibia black ringed apically, hind tarsus black with tarsomeres 1-3 yellow ringed basally. Wings slightly bicoloured, with basal half slightly flavescent-hyaline and apical half slightly infuscate; costa black with narrow yellow base, stigma and subcosta black, rest of venation yellow becoming blackish in apical half. Abdomen yellow; sawsheath with black apex.

Antenna 11-segmented, 1.2× as long as maximum head width, flagellomeres 9,10 conspicuously broader than long (Figs 130B, C). Clypeus slightly elongated medially, anterior margin shallowly rounded (Fig. 130A). Malar space very narrowly developed. Head smooth and shiny, clypeus with scattered, flat punctures, shiny;

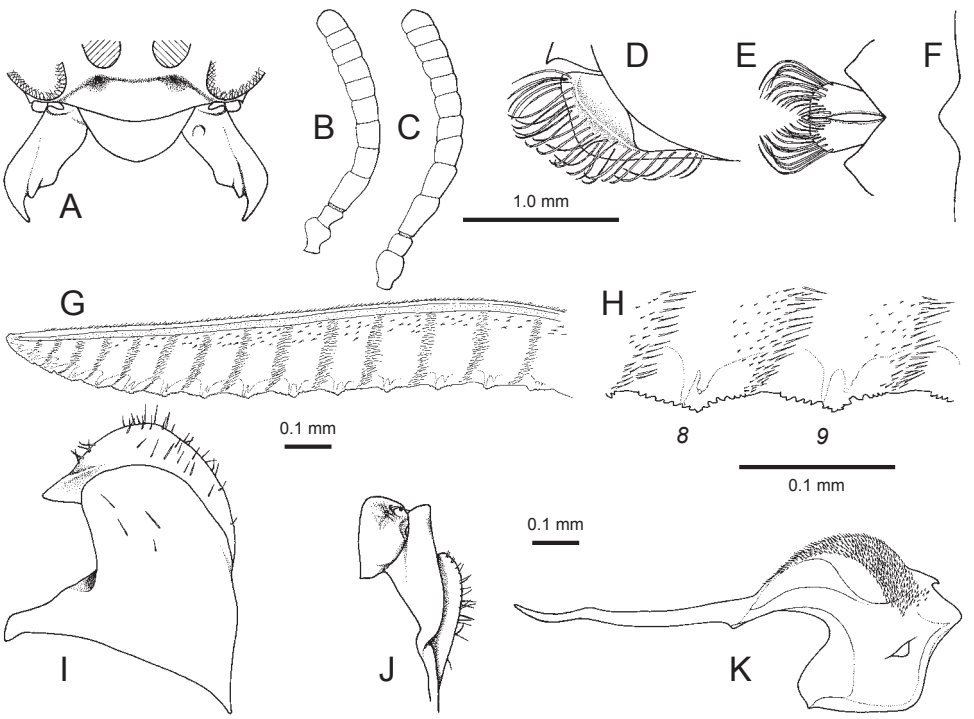

Fig. 130. A-K. *Athalia maraisi*. **A**. Female, mouthparts with clypeus (frontal aspect). **B–C**. Female, antenna. **D**. Sawsheath (lateral aspect). **E**. Sawsheath (dorsal aspect). **F**. Hypopygium (posterior margin). **G**. Lancet. **H**. Serrulae 8-9. **I**. Parapenis and harpe (right, ventral aspect). **J**. Cuspis and digitus (left, inner lateral aspect). **K**. Penis valve (left, lateral aspect).

pubescence light yellow to whitish. Mesoscutum smooth and shiny; pubescence similar to that on head. Sawsheath in lateral view obtusely pointed (Fig. 130D), in dorsal view conspicuously enlarged apically (Fig. 130E). Hypopygium as in Fig. 130F. Lancet with about 15-16 serrulae (Figs 130G, H).

Length: 7.0-7.8 mm.

Male

Colouration similar to that of female. Pronotum black except narrow yellow lateral margin, propleuron and dorsal part of mesopleuron black. Antenna 1.3× as long as maximum head width. Malar space absent. Pubescence similar to that of female. Other features as for female. Genitalia: Figs 130I-K.

Length: 6.7 mm.

Etymology

The species was named after Eugene Marais, Curator of Entomology of the Namibian National Insect Collection, Windhoek.

Distribution

Namibia (Region: Erongo, Khomas, Kunene, Otjozondjupa, (Fig. 178), South Africa (Free State Province).

Host plant

Unknown.

Ecology and habitat

All sampling localities belong to the Thornbush Savanna Biome. The flight season is December and February to March.

Remarks

Athalia maraisi differs from all other *Athalia* species of the study region by the conspicuous enlargement of the sawsheath towards the apex.

Variability of *A. maraisi* is apparent in the colour pattern. The yellow colouration on the head and thorax may be extended, so that the supraclypeal area, scape, pronotum, propleuron and mesopleuron are entirely yellow. Additionally, the antero-lateral angle of the mesonotal median lobe, mesoscutellum, mesoscutellar appendage and metanotum are more or less yellow, and the down-turned portion of each mesonotal lateral lobe is light brown. In males, the scape and pedicel may be entirely yellow. In the female from the locality “Sandveld Nature Reserve” (Free State Province, South Africa) the antenna is 12-segmented (Fig. 130C).

Athalia marginipennis Enderlein, 1920

Athalia marginipennis Enderlein, 1920: 354. ♀. Type locality: Nyembe-Bulungwa, Deutsch-Ostafrika [Tanzania] (ZMPA).

Female (Figs 131A, B)

Head and antenna black; basal half of mandible whitish becoming dark reddish apically; clypeus brown with dirty yellow anterior margin, labrum light brown. Thorax black; metascutellum yellow, metepisternum with narrow yellow posterior margin. Legs yellow; fore and mid coxa narrowly at base and lateral surface more or less blackish, hind coxa with very small blackish spot at extreme base; tibiae apically black, broadening from front to rear, tarsomeres1-3 black ringed apically, tarsomeres 4,5 entirely black. Wings bicoloured, with basal half slightly flavescent-hyaline and apical half infuscate; intercostal area strongly infuscate; costa, subcosta and stigma dark brown, rest of venation yellow in basal half becoming brown in apical half. Abdomen yellow; tergum 1 with two blackish medial spots, sawsheath with black apical half.

Antenna 1.4× as long as maximum head width, 10-segmented. Clypeus truncated. Malar space conspicuously developed (Fig. 132). Head smooth and shiny, clypeus moderately densely punctate; pubescence on head whitish to yellowish. Mesoscutum smooth and shiny; mesonotum yellowish pubescent, mesopleuron whitish pubescent with a small glabrous ventro-lateral patch, mesosternum with a large conspicuous glabrous patch. Abdomen smooth and shiny. Sawsheath in lateral view narrowly rounded apically (Fig. 132B), in dorsal view parallel sided and obtusely pointed apically (Fig. 132C). Hypopygium as in Fig. 132D. Lancet with about 16 serrulae (Fig. 132E).

Length: 7.5–9.3 mm

Fig. 131. A-B. *Athalia marginipennis*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Male

Colouration similar to that of female, except for: clypeus whitish, metapleuron nearly entirely yellow and mid coxa very narrowly blackish at base. Mesopleuron and mesosternum rather densely white pubescent, without glabrous patch. Antenna 1.4× as long as maximum head width, very slightly enlarged towards apex. Other features as for female. Genitalia: Figs 132F-H.

Length: 7.0–8.3 mm.

Etymology

From Latin: *margini* (margined) and *pennis* (wing), referring to the bicoloured fore wing.

Distribution

Botswana , Burundi, Democratic Republic of Congo, Kenya, Lesotho, Malawi, Namibia (Region: Kunene, Okavango) (Fig. 179), Rwanda, South Africa (Province:

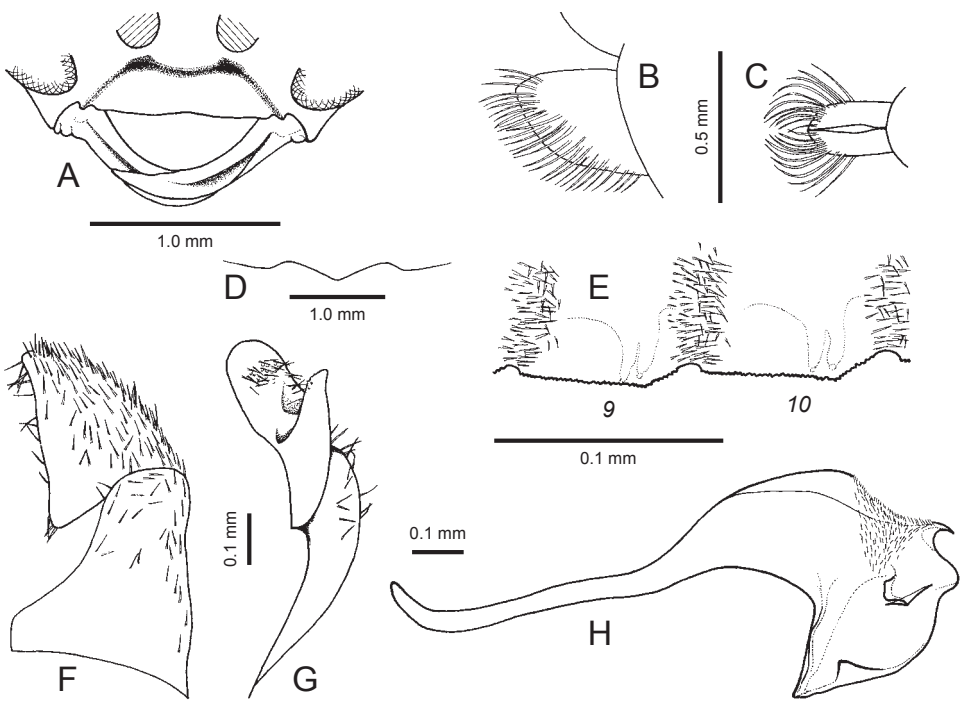

Fig. 132. A-H. *Athalia marginipennis*. **A**. Female, mouthparts with clypeus (frontal aspect). **B**. Sawsheath (lateral aspect). **C**. Sawsheath (dorsal aspect). **D**. Hypopygium (posterior margin). **E**. Serrulae 9-10. **F**. Parapenis and harpe (right, ventral aspect). **G**. Cuspis and digitus (left, inner lateral aspect). **H**. Penis valve (left, lateral aspect).

Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, North West), Tanzania, Uganda, Zimbabwe; detailed distribution is presented by Koch (2007).

Host plant

Brassicaceae (Opitz *et al*. 2012).

Ecology and habitat

The Namibian collection sites are located on the Okavango [Kavango] River as well as at the foot of the Waterberg (Fig. 24). Some old records are known from the Kaokoveld. The more or less moist habitats with dense and species rich vegetation belong to the Woodland Savanna Biome and the Thornbush Savanna Biome. The flight season is from January to March.

Remarks

Athalia marginipennis belongs to the *A. himantopus* species group (Koch 2007), and is clearly distinguished by the truncated clypeus from all other *Athalia* species in Namibia.

Athalia turneri Forsius, 1931

Athalia turneri Forsius, 1931: 21. ♀. Type locality: Okahandja, South West Africa [Namibia] (BMNH).

Female (Figs 133A, B)

Head black, narrow ventral angle of gena and supraclypeal area yellow; basal half of mandible whitish becoming reddish to black apically; clypeus and labrum whitish; scape and pedicel yellow, ventral surface of flagellum yellowish brown.

Fig. 133. A-B. *Athalia turneri*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by B. Schurian)

Thorax yellow with median lobe of mesoscutum blackish. Legs yellow; hind tibia narrowly blackish apically, hind tarsomeres blackish ringed in apical half. Wings subhyaline throughout; intercostal area infuscate, costa blackish with yellow basal half, stigma and subcosta blackish, rest of venation brown. Abdomen yellow; sawsheath with black apical half.

Antenna short, 1.1× as long as maximum head width, 9-segmented, conspicuously enlarged towards apex (Fig. 134C). Clypeus elongated medially, anterior margin shallowly rounded (Fig. 134B). Malar space absent. Maxillary palps abnormally elongated (Fig. 134A). Head smooth and shiny, clypeus with scattered, flat

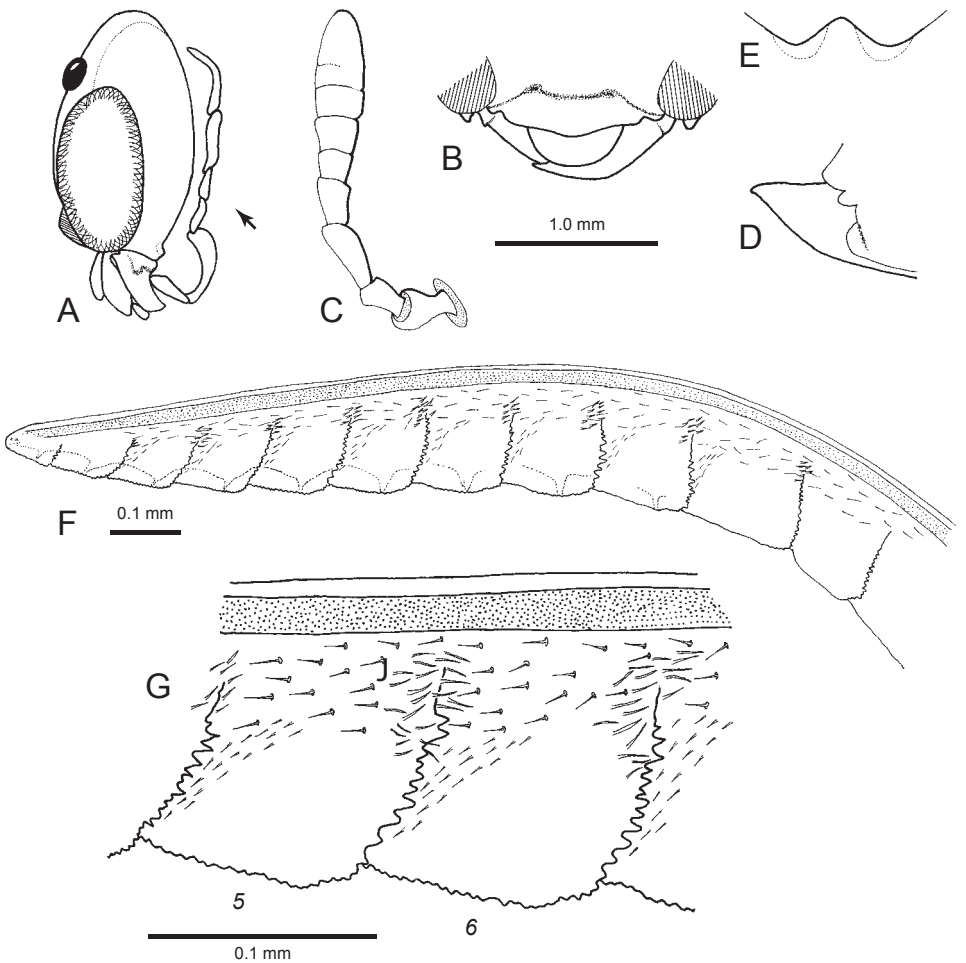

Fig. 134. A-G. *Athalia turneri*. **A**. Head (lateral aspect) with abnormally elongated maxillary palps (arrowed). **B**. Mouthparts with clypeus (frontal aspect). **C**. Antenna. **D**. Sawsheath (lateral aspect). **E**. Hypopygium (posterior margin). **F**. Lancet. **G**. Serrulae 5-6.

punctures, shiny. Pubescence whitish. Thorax smooth and shiny. Pubescence similar to that on head. Abdomen smooth and shiny. Sawsheath in dorsal view narrowed and pointed apically, in lateral view pointed apically (Fig. 134D). Hypopygium as in Fig. 134E. Lancet with about 11 serrulae (Figs 134F,G).

Length: 6.5-9.0 mm.

Male

Unknown.

Etymology

Named after Rowland Edwards Turner (1863-1945; born in Australia, deceased in South Africa), an amateur hymenopterist of major significance, who for many years worked voluntarily for the BMNH and was a recognised specialist on the Thynninae (= Tiphiidae).

Distribution

Namibia (Otjozondjupa Region) (Fig. 180), Zimbabwe.

Host plant

Unknown.

Ecology and habitat

From the study region only the holotype of *A. turneri* is known, collected in February 1928 from Okahandja, which is located in the Thornbush Savanna Biome. The second known specimen of this species was collected in South Zimbabwe (near Breitbridge, Limpopo River) in 1998.

Remarks

Over the past 20 years numerous field trips specifically targeting sawflies were undertaken in the area of Okahandja, but no additional specimens of this species were collected.

Athalia turneri is separated from all other Namibian *Athalia* species by its predominantly yellow colouration and the abnormally elongated maxillary palps.

***Athalia ustipennis* Mocsáry, 1909**

Athalia ustipennis Mocsáry, 1909: 12. ♂. Type locality: Kilima-Ndjaro [Kilimanjaro], Arusha-Ju, Africa orientalis [Tanzania] (HNHM).

Athalia elisabethae Muche, 1979: 55, **syn. n.** ♀. Type locality: Francistown, Botswana (MFN).

Female (Figs 135A, B)

Head black; basal half of mandible whitish becoming reddish to black apically; clypeus yellow, labrum whitish; ventral surface of flagellum pale, apical flagellomere with whitish spot at apex. Thorax yellow with following black; propleuron except for ventral margin, pronotum except for narrow ventro-lateral angle, mesoscutum, anepimeron and anterior half of mesoscutellum, postspiracular sclerite and dorsal angle of mesepisternum blackish, tegula blackish to dirty whitish. Legs yellow with black apices of tibiae, broadening from front to rear; tarsomeres black ringed apically. Wings sharply bicoloured with flavescent basal half and dark fuscous apical half; intercostal area blackish infuscate, stigma, costa and subcosta black, rest of venation yellow in basal half becoming black apically. Abdomen yellow; sawsheath with black apical half.

Antenna length 1.6× as long as maximum head width, 10-segmented. Clypeus elongate medially, anterior margin shallowly rounded. Malar space narrowly developed. Head smooth and shiny, clypeus with scattered, flat punctures, shiny; pubescence greyish-brown. Mesoscutum smooth and shiny; pubescence similar to that on head. Abdomen smooth and shiny. Sawsheath in lateral view obtusely pointed apically (Fig. 136A), in dorsal view slightly narrowed and obtusely pointed apically (Fig. 136B). Hypopygium: Fig. 136C. Lancet with about 18 serrulae (Fig. 136D).

Length: 6.3-7.8 mm.

Male

Colouration similar to that of female; clypeus whitish, supraclypeal area dirty

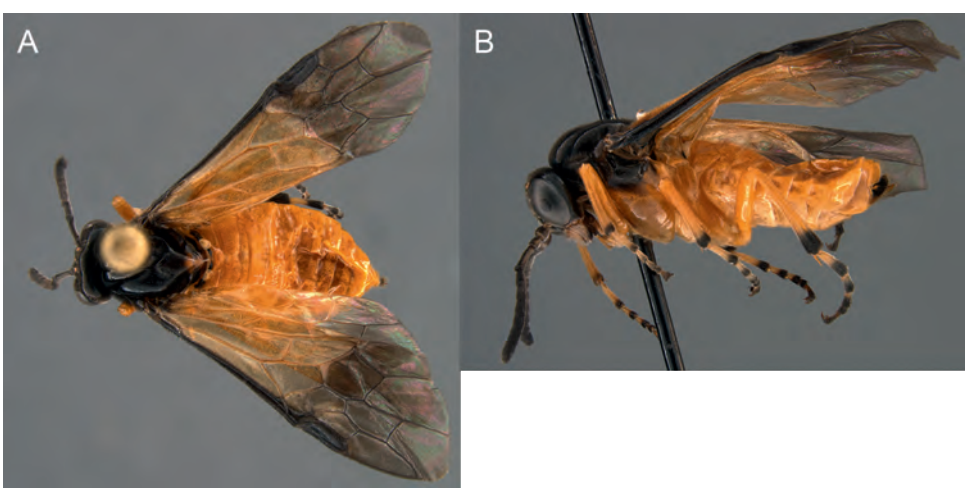

Fig. 135. A-B. *Athalia ustipennis*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by B. Schurian)

whitish, scapus yellow. Antenna 1.2× as long as maximum head width, slightly enlarged towards apex. Other features as for female. Genitalia: Figs 136E-G.

Length: 6.3-7.0 mm.

Etymology

From Latin *usti-* (burnt) and *pennis* (wing), referring to the dark tips of the fore wings.

Distribution

Botswana, Democratic Republic of the Congo, Kenya, Malawi, Namibia (Region: Erongo, Kunene, Omaheke, Otjozondjupa), South Africa (Province: Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga) (Fig. 180), Tanzania, Uganda, Zambia, Zimbabwe.

Host plant

Brassicaceae (Opitz *et al*. 2012).

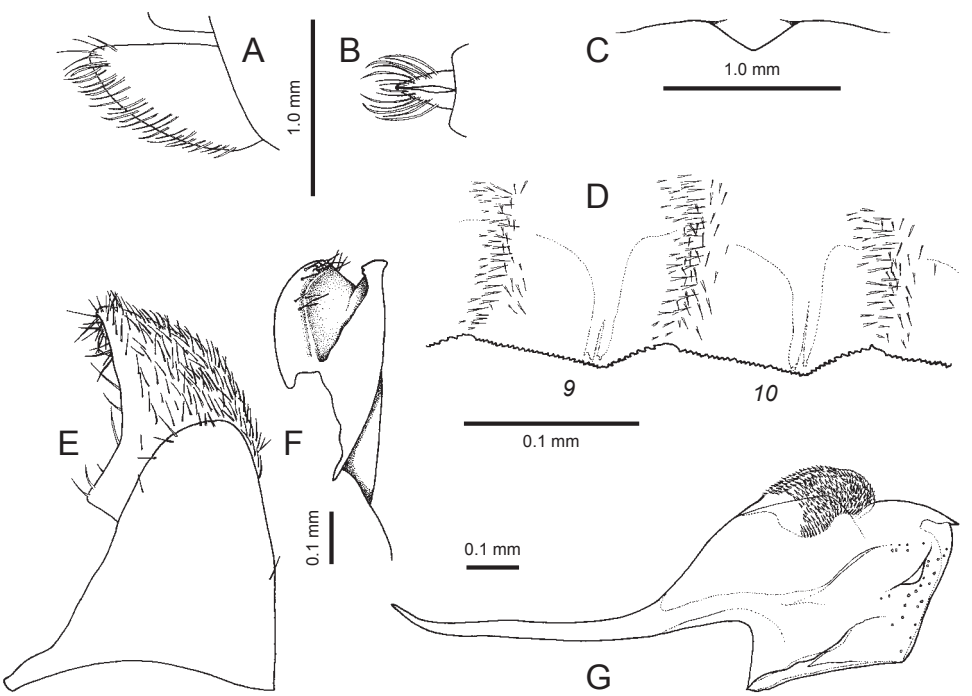

Fig. 136. A-G. *Athalia ustipennis*. **A**. Sawsheath (lateral aspect). **B**. Sawsheath (dorsal aspect). **C**. Hypopygium (posterior margin). **D**. Serrulae 9-10. **E**. Parapenis and harpe (right, ventral aspect). **F**. Cuspis and digitus (left, inner lateral aspect). **G**. Penis valve (left, lateral aspect).

Ecology and habitat

At the foot of the Waterberg adults were repeatedly observed on *Grewia flavescens* Jussieu (Malvaceae). Further records are from the dense vegetation of moist habitats of the Waterberg area and the Kunene River (Fig. 126). All habitats belong to the Woodland Savanna Biome and the Thornbush Savanna Biome.

Despite the great abundance of this species, it has not been possible to discover the host plant. In the area of the Waterberg *A. ustipennis* shows a high attraction to yellow pan traps. The flight season is from February to March.

Remarks

The very widely distributed and common *Athalia ustipennis* is relatively easy to recognize because of its black anepimeron and sharply bicoloured wings. Prompted by its wide distribution, especially in southern Africa, sequencing of the mitochondrial COI gene was carried out. First results point to the existence of two different species, but distinct morphological differences have not so far been found.

Intraspecific variability is especially visible in the colouration of tegulae and mesoscutellum, from entirely black to more or less yellow.

The holotype of *Athalia elisabethae* Muche was examined and compared with that of *A. ustipennis*. It was not possible to find any significant differences between these species, which are relevant for distinguishing them as different species; therefore they are considered to be conspecific.

Subfamily Allantinae

Genus *Neacidiophora* Enslin, 1911

Neacidiophora Enslin,1911, 665. Type species: *Neacidiophora africana* Enslin, 1911 [=*Neacidiophora calo* (Konow, 1907c)], by original designation. http://www.waspweb.org/Tenthredinoidea/Tenthredinidae/Allantinae/Neacidiophora/index.htm

Netrocerina Enderlein, 1920: 370. Type species: *Netrocerina fuscipennis* Enderlein, 1920 [= *Neacidiophora calo* (Konow, 1907c)], by original designation.

Description

Antenna short, about 1.2-1.5× as long as maximum head width, 9-segmented, medially slightly enlarged, distal flagellomeres slightly broader than long (Fig. 137E) or about twice as long as maximum head width (Koch 1998: 86, fig. 5). Supraantennal crests conspicuously developed (Figs 137B, C); clypeus separated by epistomal suture from supraclypeal area; more or less truncated to subtruncated at anterior margin (Fig. 138A); mandibles subsymmetrical, each with subapical tooth (Fig. 137A); malar space absent (Figs 137A, B); frontal area indistinctly limited; lateral grooves of postocellar area deep. Tarsal claws with a large basal

lobe, subapical tooth larger than the apical one (Fig. 137D). Fore wing with radial crossvein (2r) present, anal cell with crossvein (a), 2nd and 3rd anal vein (2A+3A) outlined (Fig. 41I); hind wing with closed radial cell (R1) and middle cells (Rs and M) absent, anal cell (A) scarcely or very short petiolate (Fig. 41I). Tergum 1 with small median split. Sawsheath in dorsal view enlarged medially and pointed apically.

The head is mostly black, the thorax is black or black with yellowish markings, and the abdomen is predominantly yellow.

Ranging from 6.5-14.0 mm in length.

Remarks

The 16 species (Taeger *et al*. 2010) of the genus *Neacidiophora* are endemic to the Afrotropical Region, and were revised by Koch (1998). Meanwhile, *N. quadrifoveata* Koch, 1998 is recognized as a misidentification and is synonymized with *Kivua incrassata* Pasteels, 1949 by Koch & Liston (2012c). Therefore 15 valid *Neacidiophora* species are known.

Until now only one species namely *Neacidiophora brevicornis* Pasteels, 1954a, is reported for the eastern provinces of South Africa (Koch 1998), however, so far not from the current study area. As a species possessing short antennae (Fig. 137E) it is expected that *N. brevicornis* (Figs 138A-C), is most likely to occur in the Woodland Savanna Biome (Northeast Namibia) along with *Distega bevisi*, *Xenapates eardleyi* and *X. similis*.

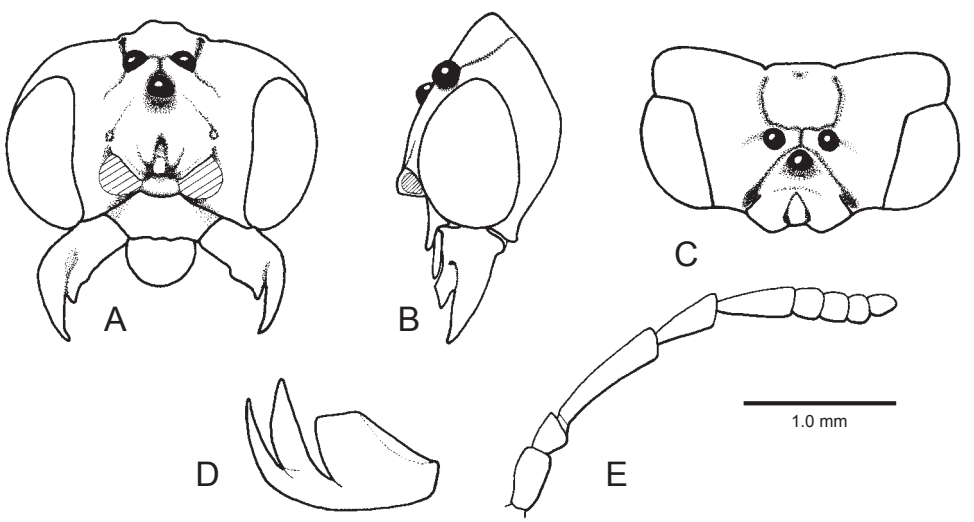

Fig. 137. A-E. *Neacidiophora* sp. **A**. Head (frontal aspect). **B**. Head (lateral aspect). **C**. Head (dorsal aspect). **D**. Tarsal claw. — **E**. *N. brevicornis*. Antenna.

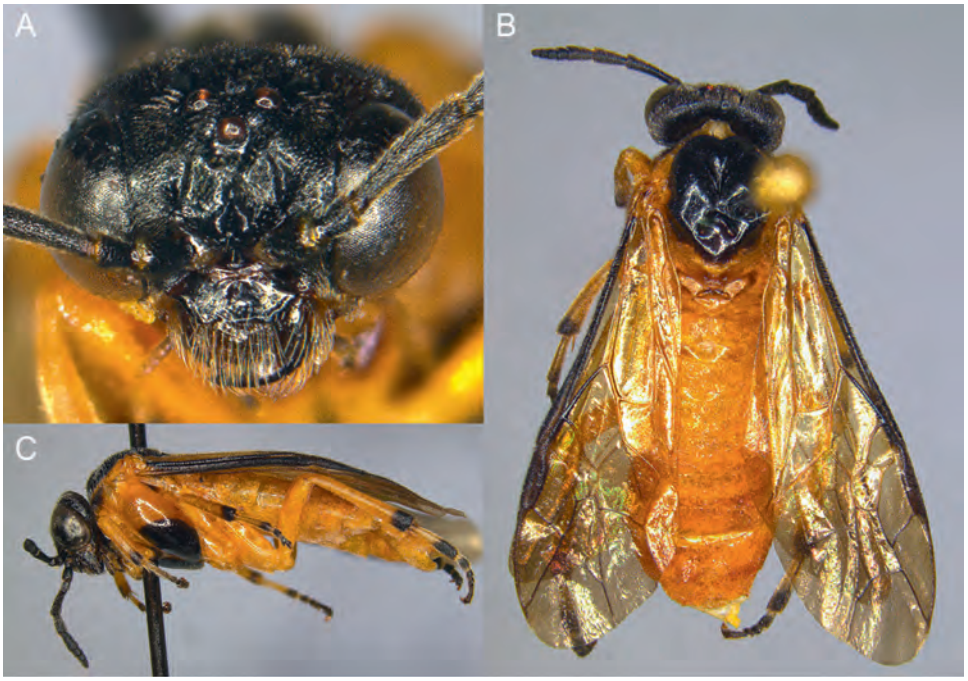

Fig. 138. A-C. *Neacidiophora brevicornis*. **A**. Head (frontal aspect). habitus, male. **B**. Dorsal aspect. **C**. Lateral aspect. (Photos by A.D. Liston)

The species with long antennae are particularly distributed in the equatorial region of Africa (Koch 1998).

Host plants

Nothing is known about their host plants.

Genus *Xenapates* W.F. Kirby, 1882

Xenapates W.F. Kirby, 1882: 180. Type species: *Dineura africana* Cameron, 1876 [= *Xenapates africanus* (Cameron, 1876)], by monotypy. http://www.waspweb.org/Tenthredinoidea/Tenthredinidae/Allantinae/Xenapates/index.htm

Anataxates Benson, 1939: 122. Type species: *Taxonus gaullei* Konow, 1896 [= *Xenapates gaullei* (Konow, 1896)], by original designation.

Description

Antenna short or about twice as long as maximum head width. In *X. variator* and *X. tessmanni* groups (Koch 1995), mostly 1.5-1.7× as long as maximum head width, 9-segmented (Fig. 142 D). Clypeus separated by epistomal suture from

supraclypeal area; very narrow, anterior margin emarginate with large lateral teeth; mandibles asymmetrical, left mandible with large subbasal tooth; labrum sinistral asymmetrical (Fig. 142A); malar space absent (Figs 142A, B); frons in lateral view obtusely angled (Fig. 142B); frontal area domed, lateral furrows distinctly developed (Figs 142A, C). Tarsal claws with a large basal lobe (Fig. 142E). Fore wing with radial crossvein (2r) present, anal cell with cross vein (a), 2nd and 3rd anal vein (2A+3A) outlined (Fig. 41J); hind wing with closed radial cell (R1), anal cell (A) and two middle cells (Rs and M) (Fig. 41J). Tergum 1 with a wide and deep median split (Fig. 142F).

The Namibian and South African species are mostly black with whitish markings, and short antennae.

Ranging from 6.0-10.0 mm in length.

Remarks

This genus is endemic to the Afrotropical Region, and was recently revised by Koch (1995) with 36 valid species, and now comprises 47 species. Taeger *et al*. (2010) listed 43 species, and additionally a further 4 new species are described by Koch (2012b, c). Most species are recorded from equatorial Africa. In the study region only 4 species are known.

For correct identification, it is necessary to examine the genitalia of males (penis valve) and females (lancet). In females the shape of the serrulae is important for species determination.

Host plants

Nothing is known about the host plants of the species occurring in the study region. In Benin, larvae of *Xenapates braunsi* (Konow, 1896) were found on *Digitaria horizontalis* (Jamaican crabgrass), *Pennisetum purpureum* (elephant grass), and *Setaria barbata* (bristly foxtail grass) (Poaceae), as well as *Zea mays* (corn, maize) (Poaceae), larvae of *Xenapates gaullei* (Konow, 1896) were feeding on *Commelina communis* (Asiatic dayflower) and *C. benghalensis* (Bengal dayflower) (Commelinaceae) (**Chapter 7: Host plants**).

Xenapates beateae Koch, 1996

Xenapates beateae Koch, 1996: 307. ♂. Type locality: 50 km N Sesfontein, Kaokoveld, Namibia (NNIC).

Male (Figs 139A, B)

Head black; apical half of mandible dark reddish; anterior margin of clypeus very narrowly whitish; distal flagellomeres ventrally brightened. Thorax black with following whitish: dorso-lateral angles of pronotum, partly postspiracular sclerite and outer lateral margin of tegula. Legs blackish with following whitish: apical

margin of mid coxa, apical half of hind coxa, trochanters, dorsal surface of fore femur, broadly base and narrow apex of hind femur, fore and mid tibiae, hind tibia except for its broadly blackish apex, fore and mid tarsi, hind tarsus gradually darkened towards apex. Wings hyaline; stigma, costa, subcosta black and rest of venation blackish. Abdomen black; terga with narrow whitish posterior margins.

Head conspicuously narrowed behind eyes. Antenna 1.3× as long as maximum head width, flagellomeres 8,9 about as long as width. Eyes converging below. Postocellar area: width : length = 1.0 : 0.8; lateral furrows convex. Frontal area distinctly limited; anterior cross-ridge shallowly interrupted medially; lateral furrows convex. Interantennal area with shallow semicircular furrow.

Head smooth and shiny; pubescence whitish. Mesoscutum scattered micropunctate, shiny; pubescence similar to that on head. Abdomen scattered micropunctate, shiny. Penis valve: Fig. 140.

Length: 6.5-7.0 mm.

Female

Unknown.

Etymology

This species was named after Dr. med. Beate Koch, the daughter of the describing author.

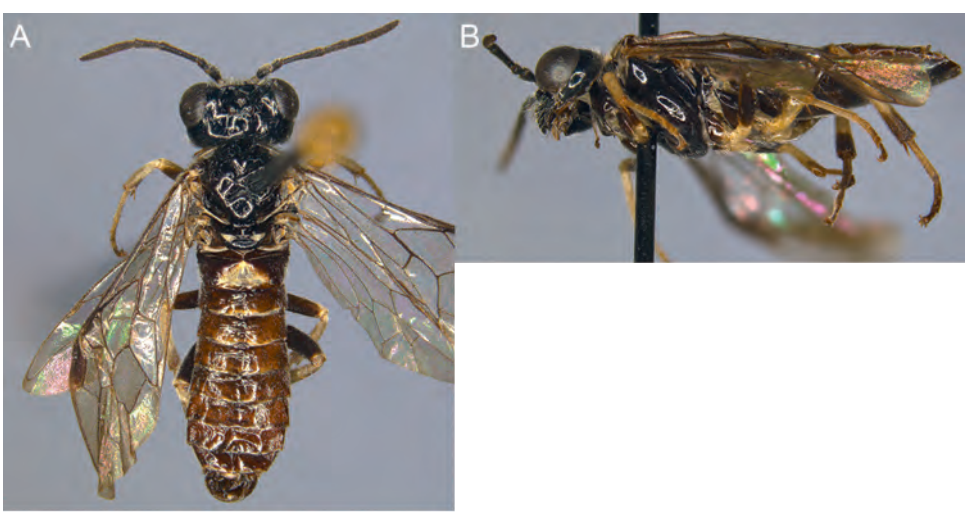

Fig. 139. A-B. *Xenapates beateae*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Distribution

Namibia (Kunene Region) (Fig. 181).

Ecology and habitat

This species is only known from the type locality, being a comparatively small shallow moist dip in the terrain located in the Thornbush Savanah Biome.

The vegetation of this habitat (Fig. 141) is dominated by the small *Acacia*-like tree *Dichrostachys cinerea* (Linnaeus) Wight & Arnott (Fabaceae), and in their semi-shade the herbaceous plant *Achyranthes aspera* Linnaeus var. *sicula* Linnaeus (Amaranthaceae). All specimens were observed on leaves of the latter species, and therefore it may be the food plant. The area was visited on three occasions, but females were not collected. The flight season is February and March.

Remarks

Xenapates beateae belongs to the *X. brevicornis* species group (Koch 1995) and inhabits together with *X. damaraensis* the same habitat north of Sesfontein.

In its colouration *X. beateae* is similar to *X. damaraensis*. *Xenapates beateae* differs strikingly from the other *Xenapates* species of the study region by its nearly entirely black clypeus and labrum. Further morphological differences between the species are discussed under *X. damaraensis.*

The ratio of length of antenna to the maximum head width varied from 1.3x to 1.4x.

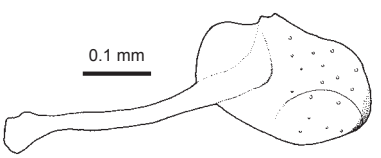

Fig. 140. *Xenapates beateae*. Penis valve (left, lateral aspect).

Xenapates damaraensis **Koch, 1995**

Xenapates damaraensis Koch, 1995: 373, 389. ♂♀. Type locality: Kaross, S.[outh] W.[est] A.[frica] [Namibia] (NNIC).

Female

Head black, gena with white spot; base of mandible white, blackish medially becoming reddish in apical half; labrum white with very narrow anterior margin black, lateral teeth and narrow anterior margin of clypeus white; distal flagellomeres

Fig. 141. The habitat of *Xenapates beateae* and *X. damaraensis* about 40 km north of Sesfontein in northwestern Namibia (Thornbush Savanna Biome). (Photo by F. Koch)

ventrally brightened. Thorax black with following whitish: dorso- and ventro-lateral angels of pronotum, postspiracular sclerite, margin of tegula and small dorsal angel of mesopleuron. Legs whitish with following blackish: more or less basal half of coxae, broad apex of posterior surface of fore and mid femur, apex of hind femur and hind tibia, distal tarsomeres darkened. Wings hyaline; stigma and costa blackish with narrow pale at base, subcosta and rest of venation blackish. Abdomen black; terga and sterna with very narrow whitish posterior margins.

Head parallel-sided behind eyes. Antenna 1.2× as long as maximum head width. Eyes converging below. Postocellar area: width : length = 1.0 : 1.2, lateral furrows slightly convex towards posterior margin of head. Frontal area distinctly limited; anterior cross-ridge deeply and broadly interrupted medially; lateral furrows convex. Interantennal area with deep triangular groove.

Vertex and gena smooth and shiny, frons and supraclypeal area scattered micropunctate, shiny, paraantennal field densely punctuate, subshiny; pubescence whitish. Thorax smooth and shiny; pubescence similar to that on head. Abdomen smooth and shiny. Sawsheath in dorsal view very narrow, in lateral view obtusely pointed apically. Lancet with about 21 serrulae (Fig. 142G).

Length: 7.0-7.5 mm.

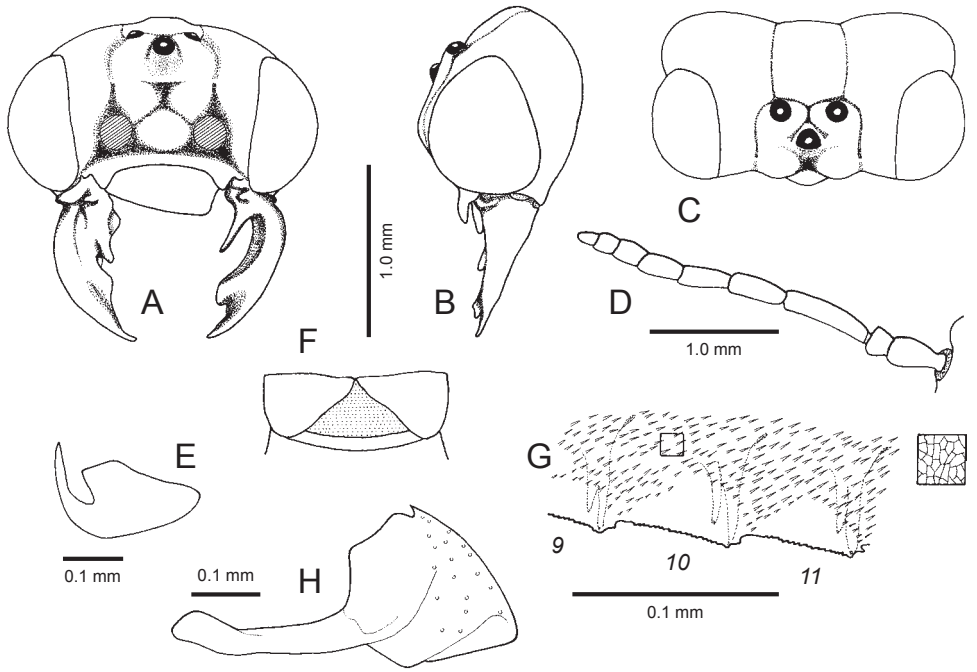

Fig. 142. A-H. *Xenapates damaraensis*. **A**. Head (frontal aspect). **B**. Head (lateral aspect). **C**. Head (dorsal aspect). **D**. Antenna. **E**. Tarsal claw. **F**. Tergum 1. **G**. Serrulae 9-11, square illustrating enlarged microsculpture. **H**. Penis valve (left, lateral aspect).

Male (Figs 143A, B)

Colouration similar to that of female. Terga 2-7 light brown in the middle so that abdomen appears to be pale longitudinally striped, sterna also light brown medially, sternum 9 black. Head slightly narrowed behind eyes. Antenna 1.3× as long as maximum head width. Other features as for female. Penis valve: Fig. 142H.

Length: 6.0-7.0 mm.

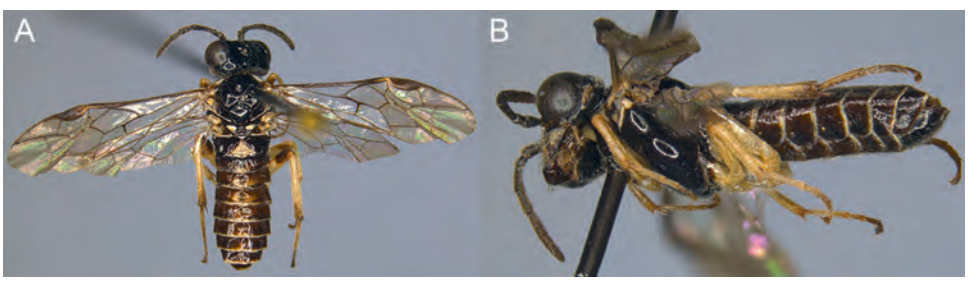

Fig. 143. A-B. *Xenapates damaraensis*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Etymology

This species is named after Damaraland in Namibia, the landscape of the type locality.

Distribution

Namibia (Region: Erongo, Kunene, Omusati) (Fig. 182).

Ecology and habitat

Xenapates damaraensis was found together with *X. beateae* in the described habitat (Fig. 141) under the latter species.

Xenapates damaraensis seems to prefer moist habitats, which are located mostly in the Thornbush Savanna Biome (Fig. 144). Furthermore this species was collected in the dense and species rich vegetation at the banks of the Kunene River in the Thornbush Savanna Biome. Further material was collected from the Brandberg Massif (Figs 16, 80) during the rainy season, and from the immediate surroundings of a dry-river south of Windhoek. The flight season is February and March.

Fig. 144. The habitat of *Xenapates damaraensis* in the vicinity of the Ongongo Falls in the Kaokoveld (Thornbush Savanna Biome) in north-western Namibia. an especially large Malaise trap with two collecting heads, designed by Gressitt & Gressitt (1962), is depicted on the right of the photograph. (Photo by F. Koch)

Remarks

Xenapates damaraensis is the most abundant species of *Xenapates* in Namibia, and belongs to the *X. brevicornis* species group (Koch 1995). At the first glance, it differs from *X. beateae* mainly by the possession of the white genal spot and the more whitish legs. Both species are clearly distinguished in the shape of the penis valve (Figs 140, 142H).

Sometimes the hind tibia of males is only dark spotted apically. In some females the terga and sterna may be medially dirty white.

Xenapates eardleyi Koch, 1995

Xenapates eardleyi Koch, 1995: 374, 392. ♂♀. Type locality: D'Nyala Nat.[ure] Res.[erve], Ellisras District, Tvl. [Transvaal] (Limpopo Province), South Africa (PPRI).

Female

Head black with following whitish, a small spot on the dorso-interior angle of the eye, ventral half of gena and a narrow posterior margin rising up to top of the eye; base of mandible whitish, blackish medially becoming reddish in apical half, labrum and clypeus whitish; distal flagellomeres ventrally brightened. Thorax black; with pronotum extensively white, postspiracular sclerite, tegula, a large spot on mesopleron and narrow posterior margin of mesoscutellar appendage white. Legs whitish; fore and mid coxa at the extreme base black, hind coxa dorsally and ventrally extended blackish, posterior surface of fore and mid femur blackish in apical half, hind femur with entirely broad black apex, fore and mid tibia with blackish stripe on posterior surface, hind tibia only in apical half blackish striped, hind tarsus light brown. Wings hyaline with very slightly infuscate apical half; stigma and costa dark brown with pale at base, subcosta and rest of venation dark brown. Abdomen black; terga with very narrow whitish posterior margins, sterna more whitish.

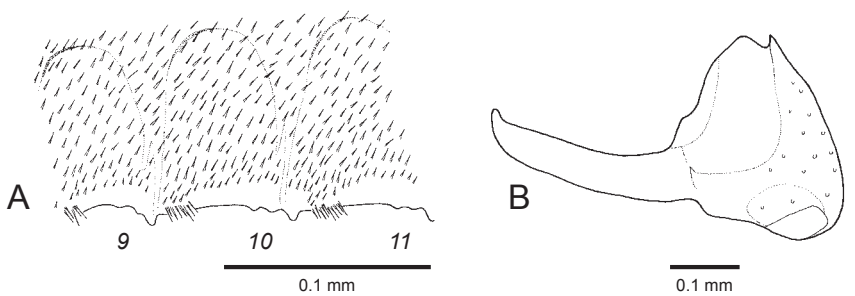

Fig. 145. A-B. *Xenapates eardleyi*. **A**. Serrulae 9-11.
B. Penis valve (left, lateral apect).

Head parallel-sided behind eyes. Antenna 1.3× as long as maximum head width. Eyes converging below. Postocellar area: width : length = 1.0 : 1.0L; lateral furrows convex. Frontal area distinctly limited; anterior cross-ridge deeply interrupted medially; lateral furrows convex. Interantennal area with a deep triangular groove.

Vertex, frons and supraclypeal area smooth and shiny, gena scattered micropunctate, shiny, paraantennal field shallowly punctate, shiny; pubescence whitish. Mesoscutum smooth and shiny; pubescence similar to that on head. Abdomen smooth and shiny. Sawsheath in dorsal view very narrow, in lateral view acutely rounded. Lancet with about 22 serrulae (Fig. 145A).

Length: 8.5 mm.

Male (Figs 146A, B)

Colouration similar to that of female. Sterna extensively whitish, except for black sternum 9. Head slightly narrowed behind eyes. Antenna 1.4× as long as maximum head width. Other features as for female. Penis valve: Fig. 145B.

Length: 7.0-7.8 mm.

Etymology

This species was named after Dr. Connal Desmond Eardley, specialist scientist of Agricultural Research Council, Plant Protection Research Institute, Pretoria, South Africa.

Distribution

Namibia (Otjozondjupa Region) (Fig. 182), South Africa (Province: KwaZulu-Natal, Limpopo), Zambia, Zimbabwe.

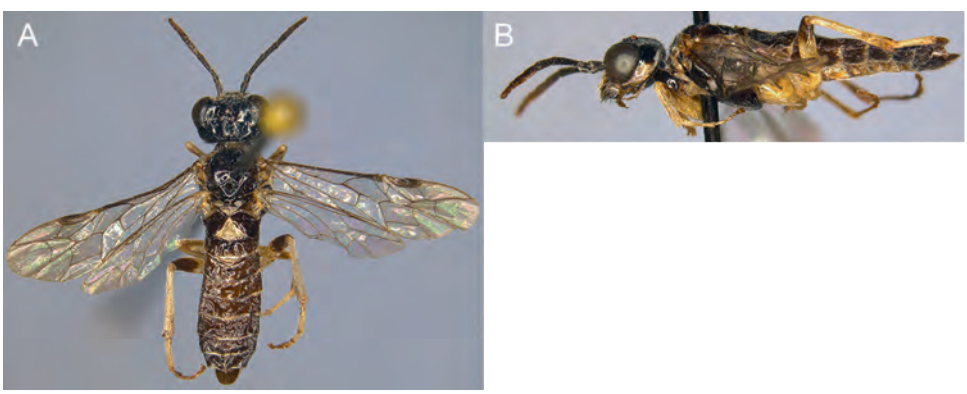

Fig. 146. A-B. *Xenapates eardleyi*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Ecology and habitat

The Namibian locality of *Xenapates eardleyi* is Aha Hills in the Northern Kalahari, and belongs to the Kalahari Basin as part of the Woodland Savanna Biome. The vegetation is quite dense and floristically species rich. The flight season is December and February-March.

Remarks

Externally, *Xenapates eardleyi* is distinguished from all other *Xenapates* species occurring in the study region by its white colouration pattern on the gena.

Xenapates eardleyi is clearly separated from the *X. brevicornis* species group (Koch 1995) by the shape of the serrulae, which are apically rounded (Fig. 145A). This shape is unique in all known species of this genus, and therefore it is the only species of the hypothetical *X. eardleyi* species group (Koch 1995).

In males the sterna 2-8 may be entirely whitish, and sometimes the extreme apex of hind tibia is blackish.

Xenapates similis Benson, 1939

Xenapates similis Benson, 1939: 121. ♀. Type locality: Sawmills, S.[outh] Rhodesia [Zimbabwe] (BMNH).

Female (Figs 147A, B)

Head and antenna black; base of mandible white, dark reddish medially becoming reddish in apical half; labrum, lateral teeth and narrow anterior margin of clypeus white. Thorax black; with pronotum extensively whitish, postspiracular sclerite, tegula and a large spot on mesopleron white. Legs light yellow; coxae very narrowly blackish marginate, posterior surface of fore and mid femur blackened apically, hind femur with entirely black apex, fore and mid tibia blackish striped at posterior surface, hind tibia blackish ringed apically, distal tarsomeres of fore and mid legs blackish, hind tarsus black. Wings subhyaline; stigma, costa, subcosta and rest of venation blackish. Abdomen black; terga and sterna with narrow whitish posterior margins, medially broadened.

Head parallel behind eyes. Antenna 1.3× as long as maximum head width. Eyes converging below. Postocellar area: width : length = 1.0 : 0.9, lateral furrows slightly convex towards posterior margin of head. Frontal area distinctly bordered; anterior cross-ridge shallowly interrupted medially; lateral furrows convex. Interantennal area with two lateral grooves.

Vertex, frons and supraclypeal area smooth and shiny, gena scattered micropunctate, shiny, paraantennal field densely, shallowly punctuate, subshiny; pubescence whitish. Mesoscutum smooth and shiny; pubescence similar to that on head. Terga 1,2 smooth and shiny, following terga slightly microsulptured, shiny.

Sawsheath in dorsal view very narrow, in lateral view pointed apically. Lancet with about 23 serrulae (Fig. 148A).

Length. 6.5-8.0 mm.

Male (Figs 147C, D)

Colouration similar to that of female. Mesoscutellum, mesoscutellar appendage and small dorsal angle of mesopleuron white. Terga 2-5(6) pale in the middle, so that the abdomen appears to have a pale longitudinal stripe; sterna nearly entirely whitish; sternum 9 black with whitish posterior margin. Fore and mid tarsus nearly entirely pale yellow. Head slightly narrowed behind eyes. Antenna 1.4× as long as head maximum width. Other features as for female. Penis valve: Fig. 148B.

Length. 6.0-7.0 mm.

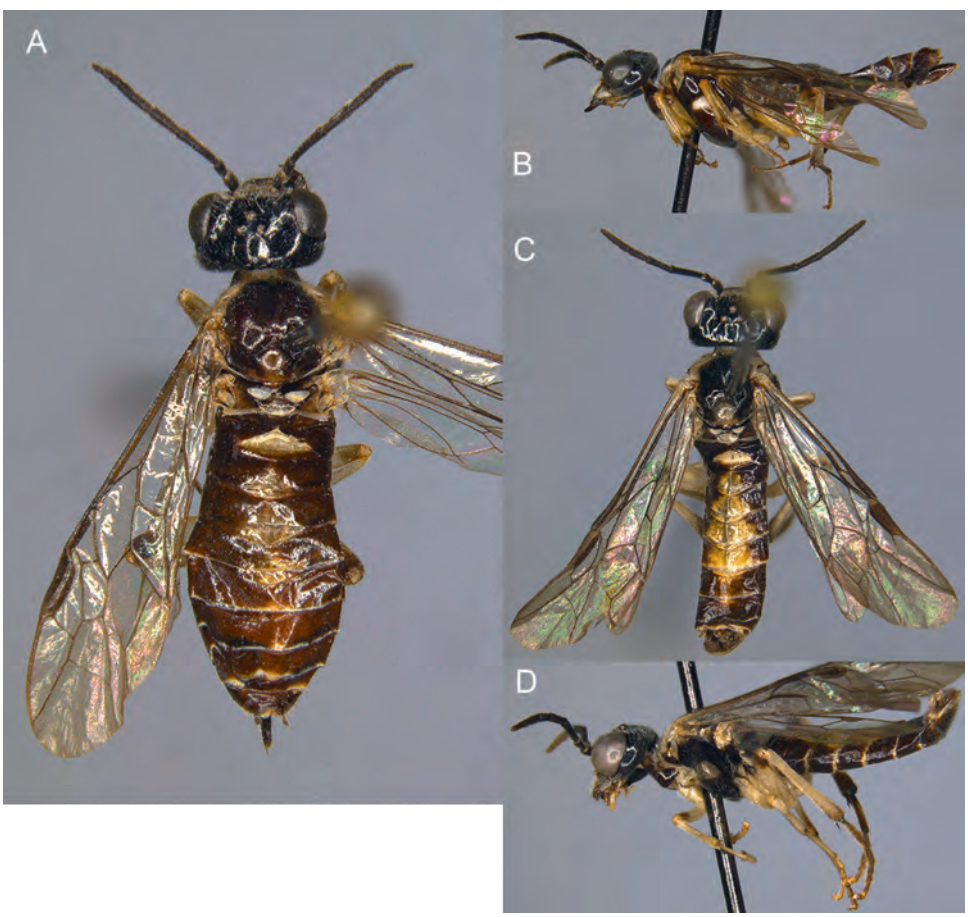

Fig. 147. A-D. *Xenapates similis*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect, male. **C**. Dorsal aspect. **D**. Lateral aspect. (Photos by A.D. Liston)

Etymology

The species name means "*similar*", alluding to a likeness with *Xenapates abyssinica* Benson.

Distribution

Botswana, Cameroon, Mozambique, Namibia (Region: Otjozondjupa, Okavango) (Fig. 181), South Africa (Province: Limpopo, Mpumalanga), Zambia, Zimbabwe detailed distribution is presented by Koch (1995).

Ecology and habitat

In Namibia, *Xenapates similis* was recorded from riverine habitats at the Okavango River [Kavango], in the Caprivi Strip, as well as from moist habitats with dense vegetation of the Northern Kalahari and from the foot of the Waterberg (Fig. 24). All localities belong to the Woodland Savanna Biome.

In the area of the Waterberg, *Xenapates similis* is highly attracted to yellow pan traps. The flight season is from December to February.

Remarks

Based on the shape of the penis valve (Koch 1995), *Xenapates similis* is the only known species of the hypothetical *X. similis* species group.

The pale longitudinal stripe on the dorsal surface of the abdomen of *Xenapates similis* is similar to *X. damaraensis* especially in males. However, the latter species is distinguished by the whitish genal spot and by the entirely black mesopleuron.

Sometimes in females the sterna are paler, similar to males, and the mesoscutellum and mesoscutellar appendage may be more or less whitish.

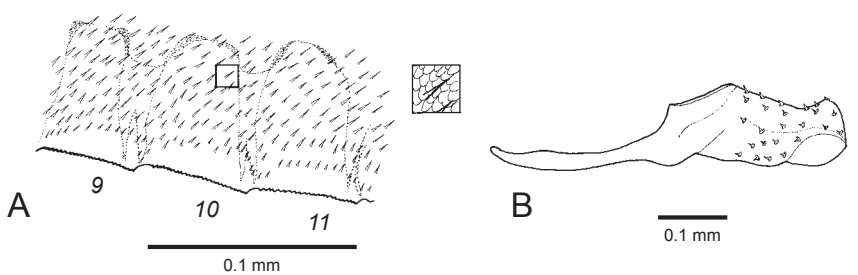

Fig. 148. A-B. *Xenapates similis*. **A**. Serrulae 9-11, square illustrating enlarged microsculpture. **B**. Penis valve (left, lateral apect).

Subfamily Blennocampinae

Genus *Distega* Konow, 1904

Distega Konow, 1904b: 244. Type species: *Distega sjoestedti* Konow, 1904b, by monotypy. http://www.waspweb.org/Tenthredinoidea/Tenthredinidae/Blennocampinae/Distega/index.htm

Paradistega Forsius, 1934: 394, 396. Type species: *Distega bevisi* Forsius, 1930, by original designation.

Codistega Pasteels, 1949: 19, 23. Type species: *Paradistega congonensis* Forsius, 1934 [=*Distega congonensis* (Forsius, 1934)], by original designation.

Eudistega Pasteels, 1949: 19, 24. Type species: *Eudistega formosus* Pasteels, 1949 [=*Distega formosa* (Pasteels, 1949)], by original designation.

Pachydistega Pasteels, 1949: 19, 20. Type species: *Distega mocsaryi* Enslin, 1913b, by original designation.

Distegella Pasteels, 1951: 197, 198. Type species: *Distegella velutina* Pasteels, 1951 [=*Distega velutina* (Pasteels, 1951], by original designation.

Description

Antenna 9-segmented (Fig. 150C). Head without especially conspicuous structures; clypeus separated by an epistomal suture from the supraclypeal area, anterior margin of clypeus truncate or very slightly emarginate (Fig. 150A); malar space absent (Fig. 150B). A continuous suture divides the upper and lower halves of the mesepisternum (Fig. 149A). Tarsal claws with a basal lobe and with a smaller inner tooth (Fig. 150D). Fore wing with radial cell (R1) divided by radial crossvein (2r), anal cell present only distally (2A), petiolate (1A), 2nd and 3rd anal vein (2A+3A) almost completely obliterated, only a stub present (Fig. 41G) or incompletely outlined (Fig. 41H); hind wing with closed radial cell (R1), with anal cell (A) and two middle cells (Rs and M) present (Fig. 41G). Tergum 1 with a rather wide and deep median split (Fig. 150E).

The colouration of the species is all black, or black with yellowish markings or yellowish with black markings.

Ranging from 6.0 to 10.0 mm in length.

Remarks

The genus *Distega* is endemic to the Afrotropical Region, and with 25 valid species (Taeger *et al*. 2010) it is the largest genus of the Afrotropical Blennocampinae. This genus was revised by Pasteels (1955a), but it is urgently in need of a taxonomic revision.

For the south-west African study region only two species are reported, both of which have been collected in the Woodland Savanna Biome.

Sporadically, it is possible to find specimens of different species with variable reduction of the fore wing veins 2A+3A (Fig. 41H). In fact, apart from a basal stub of 2A+3A straight at apex, and in very few cases a very small vestige of these veins at the base of the anal crossvein (a) (Fig. 41G, arrowed), particularly in *D. bevisi* (Fig. 41H), these veins are almost completely obliterated (Fig. 41G) in all other species.

Host plants

The larvae of the western African *Distega nigeriae* Forsius, 1927b (Fig. 37C) were observed feeding on *Commelina benghalensis*, *C. communis* (Commelinaceae) and *Digitaria horizontalis* (Poaceae) in Benin including recording of the complete metamorphosis (G. Goergen, unpublished) (**Chapter 7: Host plants**).

Distega bevisi Forsius, 1930

Distega bevisi Forsius, 1930a: 71. ♀. Type locality: Widenham, Natal [KwaZulu-Natal], South Africa (BMNH).

Female (Figs 149A-C)

Head and antenna black; apical half of mandible reddish brown. Thorax yellow with following black: propleuron, a patch on ventro-lateral angel of pronotum, one small medial patch on median lobe of mesoscutum adjacent to pronotum, ventral half of mesopleuron downwards from transverse suture, mesosternum, metapleuron. The mesoscutellar appendage and metanotum blackish. Legs black with following yellow: dorsal surface of fore and mid femur, fore and mid tibia, narrow apical margin of hind coxa, fore tarsus, dorsal surface of hind trochanter, narrow base and apex of hind femur, mid basitarsomere, except for its apex, basal half of hind tibia. Wings slightly bicoloured with infuscate apical half and basal half hyaline with narrow infuscate at base; intercostal area dark fuscous, stigma, costa, subcosta and rest of venation blackish. Abdomen yellow; tergum 1 with two large black medial patches, terga 2-7 broadly black medially, sawsheath black with yellow at base.

Head parallel-sided behind eyes. Antenna 1.3× as long as maximum head width. Eyes converging below. Anterior margin of clypeus subtruncate, malar space absent. Postocellar area: width : length = 1.0 : 0.7; lateral furrows slightly convex towards posterior margin of head. Frontal area distinctly limited, anterior cross-ridge scarcely interrupted medially, lateral furrows convex. Interantennal area with two small moderately deep lateral grooves.

Vertex and supraclypeal area smooth and shiny; gena and frons scattered micropunctate, paraantennal area irregularly microsculptured, shiny, clypeus coarsely scattered punctate, shiny; pubescence whitish. Mesoscutum nearly impunctate, shiny; pubescence similar to that on head. Abdomen smooth and shiny. Sawsheath in dorsal view narrow, in lateral view obtusely pointed apically (Fig. 150F). Lancet with about 21 serrulae (Fig. 150G).

Length: 10.0-11.0 mm.

Male (Figs 149D, E)

Colouration similar to that of female, except for: mesonotum, metanotum and mesopleuron entirely black. Terga 1-8 broadly black, only narrowly laterally yellow, sternum 9 black.

Head conspicuously narrowed behind eyes. Antenna 1.5× as long as maximum head width. Malar space absent. Vertex, paraantennal and supraclypeal area scattered micropunctate, shiny, clypeus scattered punctate, shiny, frontal area irregularly microsculptured, shiny; pubescence dark brown. Median lobe of mesoscutum moderately densely punctate, shiny, lateral lobe scattered micropunctate, shiny; pubescence light brown. Genitalia: Figs 150H, I.

Etymology

This species was named after Lionel Bevis (1897-1985), who was an entomologist at the Durban Science Museum of KwaZulu-Natal.

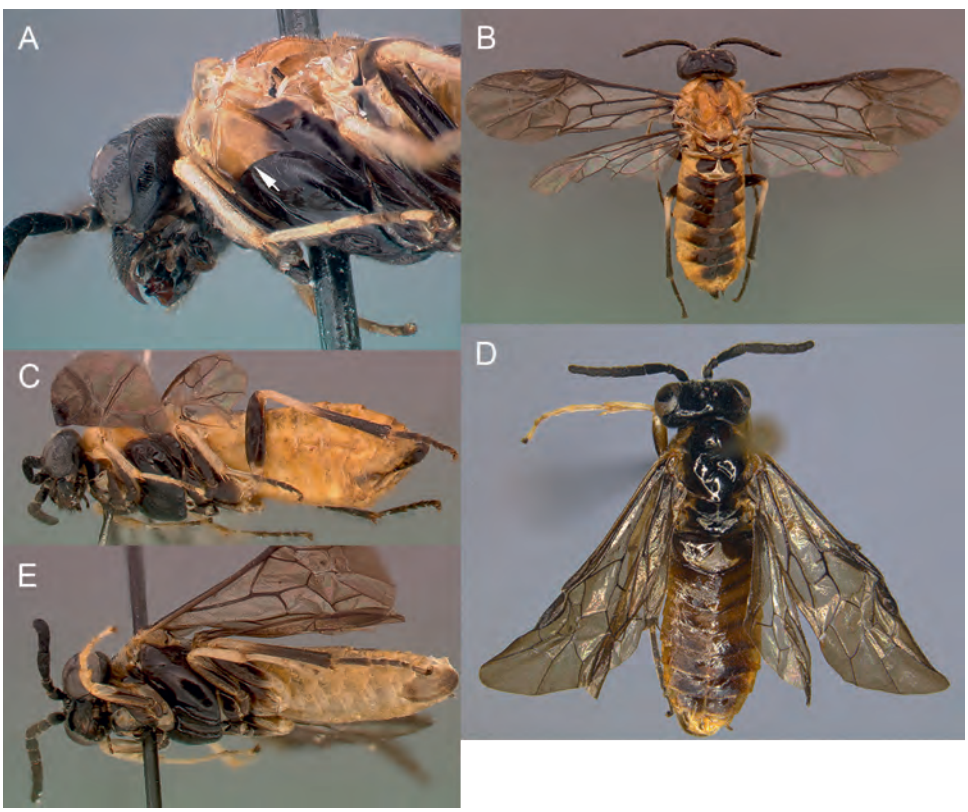

Fig. 149. A-C. *Distega bevisi*, female. **A**. mesepisternum with transverse suture (arrowed), habitus. **B**. Dorsal aspect. **C**. Lateral aspect, male. **D**. Dorsal aspect. **E**. Lateral aspect (Photos by A.D. Liston)

Distribution

Botswana, Mozambique, Namibia (Region: Okavango, Omusati, Otjozondjupa) (Fig. 183), South Africa (Province: Eastern Cape, KwaZulu-Natal, Limpopo, North West).

Ecology and habitat

In the Caprivi Strip of Namibia *D. bevisi* was recorded from riverine habitats at the Okavango River [Kavango] (Fig. 23), as well as from moist habitats of Northern Kalahari. All localities belong to the Woodland Savanna Biome. Further records exist from the Etosha Pan National Park (Thornbush Savanna Biome) at a temporary watering place. The flight season is from December to January.

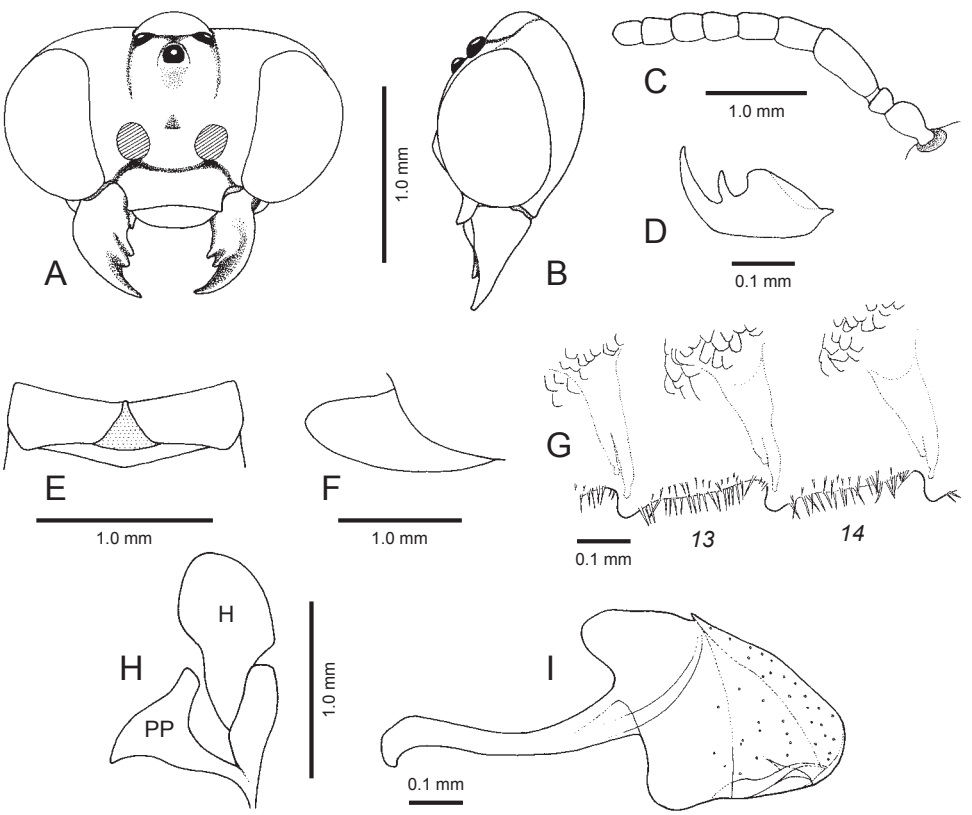

Fig. 150. A-I. *Distega bevisi*. **A**. Head (frontal aspect). **B**. Head (lateral aspect). **C**. Antenna. **D**. Tarsal claw. **E**. Tergum 1. **F**. Sawsheath (lateral aspect). **G**. Serrulae 13-14. **H**. Parapenis and harpe (right, ventral aspect). **I**. Penis valve (left, lateral aspect).

Remarks

In South Africa *D. bevisi*, including the holotype, has been reported from different areas near the coast of the KwaZulu-Natal Province, and from the mountain region of the Limpopo Province. Zoogeographically, this species belongs to the East African Coastal District, which is defined by Winterbottom (1978). This is a narrow belt between the Indian Ocean and the escarpment (Drakensberg mountain system) with some finger-like extensions further into the inland. Therefore the vegetation consists of lowland and mangrove forests at the coast and savanna and mountain forests on the plateau of the escarpment. *Distega bevisi* is the second known species beside *Arge braunsi* Konow, 1904a which has this pattern of distribution (Koch & Liston 2012b).

It was not possible to find any constant morphological differences between the specimens from South Africa and those from the Caprivi Strip as well as Botswana. Some females from the coast of the Indian Ocean Coastal Belt Biome differ in having a black mesonotum, metanotum and mesopleuron. On the other hand, in Namibian species the mesonotum and metanotum may be entirely yellow. Nevertheless, the possibility cannot be excluded that two different species are involved.

Distega montium Konow, 1907

Distega montium Konow, 1907a: 2. ♂♀. Type locality: Kilimandjaro [Kilimanjaro], Africa or. [Tanzania] (NHRS).

Distega braunsi Enslin, 1911: 667, **syn. n.** ♀**.** Type locality: Lichtenberg [Lichtenburg], Transvaal (North West Province), South Africa (TMSA).

Distega brunniventris Enslin, 1913b: 314, **syn. n.** ♀**.** Type locality: Atusha [Arusha]-Ju, Ostafrika [Tanzania] (HNHM).

Female (Figs 151A, B)

Head and antenna black; apical half of mandible dark reddish. Thorax black with

Fig. 151. A-B. *Distega montium*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

metanotum and metapleuron yellow. Legs yellow; fore coxa and fore trochanter, basal half of mid coxa, narrow apices of tibiae and tarsi blackish, only basal half of basitarsomeres yellowish. Wings infuscate throughout; intercostal area dark fuscous, stigma, costa, subcosta and rest of venation blackish. Abdomen yellow; sawsheath black with yellow at extreme base.

Head parallel-sided behind eyes. Antenna 1.5× as long as maximum head width. Eyes converging below. Anterior margin of clypeus subtruncate, malar space very narrowly developed. Postocellar area: width : length = 1.0 : 0.7; lateral furrows slightly convex. Frontal area distinctly limited; anterior cross-ridge conspicuously interrupted medially; lateral furrows convex. Interantennal area with two small deep lateral grooves.

Vertex and frons smooth and shiny; posterior half of gena, supraclypeal area and paraantennal area micropunctate, shiny, clypeus moderately coarsely, densely punctate, shiny; pubescence light brown. Mesoscutum nearly impunctate, shiny; pubescence whitish. Abdomen smooth and shiny. Sawsheath in dorsal view narrow, in lateral view narrowly rounded apically (Fig. 152A). Lancet with about 21 serrulae (Fig. 152B).

Length: 7.5-9.2 mm.

Male

Colouration similar to that of female. Flagellomeres 4-7 with brown ventral surface, thorax entirely black, tergum 1 black, posterior margin of tergum 6, dorsal surface of tergum 7,8 and sternum 9 blackish.

Head conspicuously narrowed behind eyes. Antenna 1.3× long as maximum head width. Malar space absent. Genitalia (Figs 152C, D).

Length: 8.0-9.0 mm.

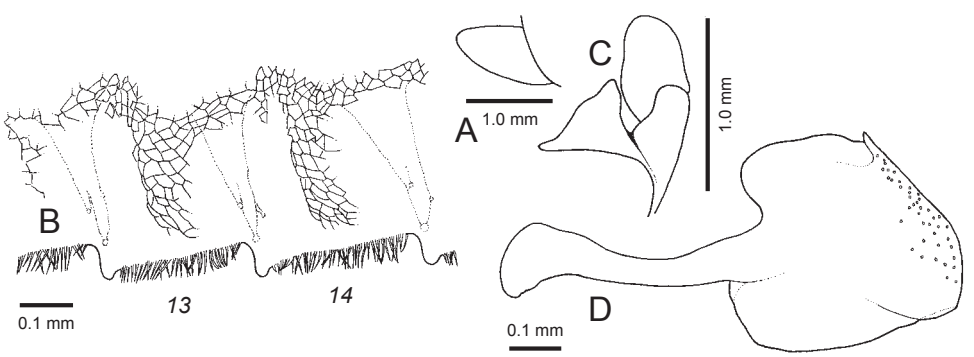

Fig. 152. A-D. *Distega montium*. **A**. Sawsheath (lateral aspect). **B**. Serrulae 13-14. **C**. Parapenis and harpe (right, ventral aspect). **D**. Penis valve (left, lateral aspect).

Etymology

The species name means “of the mountain”, referring to the type locality on Mt. Kilimanjaro.

Distribution

Burundi, Democratic Republic of the Congo, Ethiopia, Kenya, Mozambique, Namibia (Otjozondjupa Region) (Fig. 183), Rwanda, South Africa (North West Province), Tanzania, Uganda.

Ecology and habitat

Collected at the foot of the Waterberg Mountain (Namibia), located in the Thornbush Savanna Biome. The habitat is moist with dense vegetation (Fig. 24). The flight season is not well known, the Namibian specimen was collected in February.

Remarks

It was not possible to find any morphological differences between the specimens from southern Africa and those from East Africa. Nevertheless, it cannot be excluded that two different species are involved.

Sometimes the dorso-lateral angle of the pronotum and a narrow posterior margin of the mesoscutellum can be yellow. The colouration of the mid coxa varies from entirely yellow to black.

The holotypes of *Distega braunsi* and *D. brunniventris* have been examined, and it was impossible to find any differences to *D. montium*, which are relevant for distinguishing them as different species; thus, they are synonymised here with *D. montium*.

Genus *Durbadnus* Pasteels, 1954

Durbadnus Pasteels, 1954a: 503. Type species: *Monophadnus chubbi* Forsius, 1930a, by original designation. http://www.waspweb.org/Tenthredinoidea/Tenthredinidae/Blennocampinae/Durbadnus/index.htm

Description

Antenna filiform, 9-segmented, longer than maximum head width, flagellomere 1 conspicuously longer than flagellomere 2 or flagellomere 3. Head without strongly developed structures; occipital carina absent; each mandible with strongly developed, double-shouldered, subapical tooth; clypeus subtruncate, very slightly enlarged medially; malar space absent (Koch & Liston 2012c: 657, fig. 27); supraantennal crest moderately developed; frontal area indistinctly limited. Epicnemium absent. Tarsal claws cleft apically, with inner tooth somewhat shorter, and large basal lobe (Koch & Liston, 2012c: 654, fig. 16). Fore wing with radial

crossvein (2r) present, media (M) slightly curved and parallel to crossvein (1m-cu) (Fig. 41E), cells 1Rs and 2Rs subequal in length (Fig. 41E) or 2Rs is as long as 1R1 and 1Rs united, anal cell present only distally (2A), petiolate (1A), stub of 2nd and 3rd anal veins (2A+3A) nearly straight or furcate at apex (Koch & Liston, 2012c); hind wing with closed radial cell (R1), without closed middle cells (Rs and M), anal cell (A) present and about equal to width of anal cell, short petiolate (1A) (Fig. 41E). Tergum 1 with more or less wide and deep median split (Fig. 153A).

Head and abdomen black, thorax black with orange yellow markings.

Ranging from 6.0-8.0 mm in length.

Remarks

Pasteels (1949) recognized that *Monophadnus chubbi* Forsius, 1930a is atypical for *Monophadnus* Hartig, 1837, because as described by Forsius (1930a) the tarsal claws are cleft apically and lobed basally, whilst *Monophadnus* has simple claws, without basal lobe and subapical tooth. Pasteels (1954a) described *Durbadnus*, after he had seen a male of *D. chubbi* collected by Marley in 1945. However, he perpetuated a mistake made by Forsius (1930a): “Hind wings with one closed middle cell”. Actually, in *Durbadnus* the hind wing is without a closed middle cell, *i.e.* cells RS and M are missing.

Three valid species of *Durbadnus* (*D. taegeri* Koch & Liston, 2012c, *D. chubbi* (Forsius, 1930a) and *D. obscuripes* Forsius, 1931) have so far only been found in South Africa (Koch & Liston 2012c)

Host plants

Nothing is known about their host plants.

Durbadnus taegeri Koch & Liston, 2012

Durbadnus taegeri Koch & Liston, 2012c: 655 ♂. Type locality: Hexrivier, Citrusdal, Cape Province (Western Cape Province), South Africa (USNM).

Female (Figs 153A, B)

Head and antenna black; apical half of mandible reddish brown. Thorax black; pronotum, postspiracular sclerite, lateral half of lateral lobe of mesoscutum, medial lobe of mesoscutum at extreme angle and tegula orange yellow. Legs black; anterior surface of apical half and apex of posterior surface of fore femur yellow, fore tibia and fore basitarsomere at base dirty whitish. Wings uniformly slightly infuscate; stigma, costa, subcosta and rest of venation blackish. Abdomen black.

Head very slightly narrowed behind eyes. Antenna 1.4× as long as maximum head width; flagellomere 1 as long as flagellomeres 2,3 combined. Eyes converging downwards. Postocellar area: width : length = 1.0 : 0.7; lateral furrows slightly

convex. Supraclypeal furrow deep. Supraantennal grooves large and deep, with conspicuous furrow at lateral margin of torulus. Interantennal area with rounded groove and small longitudinal furrow medially, ending at front margin of frontal area. In fore wing cells 1Rs and 2Rs subequal in length; stub of 2A+3A furcate (Fig. 41E). Median split of tergum 1 wide and deep.

Head sparsely micropunctate, shiny; pubescence on head brown. Mesoscutum more densely punctate, shiny; pubescence yellow. Terga 1,2 smooth and shiny, following terga transversely microridged and micropunctate, shiny. Sawsheath in dorsal view narrowed towards apex, in lateral view narrowly rounded at apex (Fig. 154A). Lancet with about 23 serrulae (Fig. 154B, C).

Length: 6.7 mm.

Male

Unknown.

Etymology

The species was named after our colleague and specialist on Symphyta Dr. Andreas Taeger, curator of Hymenoptera and Lepidoptera at the Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany.

Distribution

South Africa (Western Cape Province) (Fig. 183).

Ecology and habitat

The riverine habitat is characterised by different shrub species and quite dense herbaceous plant vegetation and is located in the Mountain Fynbos of the winter rainfall zone (Fig. 8).

Fig. 153. A-B. *Durbadnus taegeri*, habitus, female (holotype). **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

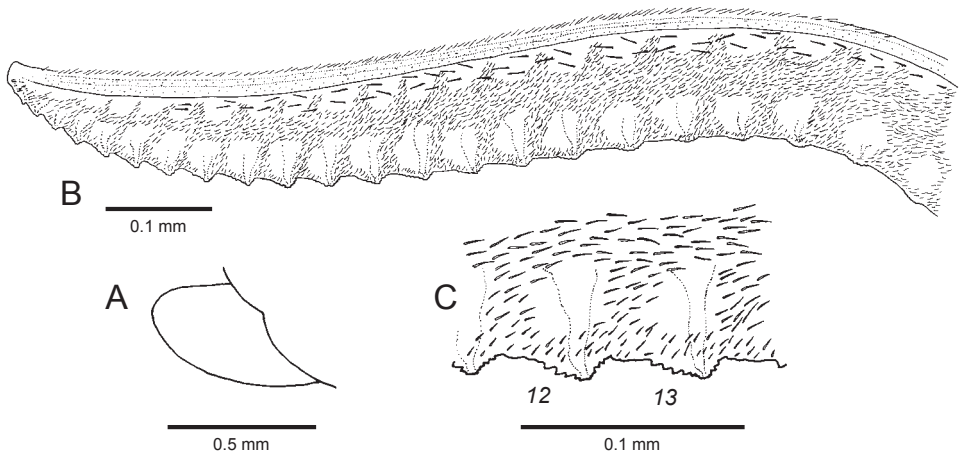

Fig. 154. A-C. *Durbadnus taegeri*. **A**. Sawsheath (lateral aspect). **B**. Lancet. **C**. Serrulae 12-13.

The flight season is more or less unknown. Only one specimen has been collected in October.

Remarks

Durbadnus taegeri was the first recorded member of the Tenthredinidae in the winter rainfall zone of southern Africa (Koch & Liston 2012c).

Genus *Trisodontophyes* Enslin, 1911

Trisodontophyes Enslin, 1911: 666. Type species: *Trisodontophyes nigroflava* Enslin, 1911, by original designation. http://www.waspweb.org/Tenthredinoidea/Tenthredinidae/Blennocampinae/Trisodontophyes/index.htm

Description

Antenna 9-segmented (Fig. 155D). Clypeus separated by an epistomal suture from the supraclypeal area, anterior margin of clypeus more or less circularly emarginate; malar space conspicuously developed (Fig. 155A); frontal area conspicuously domed, supraantennal bulges very strongly developed (Figs 155B, C). Tarsal claws tridentate with a basal lobe and two subapical teeth (Fig. 155E). Fore wing with radial cell (R1) divided by radial crossvein (2r), anal cell present only distally (2A), petiolate (1A), 2nd and 3rd anal vein (2A+3A) not outlined, only a basal stub present straight at apex (Fig. 41F); hind wing with closed radial cell, with anal cell (A) and one middle cell (M) present (Fig. 41F). Median split of tergum 1 moderately wide and deep (Fig. 155).

The head is mostly black, the thorax black or black with yellowish markings, and the abdomen yellowish.

Ranging from 6.0-11.5 mm in length.

Remarks

Trisodontophyes are readily separated from other African Blennocampinae by their tridentate claws (Fig. 155E).

Together with *Distega*, the endemic genus *Trisodontophyes* is one of the most species rich genera of Afrotropical Blennocampinae. Taeger *et al.* (2010) list 21 extant species as valid. The genus was revised by Koch (2001).

For the south-west African study region only one species is reported, which has been collected in the Woodland Savanna Biome.

Host plants

Nothing is known about their host plants.

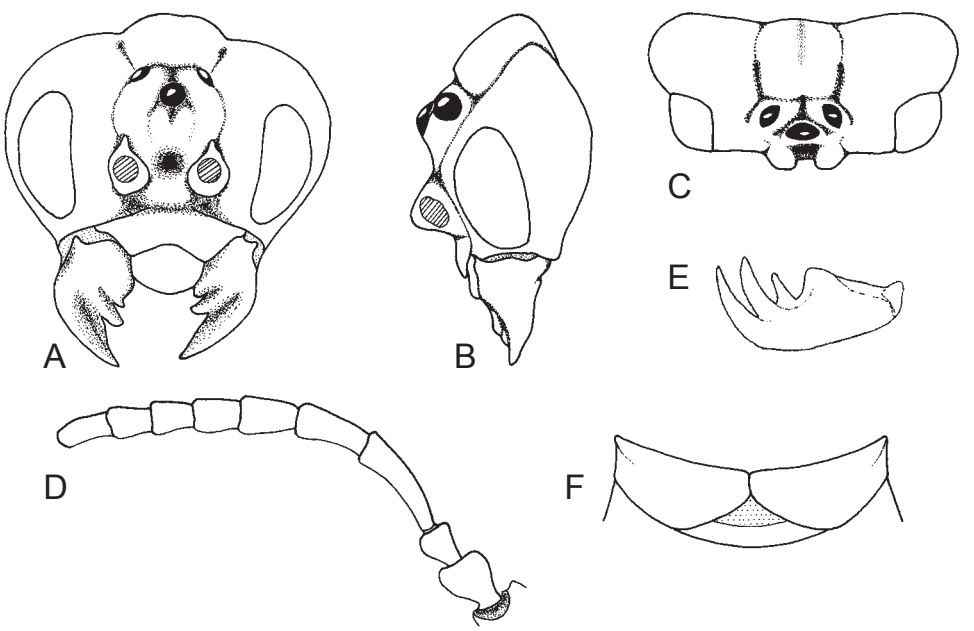

Fig. 155. A-F. *Trisodontophyes* sp. **A**. Head (frontal aspect). **B**. Head (lateral aspect). **C**. Head (dorsal aspect). **D**. Antenna. **E**. Tarsal claw. **F**. Tergum 1.

Trisodontophyes diversa Koch, 2001

Trisodontophyes diversa Koch, 2001: 266, 273. ♂♀. Type locality: Ufipa, Tanganyika [Tanzania] (BMNH).

Female

Head and antenna black; mandible light brown in basal half becoming dark reddish apically. Thorax black with following yellow: propleuron (narrowly black at dorsal angle), pronotum, mesoscutellum, mesoscutellar appendage, metanotum, mesopleuron except for narrow ventral margin, katepimeron and metapleuron. Legs yellow: tibiae blackish ringed apically, tarsi blackish with basitarsomeres yellow on basal half. Wings slightly bicoloured with infuscate apical half and flavescent-hyaline basal half, intercostal area dark fuscous, stigma, costa, subcosta dark brown, rest of venation yellow at base and dark brown in apical half. Abdomen yellow; sawsheath black margined apically.

Head slightly enlarged behind eyes. Antenna 1.3× as long as maximum head width. Eyes slightly converging below. Anterior margin of clypeus shallowly emarginate. Postocellar area: width : length = 1.0 : 0.6; lateral furrows diverging towards posterior margin of head (Fig. 156A), without median furrow. Frontal area distinctly limited laterally; anterior cross-ridge scarcely developed. Interantennal furrow shallow, with two small lateral grooves.

Vertex scattered punctate with some coarser punctures between, shiny; gena more densely punctate, subshiny; frons and clypeus rugosely sculptured, dull; pubescence light brown. Mesoscutum moderately densely punctate, shiny; pubescence similar to that on head. Sawsheath in dorsal view narrow, in lateral view moderately pointed apically. Lancet with about 18 serrulae (Figs 156B-D).

Length: 9.0-10.5 mm.

Male (Figs 157A, B)

Colouration similar to that of female. Antenna 1.4× as long as maximum head width. Postocellar area: width : length = 1.0 : 0.7, median furrow slightly developed. Genitalia: Figs 156E, F.

Length: 7.5-8.0 mm.

Etymology

Derived from Latin *diversus*, various, with reference to the intraspecific variability of this species.

Distribution

Malawi, Namibia (Region: Okavango, Otjozondjupa) (Fig. 183) Tanzania.

Ecology and habitat

The Namibian collection site “Omaramba-Omatako” is a dry-river located in the Woodland Savanna Biome. Furthermore, this species is recorded from the

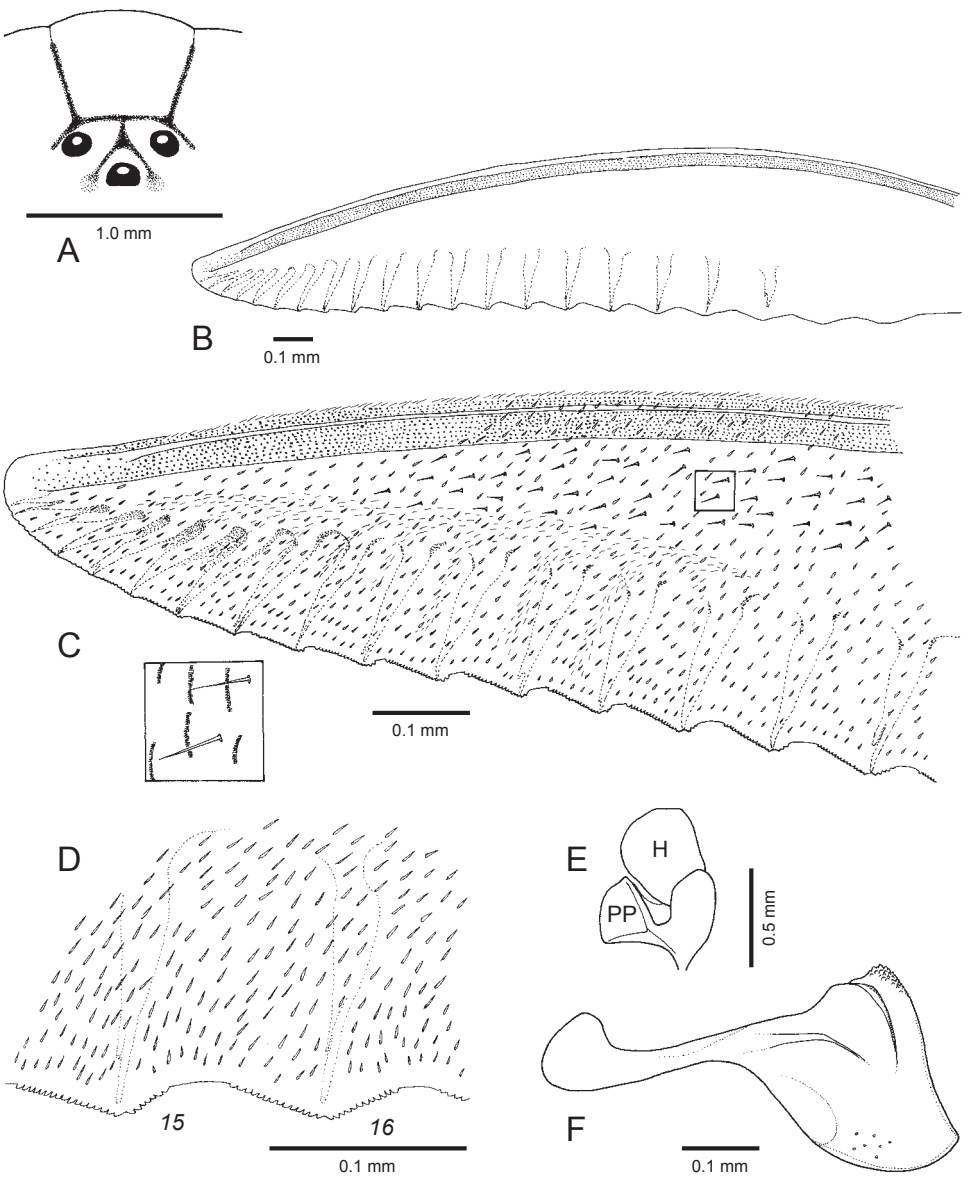

Fig. 156. A-F. *Trisodontophyes diversa*: **A**. Postocellar area (dorsal aspect). **B**. Lancet. **C**. Lancet (apical portion), square illustrating enlarged microsculpture. **D**. Serrulae 15-16. **E**. Parapenis and harpe (right, ventral aspect). **F**. Penis valve (left, lateral aspect).

Fig. 157. A-B. *Trisodontophyes diversa*, habitus, male. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Okavango River and from Grootfontein, localities also belonging to this biome. It seems that *T. diversa* prefers moist habitats with dense vegetation.

The flight season is not well known, the specimens were collected in February and December.

Remarks

The first record of *T. diversa* is from 1887, the second from 1918. Numerous entomological expeditions to these localities over the past 20 years, with the objective of obtaining new material, were unsuccessful.

Variability of colouration in this species is visible in the reduction of the largely black mesosternum to a small median patch. On the other hand, the mesoscutellum and the mesoscutellar appendage may be also black. The median furrow of the postocellar area is also developed to different degrees.

Subfamily Selandriinae

http://www.waspweb.org/Tenthredinoidea/Tenthredinidae/Selandriinae/index.htm

Genus *Dulophanes* Konow, 1907

Dulophanes Konow, 1907d: 132**.** Type species: *Dulophanes morio* Konow, 1907d, by monotypy. http://www.waspweb.org/Tenthredinoidea/Tenthredinidae/Selandriinae/Dulophanes/index.htm

Dulophanella Forsius, 1934: 405. Type species: *Dulophanella gracilis* Forsius, 1934 [= *Dulophanes gracilis* (Forsius, 1934), by original designation.

Phanodules Pasteels, 1949: 80, 88. Type species: *Dulophanes antennatus* Enslin, 1913a, by original designation.

Description

Antenna with 9-11 segments. Head without especially conspicuous structures; clypeus separated by an epistomal suture from the supraclypeal area, anterior margin of clypeus truncated or subtruncated. Anterior portion of mesepisternum with epicnemium, separated by a more or less conspicuous epicnemial groove. Tarsal claws simple (Fig. 159A) or with subapical tooth and basal lobe. Fore wing with radial cell (R1) divided by radial crossvein (2r), the origins of veins M and Rs+M with distinct distance about as long as crossvein Rs (Fig.), anal cell (A) without cross vein a (1A and 2A are fused), contracted medially (Fig. 41B); hind wing with closed radial cell (R1), with anal cell (A) and two middle cells (Rs and M) present (Fig. 41B). Tergum 1 with a rather narrow, but deep median split.

The colouration of the species is predominantly black.

Ranging from 4.0 to 6.5 mm in length.

Remarks

According to Taeger *at al*. (2010) 21 species of *Dulophanes* are known as endemic to the Afrotropical Region. However, most of them belong to the central African fauna. For the study region only one species is reported. The genus *Dulophanes* desperately needs a taxonomic revision. The revision produced by Pasteels (1949) is outdated and in some cases incorrect.

Most species other than *D. obscurus* are coloured more or less yellow, and except for *D. bensoni*, and *D. obscurus* have tarsal claws with an inner tooth and basal lobe (Pasteels 1949). In addition, in the hind wing of *D. bensoni* the cells Rs and M are absent (Forsius 1931, Malaise 1963).

Until now three valid species of *Dulophanes* are known for Lesotho, Namibia and South Africa.

Host plants

Nothing is known about their host plants.

Key to species

1 Tarsal claw simple (Fig. 159A) ……2
1* Tarsal claw with smaller inner tooth and enlarged basal lobe. Lesotho, South Africa ……***D. natalensis* Forsius, 1931**

2 Legs nearly entirely yellow; hind wing with cells Rs and M absent. South Africa ……***D. bensoni* Forsius, 1931**
2* Legs black with fore tibia light light brown; hind wing with cells Rs and M present. Lesotho, Namibia, South Africa ……***D. obscurus* Forsius, 1931**

Dulophanes obscurus Forsius, 1931

Dulophanes obscurus Forsius, 1931: 35. ♀. Locus typicus: Van Reenen, Drakensberg, Natal [KwaZulu-Natal Province], South Africa (BMNH).

Female (Figs 158A, B)

Head and antenna black; apical half of mandible light brown becoming dark reddish apically. Thorax black. Wings uniformly strongly infuscate throughout, intercostal area somewhat darker; costa, stigma, subcosta, and rest of venation blackish. Legs black; extreme apex of fore femur and fore tibia light brown. Abdomen black; sterna with narrow whitish posterior margins.

Head slightly narrowed behind eyes. Antenna 10-segmented, as long as maximum head width. Anterior margin of clypeus truncated. Frontal area laterally limited. Postocellar area about twice as broad as long, laterally inconspicuously limited. Malar space very narrow, about a half diameter of lateral ocellus. Interantennal furrow transverse, moderately deep. Tarsal claws simple, without subapical tooth and basal lobe (Fig. 159A).

Head very sparsely micropunctate, shiny; pubescence brownish. Thorax somewhat more micropunctate, shiny, pubescence similar to that on head. Sawsheath in lateral view pointed apically, conspicuously shorter than lancet. Lancet: Fig. 159B.

Length: 6.2-5.3 mm.

Male

Colouration and structure similar to that of female. Mid tibia brown. Malar space absent. Genitalia: Figs 159C, D.

Length: 4.8-5.5 mm.

Etymology

The Latin adjective *obscurus* means “dark”.

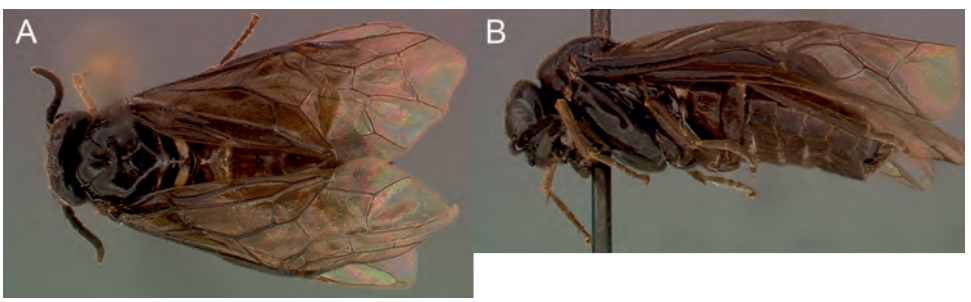

Fig. 158. A-B. *Dulophanes obscurus*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

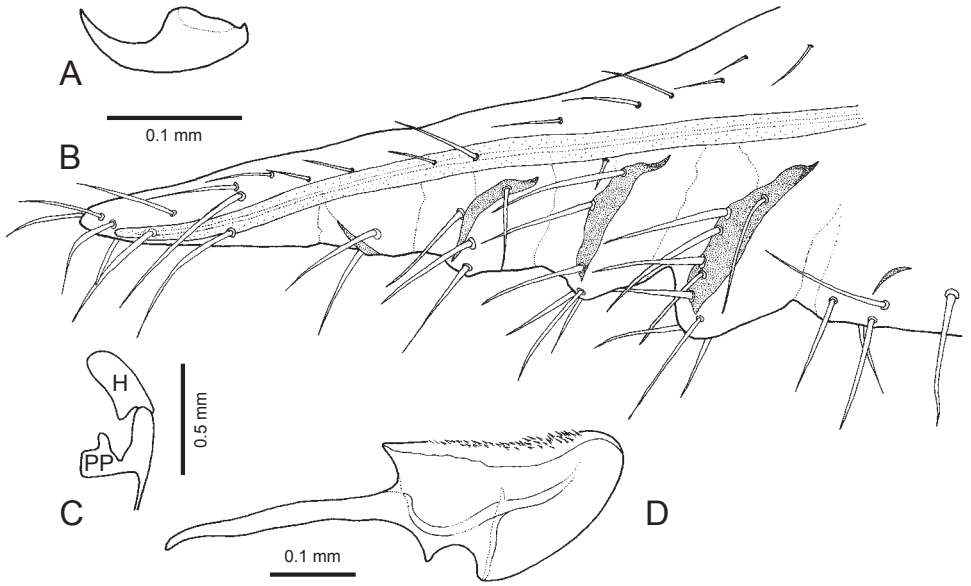

Fig. 159. A-D. *Dulophanes obscurus*. **A**. Tarsal claw. **B**. Lancet. **C**. Parapenis and harpe (right, ventral aspect). **D**. Penis valve (left, lateral aspect).

Fig. 160. The habitat of *Dulophanes obscurus* on the Farm “Vaalgrass” southwest of Windhoek (Nama Karoo Biome). (Photo by F. Koch)

Distribution

Lesotho, Namibia (Khomas Region), South Africa (Western Cape Province) (Fig. 184).

Ecology and habitat

Dulophanes obscurus has been found in different biomes: Woodland Savanna, Thornbush Savanna (Fig. 160), Grassland and Fynbos Biome. The flight season is dependent on the biome, from September to March.

Remarks

Only *Dulophanes obscurus* is recorded from the study area, and its occurrence in several different biomes suggests that it may be a group comprising a number of different species. Further taxonomic investigations are necessary.

Dulophanes obscurus was only recently recorded as the second representative species of Tenthredinidae in the winter rainfall zone of western South Africa, following on the record of *Durbadnus taegeri* (see discussion under that species).

9.5 Family Orussidae

http://www.waspweb.org/Orussoidea/Orussidae/index.htm

With their long ovipositor the females so that attacking the larvae of wood-boring Buprestidae and Cerambycidae (Coleoptera), as well as Xiphydriidae and Siricidae

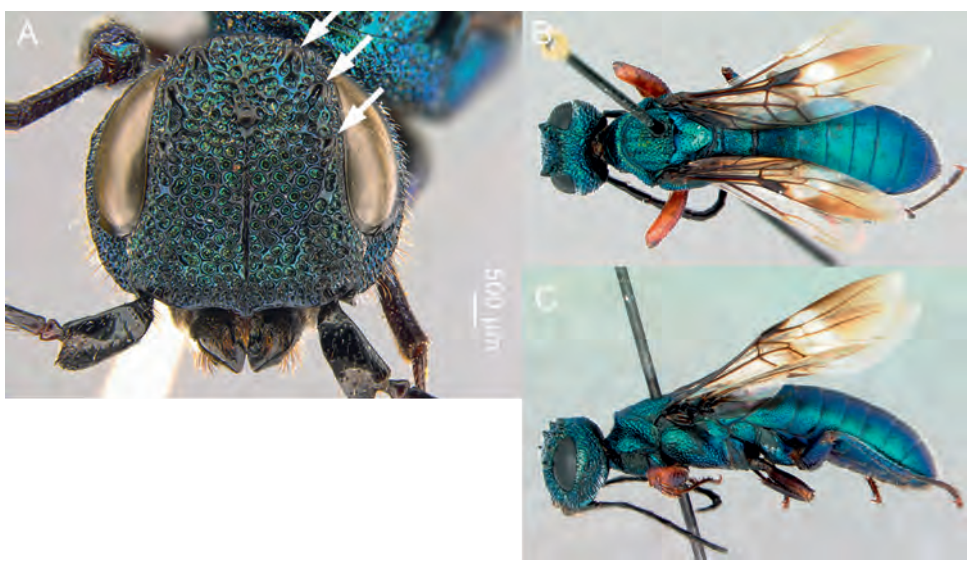

Fig. 161. A-C. *Chalinus braunsi*. **A**. Head (frontal aspect), coronal teeth arrowed, habitus, male. **B**. Dorsal aspect. **C**. Lateral aspect. (Photos S. van Noort)

(Hymenoptera). The larvae of the orussids living as ectoparasitoids (Vilhelmsen *et al*. 2013).

No species of this family are known from the study area. Up to now only three orussid species were reported in South Africa: The metallic bluish-green coloured *Chalinus braunsi* (Enslin, 1911) (Figs 161A-C) known from the Limpopo Province, Botswana, Mozambique and Zimbabwe, the black *Pedicrista hyalina* Benson, 1935 (Figs 162A-D) known from the North West Province, Malawi and Zimbabwe, as well as the very small (2.6 mm), blackish coloured *Leptorussus kwazuluensis* Vilhelmsen, 2003 from the KwaZulu-Natal Province.

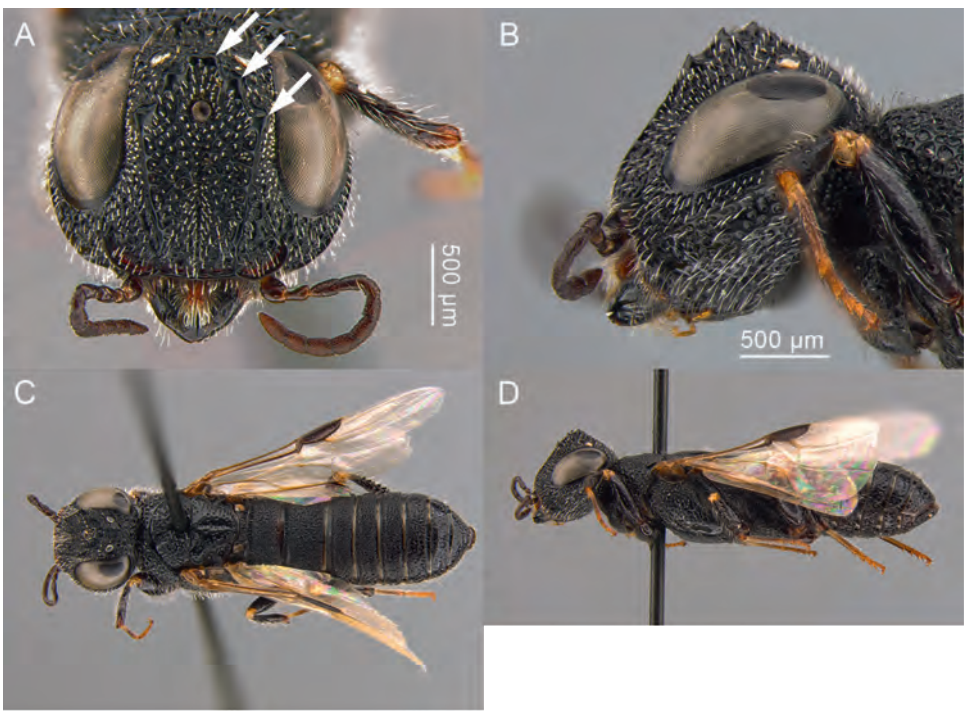

Fig. 162. A-D. *Pedicrista hyalina*. **A**. Head (frontal aspect), coronal teeth arrowed. **B**. Lateral aspect, habitus, male. **C**. Dorsal aspect. **D**. Lateral aspect. (Photos by S.M. Blank)

9.6 Introduced (aliens) and invasive species

Family Tenthredinidae

Subfamily Heterarthrinae

Genus *Caliroa* Costa, 1859

Caliroa Costa, 1859: 59. Type species: *Caliroa sebetia* Costa, 1859 [*Caliroa cothurnata* (Serville, 1823)], by monotypy. http://www.waspweb.org/Tenthredinoidea/Tenthredinidae/Heterarthrinae/Caliroa/index.htm

Synonyms are listed by Taeger *et al.* (2010).

Caliroa cerasi (Linnaeus, 1758). Pear-slug

Tenthredo cerasi Linnaeus, 1758: 557 [by indication on the work of Réaumur; the description is mainly of the larva and the type locality is Paris, France].

Pear-slug is the approved common name.

Synonyms listed by Taeger *et al.* (2010).

Female (Figs 163A, B)

Black with fore and mid tibia brownish. Mandible in apical half yellow to reddish towards apex. Wings very slightly infuscate throughout; stigma, costa, subcosta and rest of venation blackish.

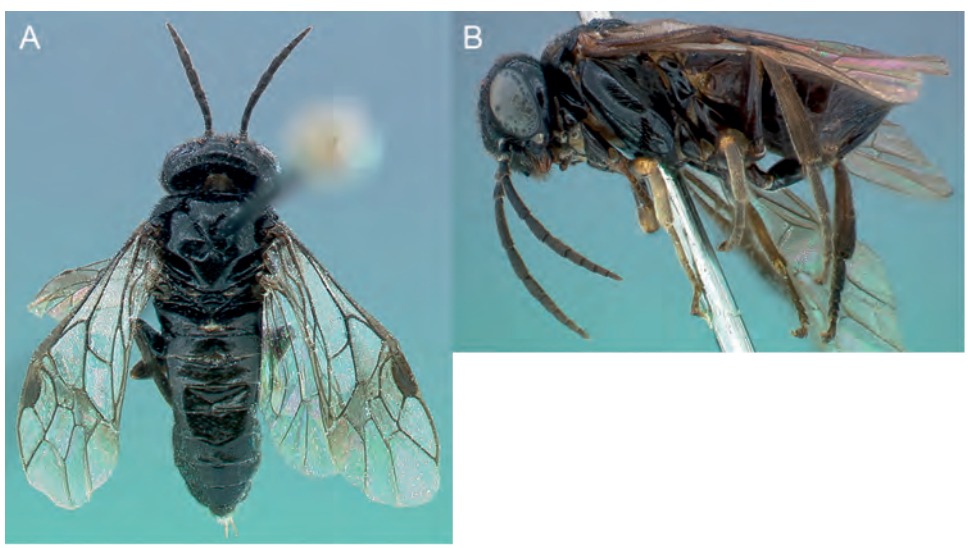

Fig. 163. A-B. *Caliroa cerasi*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Head parallel-sided behind eyes. Antenna 1.9× as long as maximum head width. Anterior margin of clypeus shallowly, triangularly emarginate. Postocellar area: width : length = 1.6 : 1.0; without longitudinal furrow, lateral furrows convex. Tarsal claws with a large basal lobe (Fig. 164A).

Head and thorax very scattered micropunctate; pubescence blackish. Abdomen smooth and shiny. Sawsheath in dorsal view parallel-sided; in lateral view pointed apically (Fig. 164B). Lancet with about 18 serrulae (Fig. 164C).

Length: 4.8–5.7 mm.

Male

Unknown in southern Africa.

Etymology

The species name alludes to *cerasus* (cherry), one of the host plants of the species.

Distribution

Widespread in the Palaearctic Region, and has been introduced into North America, Argentina, Chile, Uruguay, Australia (including Tasmania), New Zealand (Smith 1971) and South Africa. In South Africa *C. cerasi* is reported from the following provinces: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, North West, Western Cape (Fig. 184) (Koch & Smith 2012). Additionally, a map of distribution is published by Picker & Griffiths (2011).

Host plants

In South Africa *C. cerasi* is known as a pest on deciduous fruit trees such as peach, quince, apricot and plum (Prinsloo 1985).

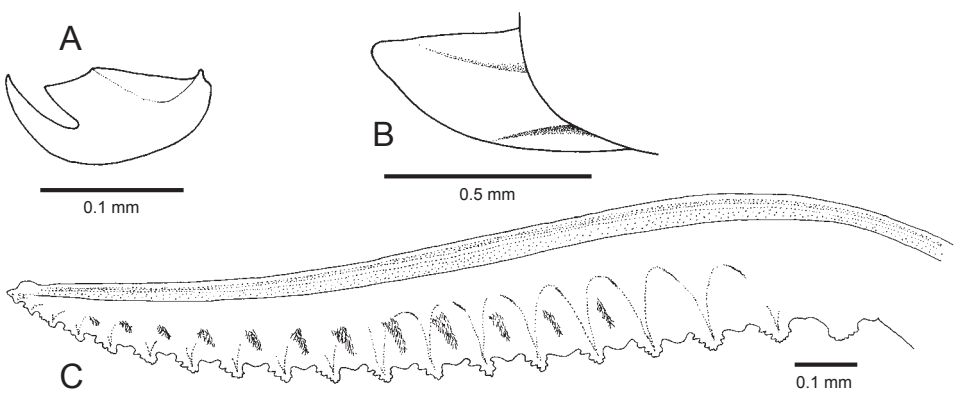

Fig. 164. A-C. *Caliroa cerasi*. **A**. Tarsal claw. **B**. Sawsheath (lateral aspect). **C**. Lancet.

Ecology and habitat

The males of this species are very rare in the Palaearctic Region, except in parts of the Mediterranean Region, and unknown in southern Africa. Therefore *Caliroa cerasi* seems to be parthenogenetic in southern Africa.

In the study region records are known from November and January. The flight season throughout South Africa is from September to April and July.

Remarks

The introduced *Caliroa cerasi* is separated from the indigenous *C. blanki* Koch & Smith, 2011, known from the western provinces Limpopo and Mpumalanga by its entirely black legs and presence of complete vein 2A+3A in the fore wing (Fig. 41C). Futhermore, in the hind wing of *C. cerasi* the cells Rs and M usually present, sometimes both absent, or either Rs or M present, whereas in *C. blanki* cell RS is present and M is absent.

Genus *Fenusa* Leach, 1817

Fenusa Leach, 1817: 126. Type species: *Tenthredo* (*Emphytus*) *pumila* Klug, 1818 [= *Fenusa* (*Fenusa*) *pumila* Leach, 1817, by monotypy]. http://www.waspweb.org/Tenthredinoidea/Tenthredinidae/Heterarthrinae/Fenusa/index.htm

Synonyms are listed by Taeger *et al.* (2010).

Fenusa dohrnii (Tischbein, 1846)

Kaliosysphinga dohrnii Tischbein, 1846: 80. ♀ [the sex is not mentioned, but this species is entirely parthenogenetic]. Type locality: Herrstein, Fürstenthum Birkenfeld (Germany).

Synonymys are listed by Taeger *et al.* (2010).

Female (Figs 165A, B)

Black with fore and mid tibia dirty whitish to light brown, hind tibia brown. Mandible in apical half yellow to reddish towards apex. Wings moderately infuscate throughout; stigma, costa and subcosta light brown, rest of venation brown in basal half becoming light brown towards apex.

Head narrowed behind eyes. Antenna 1.1× as long as maximum head width. Anterior margin of clypeus truncated. Postocellar area: width : length = 2.1 : 1.0; without longitudinal furrow, lateral furrows more or less parallel-sided. Tarsal claws simple (Fig. 166A)

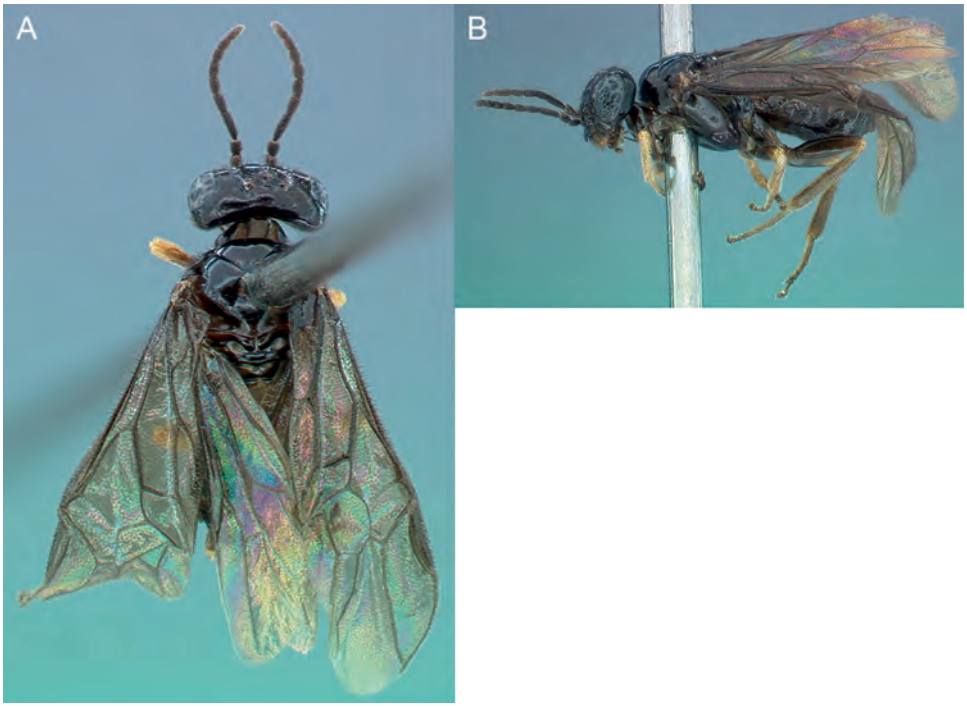

Fig. 165. A-B. *Fenusa dohrnii*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Head, thorax and abdomen smooth and shiny; pubescence light brown. Sawsheath in dorsal view gradually narrowed towards apex; in lateral view rounded apically (Fig. 166B). Lancet with about 9 serrulae (Fig. 166C).

Length: 3.2–3.5 mm.

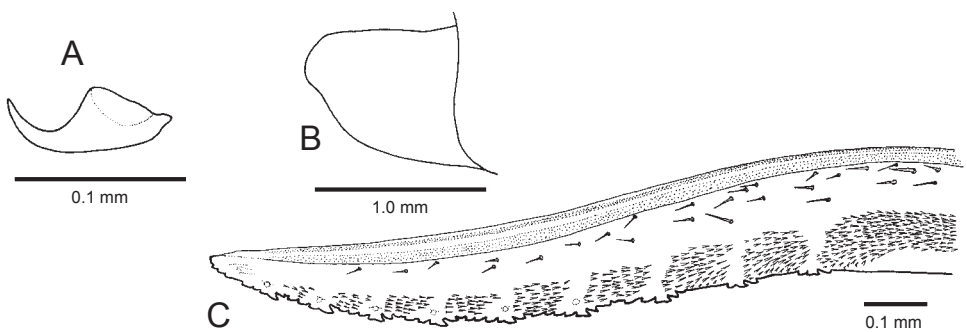

Fig. 166. A-C. *Fenusa dohrnii*. **A**. Tarsal claw. **B**. Sawsheath (lateral aspect). **C**. Lancet.

Male

Unknown; parthenogenetic.

Etymology

Named after Carl August Dohrn (1806-1892), a German entomologist.

Distribution

Widespread in the Palaearctic Region, and has been introduced into North America and South Africa; distribution in Western Cape Province (Fig. 184).

Host plant

According to Prinsloo (1985) the larvae of *F. dohrnii* make blotch mines in the leaves of species of *Alnus* spp. (alder) (Betulaceae).

Ecology and habitat

In the study region the flight season is in November and December.

Subfamily Nematinae

Genus *Nematus* Panzer, 1801

Nematus Panzer, 1801: 82: 10. Type species: *Tenthredo* (*Nematus*) *lucida* Panzer, 1801 [= *Nematus* (*Nematus*) *lucidus* (Panzer, 1801)], by monotypy.

Synonyms are listed by Taeger *et al.* (2010).

Nematus oligospilus Förster, 1854

Nematus oligospilus Förster, 1854: 284. ♀. Type locality: Aachen, Deutschland [Germany].

Synonym only included if relevant to Afrotropical fauna. The full synonymy is listed by Taeger *et al.* (2010).

Nematus desantisi Smith, 1983: 260. ♀. Type locality: Chubut, Argentinia.

Female (Figs 167A, B)

Green when alive; dry specimens faded yellow. Ocelli sometimes very narrowly black margined; apex of mandible reddish brown; antenna pale yellow, dorsal surface of scape, pedicel and flagellomere 1 black, following flagellomeres more or less brownish on dorsal surface. Hind tarsus brownish. Wings hyaline; costa and stigma yellow (green when alive), subsosta and rest of venation brown. Sawsheath apically with narrow blackish margin.

Head parallel-sided behind eyes. Antenna 3.1× as long as maximum head width. Eyes slightly diverging below. Anterior margin of clypeus circularly emarginate medially. Malar space 1.4× diameter of lateral ocellus. Frontal area moderately limited; anterior cross-ridge conspicuously interrupted medially. Interantennal fovea rounded, slightly more than diameter of lateral ocellus. Postocellar area: width: length = 2.3 : 1.0; with very shallow longitudinal furrow, lateral furrows convex.

Head and thorax shiny, with duller microsculpture at middle of vertex and frons; pubescence white. Sawsheath in dorsal view gradually narrowed towards apex; in lateral view pointed apically. Lancet with about 20 serrulae (Koch & Smith 2000: 293, figs 1, 2).

Length: 5.2-7.0 mm.

Male

Unknown in southern Africa.

The description is based on European males:

Colouration similar to that of female, except for black postocellar area, occiput behind and frontal area. Mesonotum, except for notauli, metascutellum and metapostnotum black, propleuron and anepimeron brownish. Dorsal surface of abdomen with a broad, black longitudinal stripe.

Other features similar to that of female. Penis valve: (Koch & Smith 2000: 293, fig. 5).

Length: 4.7-5.3 mm.

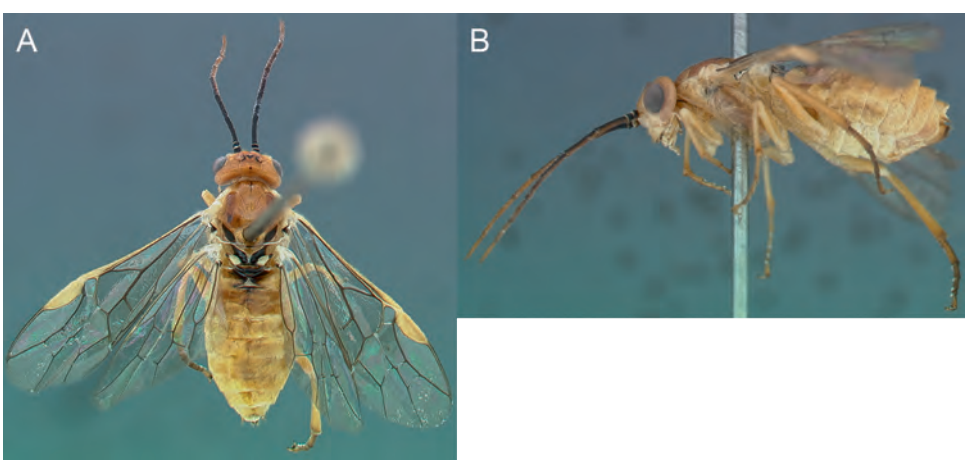

Fig. 167. A-B. *Nematus oligospilus*, habitus, female. **A**. Dorsal aspect. **B**. Lateral aspect. (Photos by A.D. Liston)

Etymology

Oligos (Greek) means “small”, and *pilus* (Latin) means “hair”. Possibly the name alludes to the rather small cerci of the female.

Distribution

Widespread in the Northern Hemisphere; introduced into Argentina, Chile, Lesotho, South Africa, Australia and New Zealand (Koch & Smith 2000).

Host plants

In South Africa: *Salix babylonica* Linnaeus, *S. fragilis* Linnaeus (Salicaceae) (Urban & Eardley (1995, 1997).

Ecology and habitat

The males of this species are unknown in southern Africa, where *N. oligospilus* is probably parthenogenetic. The species has sometimes been reported to be abundant on cultivated willows (Urban & Eardley 1995, 1997). Currently this species is only known from the summer rainfall zone in South Africa (Koch & Smith 2000). However, this species is also expected to occur in the Cape region. The flight season is from January to March.

Remarks

The southern African specimens are conspicuously paler than the European material. In Europe the specimens are black marked on the head, especially on the frons and postocellar area; mesoscutum with three black longitudinal stripes, and terga 1-3 with black medial spots.

9.7 Family Siricidae

http://www.waspweb.org/Siricoidea/Siricidae/index.htm

Woodwasps or horntails is the approved common name.

Description

Antenna with about 18 flagellomeres. Fore tibia with one apical spine. Apical tergum of female (Fig. 168A, arrowed) and apical sternum of male (Fig. 168B, arrowed) with a horn-like projection (cornus). Pronotum laterally bulging and, collar-shaped.

Genus *Sirex* Linnaeus, 1760

Sirex Linnaeus, 1760: 396. Type species: *Sirex juvencus* (Linnaeus, 1758), designated by Curtis, 1829. http://www.waspweb.org/Siricoidea/Siricidae/Sirex/index.htm

Synonyms are listed by Taeger *et al.* (2010).

Sirex noctilio Fabricius, 1793. Sirex woodwasp, European woodwasp

Sirex noctilio Fabricius, 1793: 87-91 [sex not stated, but the description is of a male]. Type locality: Germania [Germany].

Sirex woodwasp and European woodwasp are the approved common names.

Synonyms are listed by Taeger *et al.* (2010).

Female (Fig. 168A)

Body black with blue metallic luster. Legs light brown; coxae and trochanters black, and apical two tarsal segments infuscate. Wings flavescent-hyaline; first radial cell (1R1) more or less infuscate, stigma, costa, subcosta and rest of venation light brown.

An important character separating females of *S. noctilio* in the presence of large, closely set pits on the ovipositor.

Length: 15.0-36.0 mm.

Male (Fig. 168B)

Body black with blue metallic luster; abdomen with terga 4-7 and sterna 4-7 yellow. Legs light brown; coxae, trochanters, hind tibia and hind tarsus black. Wings similarly coloured to those of female.

Length: 9.0-32.0 mm.

Etymology

The species name means “of the night”; from Latin *nocte*.

Distribution

Widespread in the Palaearctic Region; introduced to Australia, New Zealand, South Africa, South America, and North America (Schiff *et al*. 2006).

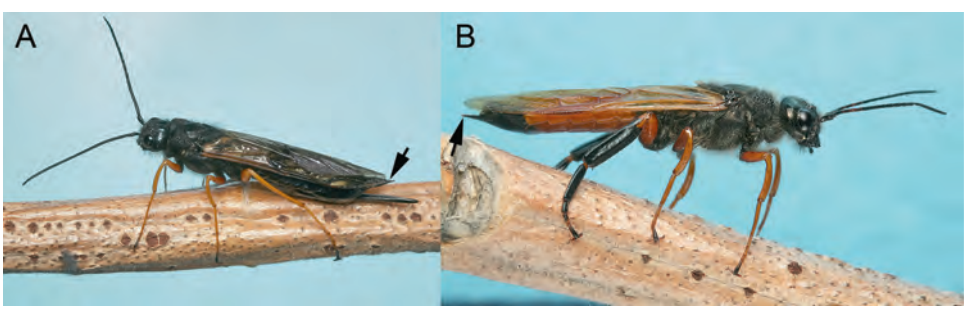

Fig. 168. A-B. *Sirex noctilio*: The tube-like projections (arrowed): **A**. On apical tergum of female. **B**. On apical sternum of male. (Photos by H. Goulet)

Within eight years of its discovery in the Cape Peninsula in 1994, the European woodwasp had spread up to 380 km along both the western and southern coasts of South Africa (Tribe & Cillie 2004). Its dispersal direction follows the *Pinus* plantations located in the mountains of Western Cape Province, especially in the Bokkeveld direction to the North as well as Riviersonderendberge, Langeberg, Outenikwaberge to Kougaberge in the East (Fig. 183). It has now reached Eastern Cape and KwaZulu-Natal (van Noort & Picker 2010) provinces.

The trade in products comprising untreated timber from small sawmills in Western Cape Province has facilitated the uncontrolled spread of this pest.

Host plants

Pine (*Pinus* spp.) and other coniferous trees (Prinsloo 1985); larvae live in tunnels in the wood of the trunk. In Western Cape Province larvae have been found in *P. patula* Schlechtendal & Chamisso (patula pine) introduced from east-central Mexico and on *P. radiata* David Don (radiata pine) native to California. Although *Sirex noctilio* was regarded as having not become established in southern Africa in the mid 1980's (Prinsloo 1985), this species is currently the most important pest of *Pinus* spp. in South Africa and is regarded as a serious threat to the forestry industry (Tribe & Cillie 2004).

Ecology and habitat

The invasive species *S. noctilio* needs the introduced species of *Pinus* spp. as host plants.

In the study region the flight season begins in the middle of November and ends in the middle of April, with a maximum in March and a second, smaller peak in January (Tribe & Cillie 2004). Most of the reported localities belong to the Fynbos Biome.

Remarks

Sirex noctilio displays a high degree of sexual dimorphism.

In South Africa some methods of biological pest control are employed, especially with nematodes and other parasitoid Hymenoptera (Tribe & Cillie 2004).

10. Checklist of species recorded in south-western Africa

Family Argidae

Arge angulifera Pasteels, 1953
Arge annulipes (Klug, 1834)
Arge bensoni Pasteels, 1953
Arge bisignata Konow, 1907
Arge capensis (Klug, 1814)

Arge cochraneae Koch & Goergen, 2010
Arge deckerti Koch, 2005
Arge dirce (W. F. Kirby, 1882)
Arge elandsbayensis Koch & Goergen, 2010
Arge furvipes Konow, 1907
Arge hereroensis Koch & Goergen, 2010
Arge iota Pasteels, 1953
Arge krabbefonteinensis Koch & Goergen, 2010
Arge kungveldensis Koch & Eardley, 2011
Arge langebergensis Koch & Goergen, 2010
Arge meyi Koch, 2006
Arge montana Koch & Goergen, 2010
Arge namaensis Koch & Goergen, 2010
Arge rufocyanea (Enslin, 1911)
Arge sjoestedti Konow, 1907
Arge speciosa (Klug, 1834)
Arge spei (Enslin, 1911)
Arge stuhlmanni (Kohl, 1893)
Arge taeniata (Klug, 1834)
Arge vannoorti Koch & Liston, 2012
Arge whiteheadi Koch & Goergen, 2010

Pampsilota brandbergensis Koch, 2006
Pampsilota luederitzensis Koch, 2006

Triarge citrusdalensis Koch, 2006
Triarge driehoekensis Koch, 2010
Triarge flavoapicalis Koch, 2006
Triarge karooensis Koch, 2006
Triarge mosselbayensis Koch, 2006
Triarge namaquaensis Koch, 2006
Triarge nigra Koch, 2006
Triarge plumbea Forsius, 1931
Triarge winterhoekensis Koch, 2006

Family Tenthredinidae

Subfamily Allantinae

Xenapates beateae Koch, 1996
Xenapates damaraensis Koch, 1995
Xenapates eardleyi Koch, 1995
Xenapates similis Benson, 1939

Subfamily Athaliinae

Athalia brevicornis Benson, 1962
Athalia incomta Konow, 1908

Athalia maraisi Koch, 2010
Athalia marginipennis Enderlin, 1920
Athalia turneri Forsius, 1931
Athalia ustipennis Mocsáry, 1909

Subfamily Blennocampinae

Distega bevisi Forsius, 1930
Distega montium Konow, 1907
Durbadnus taegeri Koch & Liston, 2012
Trisodontophyes diversa Koch, 2001

Subfamily Selandriinae

Dulophanes obscurus Forsius, 1931

Introduced and invasive species

Family Tenthredinidae

Subfamily Heterarthrinae

Caliroa cerasi (Linnaeus, 1758)
Fenusa dohrnii (Tischbein, 1846)

Subfamily Nematinae

Nematus oligospilus Förster, 1854

Family Siricidae

Sirex noctilio Fabricius, 1793

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Fig. 169. The entomologists and staff from MFN, who collect sawflies on a regular basis (from left): J. Deckert, F. Koch, W. Mey and K. Ebert. (Photo by J. Deckert)

12. Distribution maps

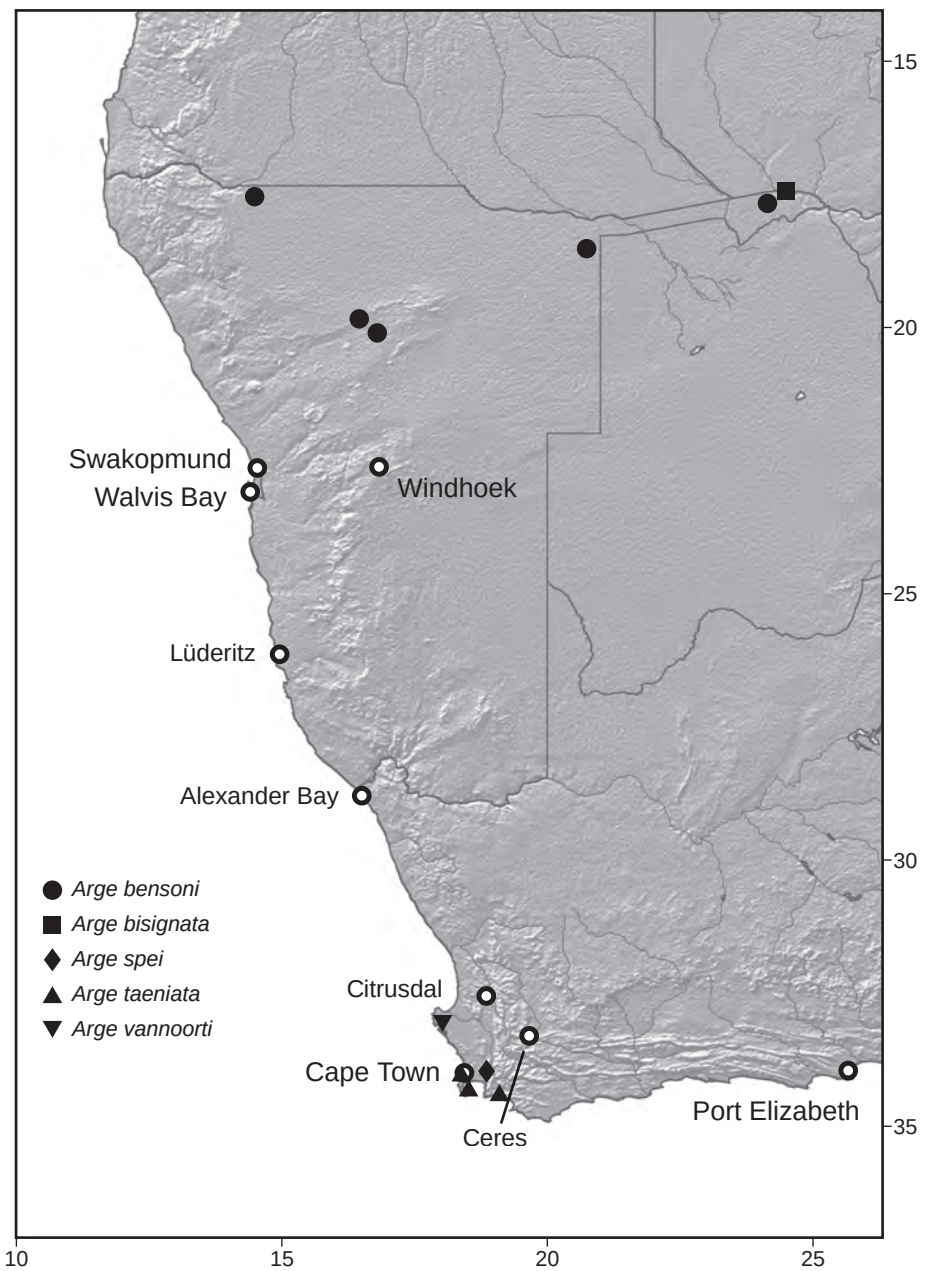

Fig. 170. Distribution map of *Arge bensoni* Pasteels, *A. bisignata* Konow, *A. spei* (Enslin), *A. taeniata* (Klug) and *A. vannoorti* Koch & Liston.

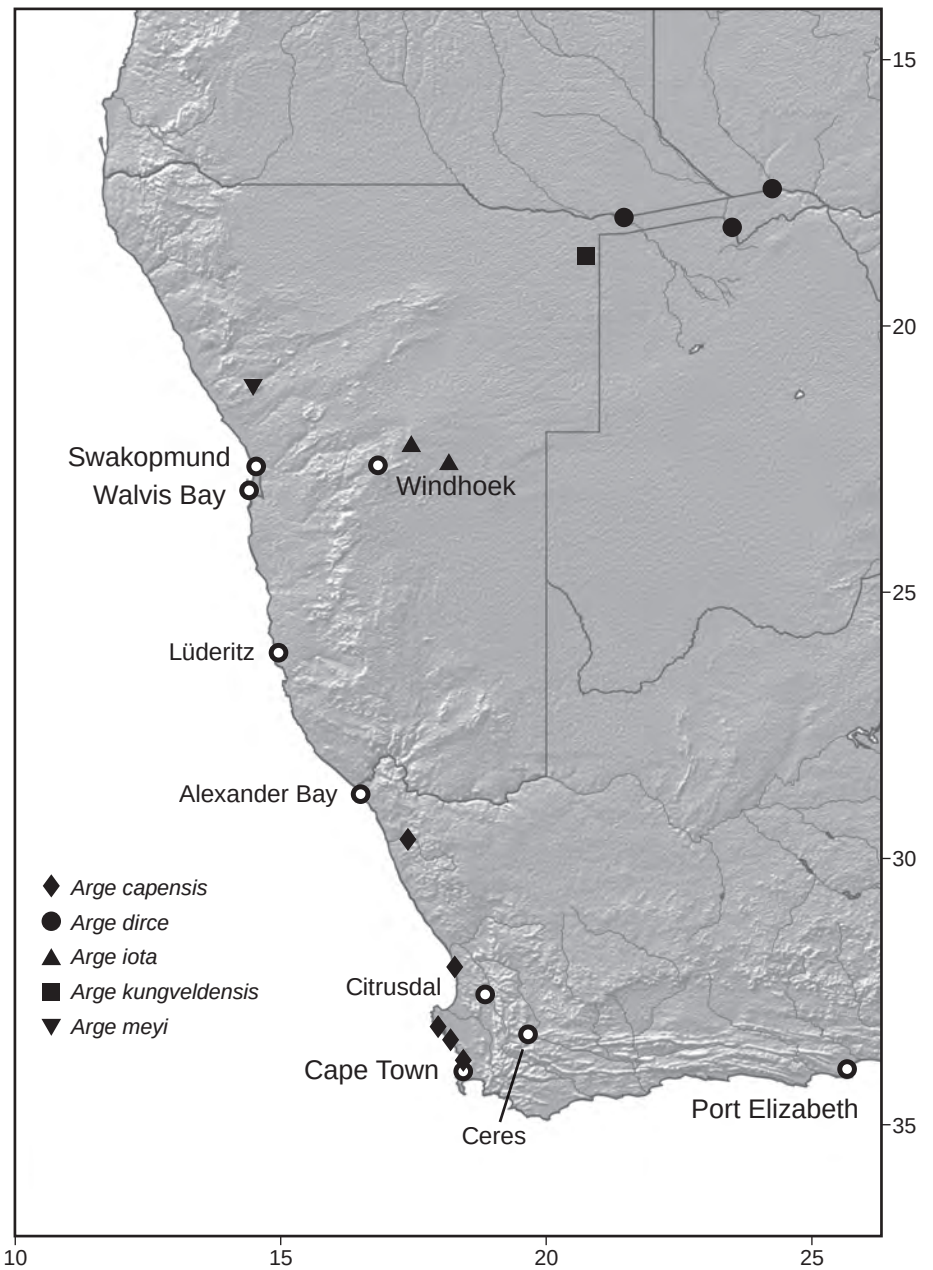

Fig. 171. Distribution map of *Arge capensis* (Klug), *A. dirce* (W.**F**. Kirby), *A. iota* Pasteels, *A. kungveldensis* Koch & Eardley and *A. meyi* Koch.

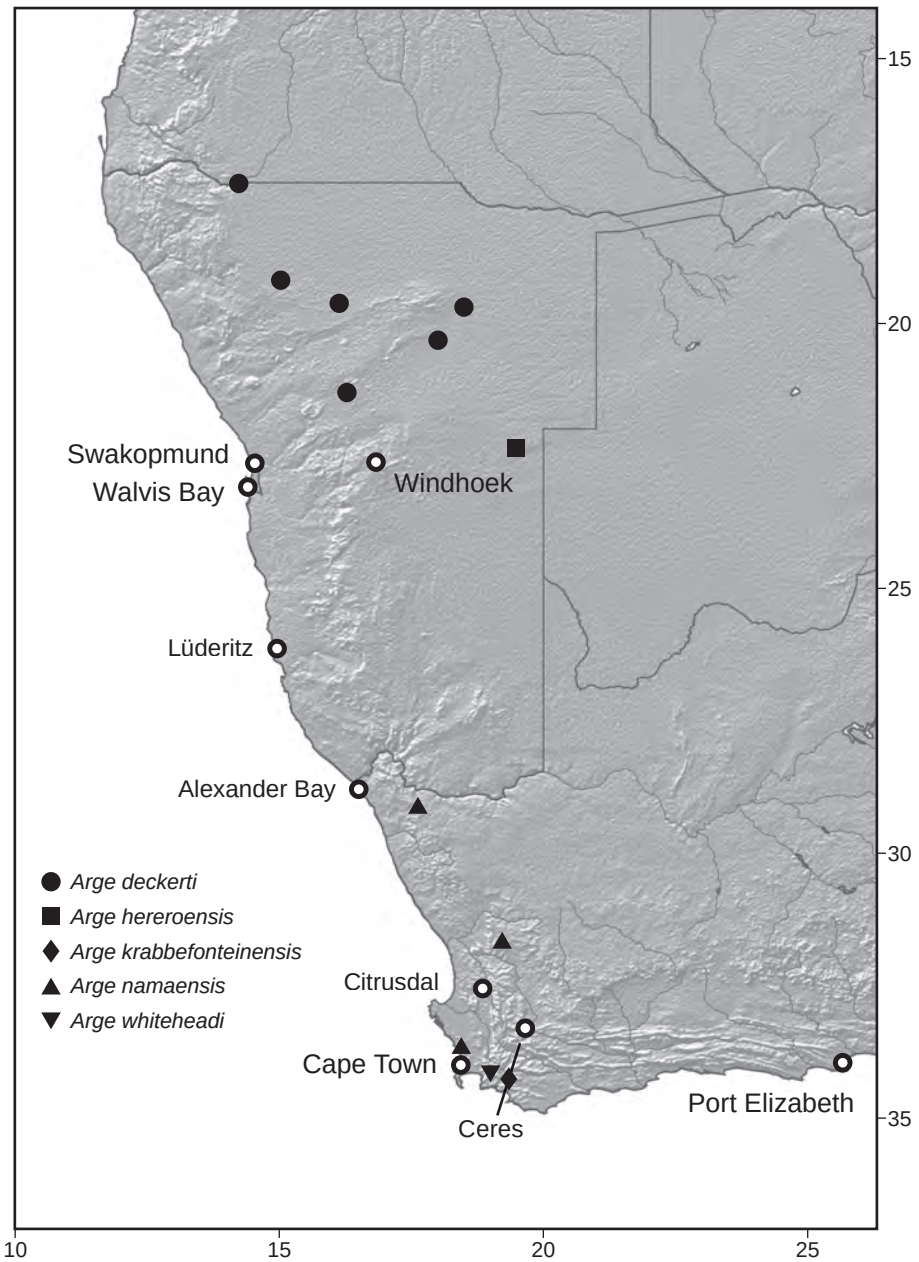

Fig. 172. Distribution map of *Arge deckerti* Koch, *A. hereroensis* Koch & Goergen, *A. krabbefonteinensis* Koch & Goergen, *A. namaensis* Koch & Goergen and *A. whiteheadi* Koch & Goergen.

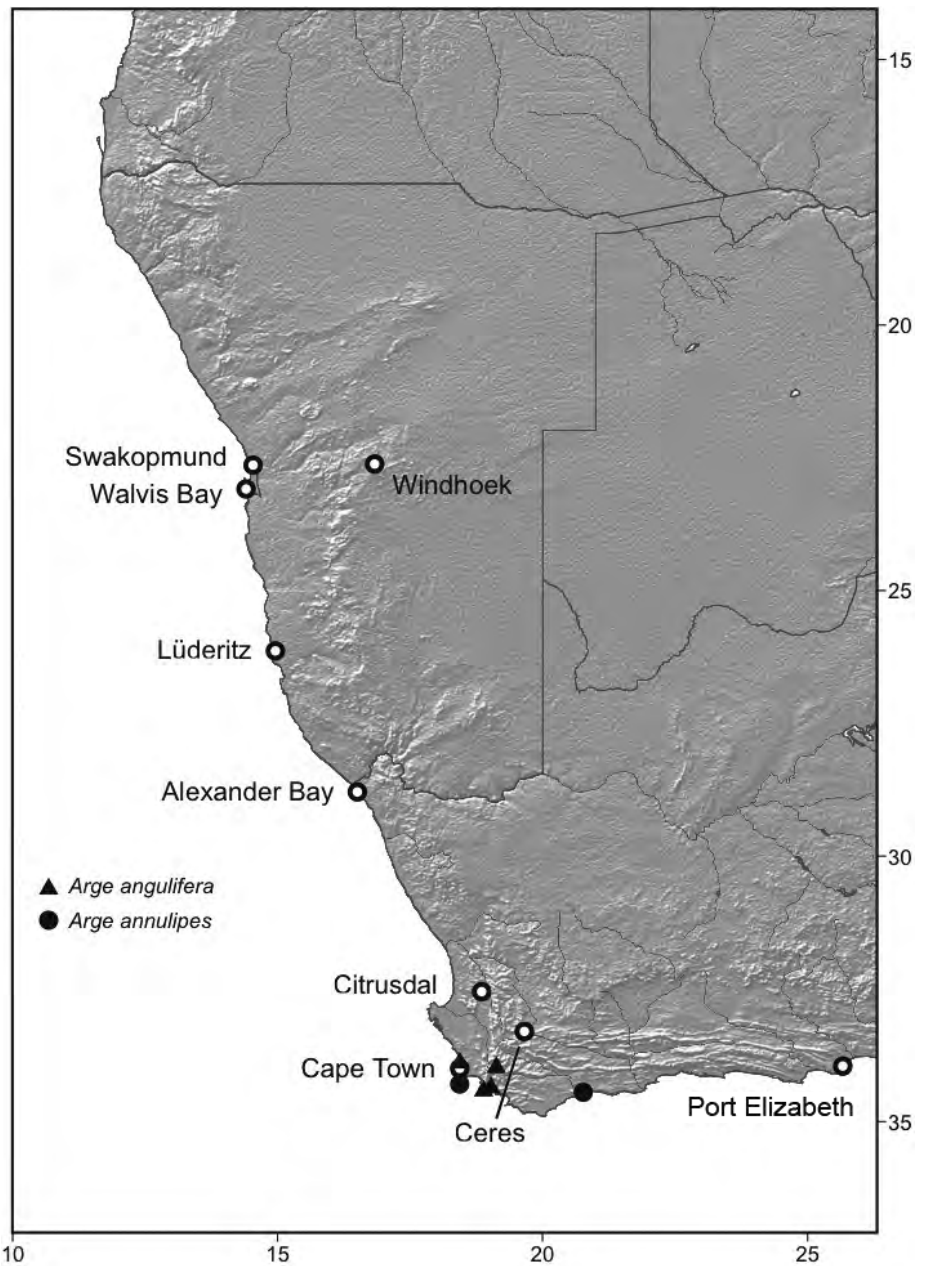

Fig. 173. Distribution map of *Arge angulifera* Pasteels and *A. annulipes* (Klug).

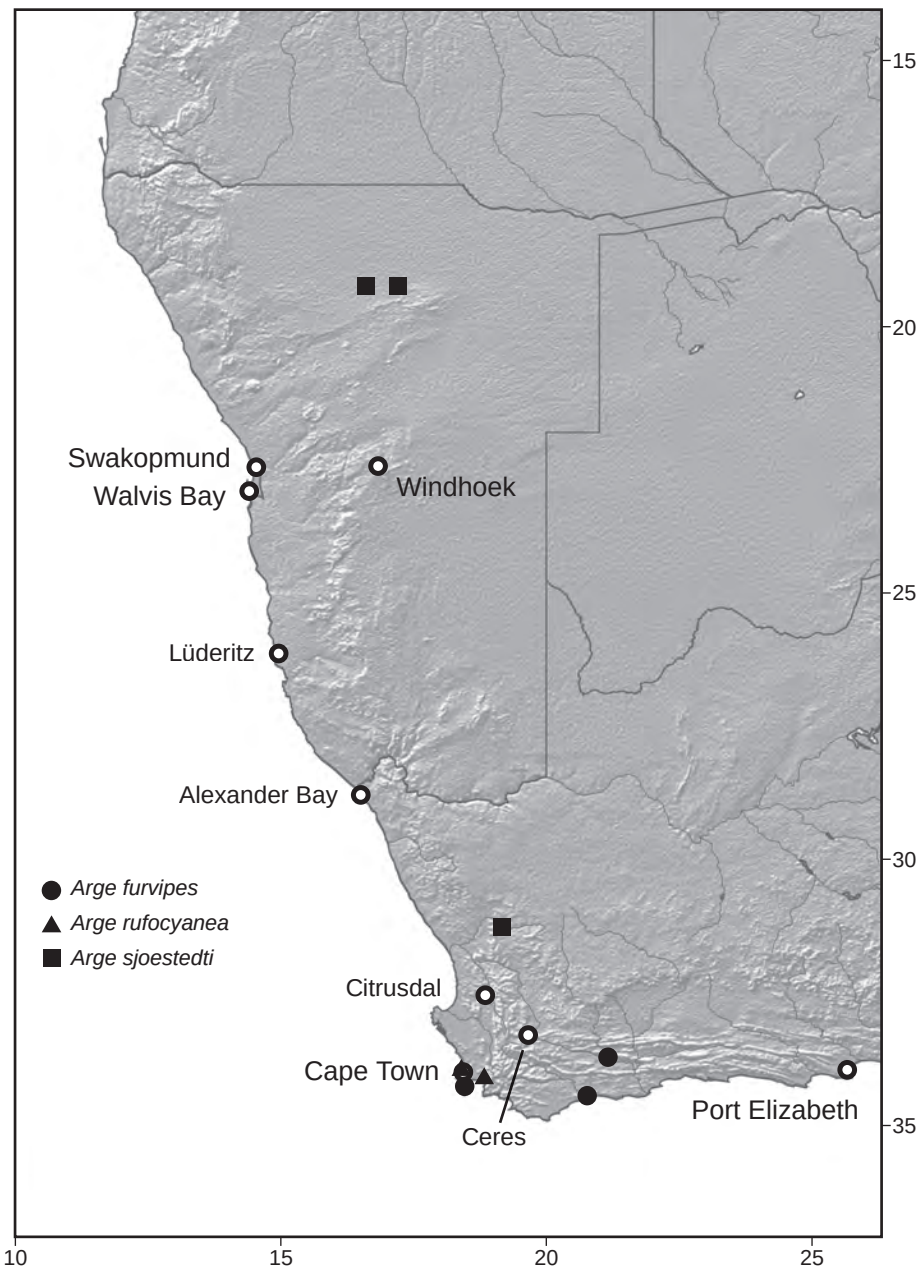

Fig. 174. Distribution map of *Arge furvipes* Konow, *A. rufocyanea* (Enslin) and *A. sjoestedti* Konow.

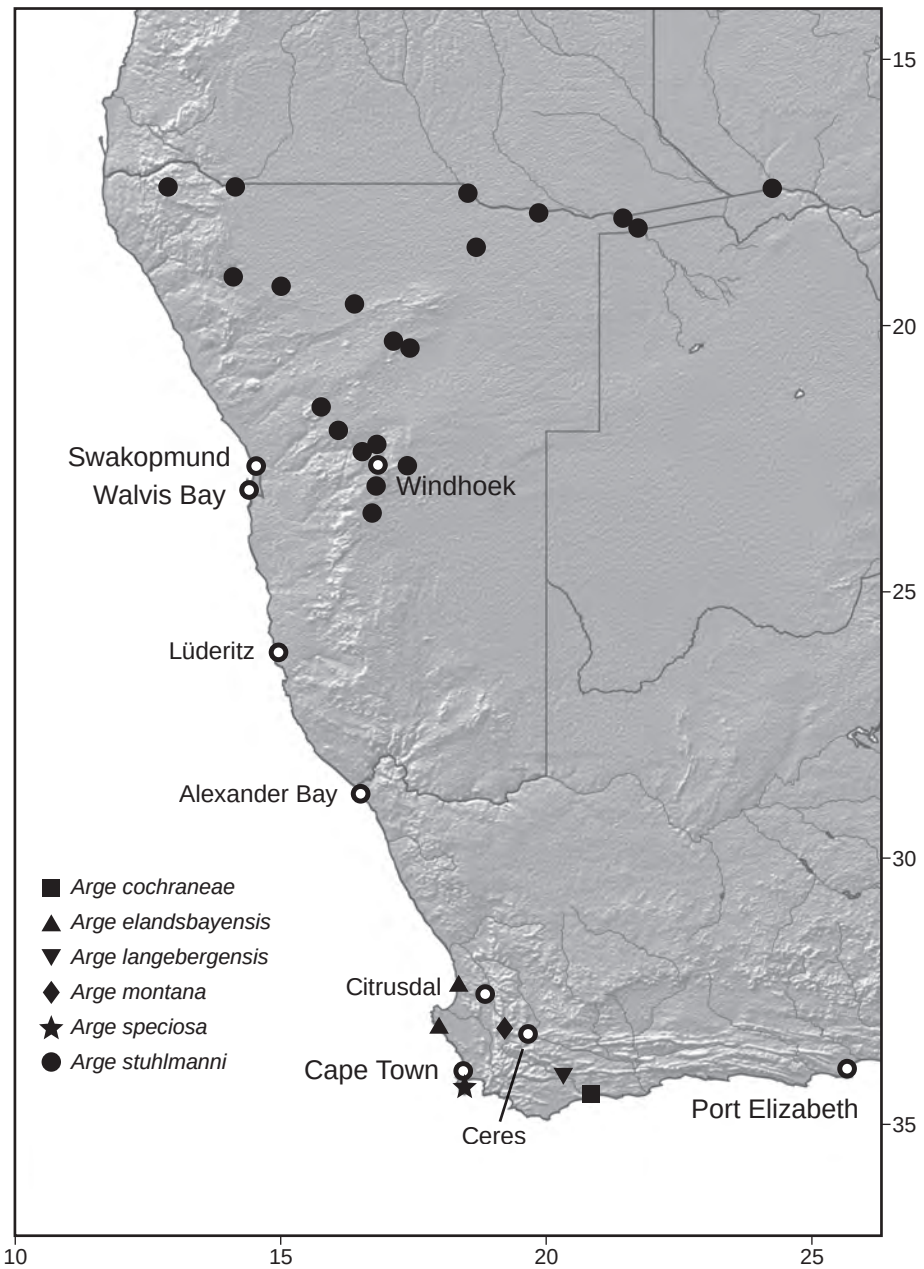

Fig. 175. Distribution map of *Arge cochraneae* Koch & Goergen, *A. elandsbayensis* Koch & Goergen, *A. langebergensis* Koch & Goergen, *A. montana* Koch & Goergen, *A. speciosa* (Klug) and *A. stuhlmanni* (Kohl).

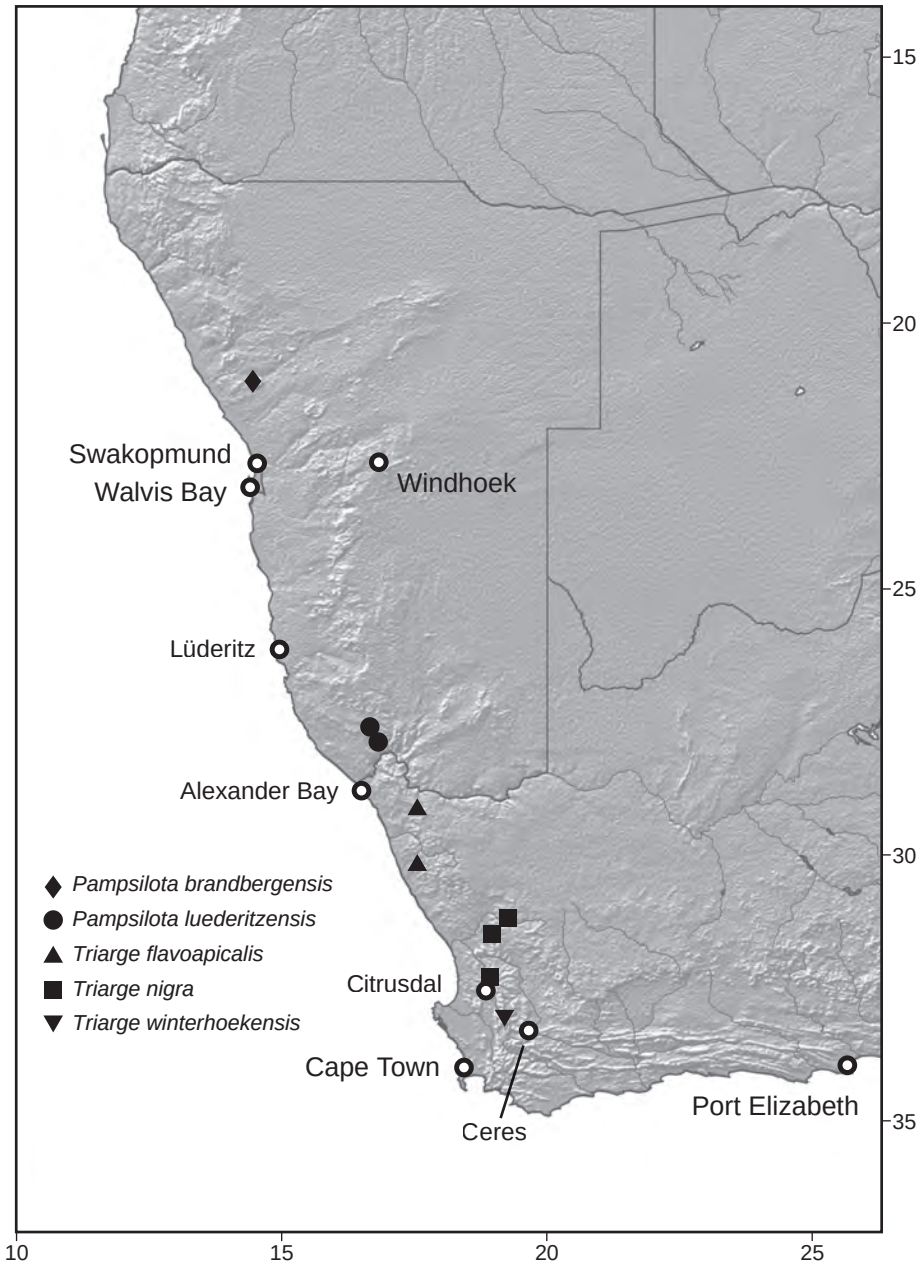

Fig. 176. Distribution map of *Pampsilota brandbergensis* Koch, *P. luederitzensis* Koch, *Triarge flavoapicalis* Koch, *T. nigra* Koch and *T. winterhoekensis* Koch.

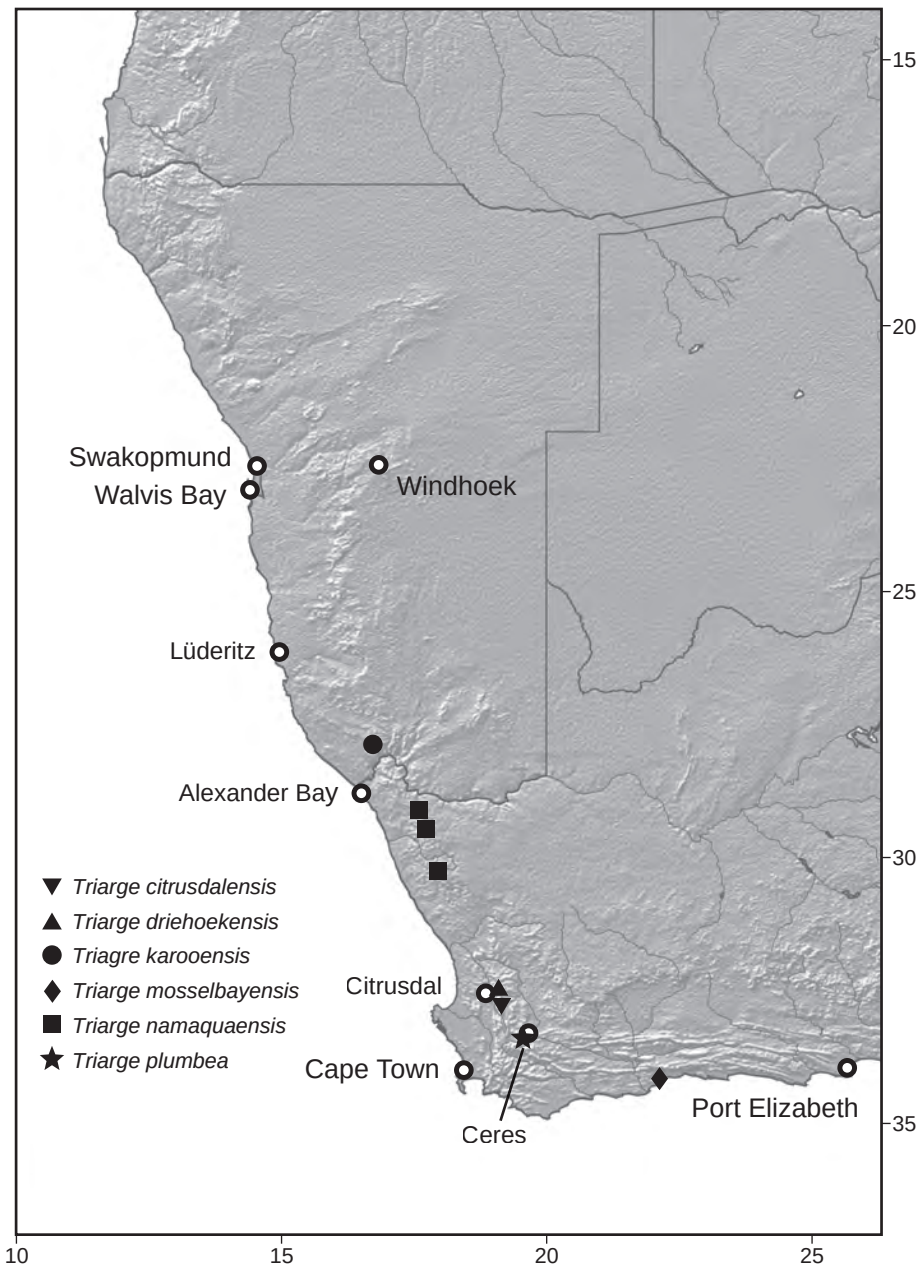

Fig.177. Distribution map of *Triarge citrusdalensis* Koch, *T. driehoekensis* Koch, *Triarge karooensis* Koch, *T. mosselbayensis* Koch, *T. namaquaensis* Koch and *T. plumbea* Forsius.

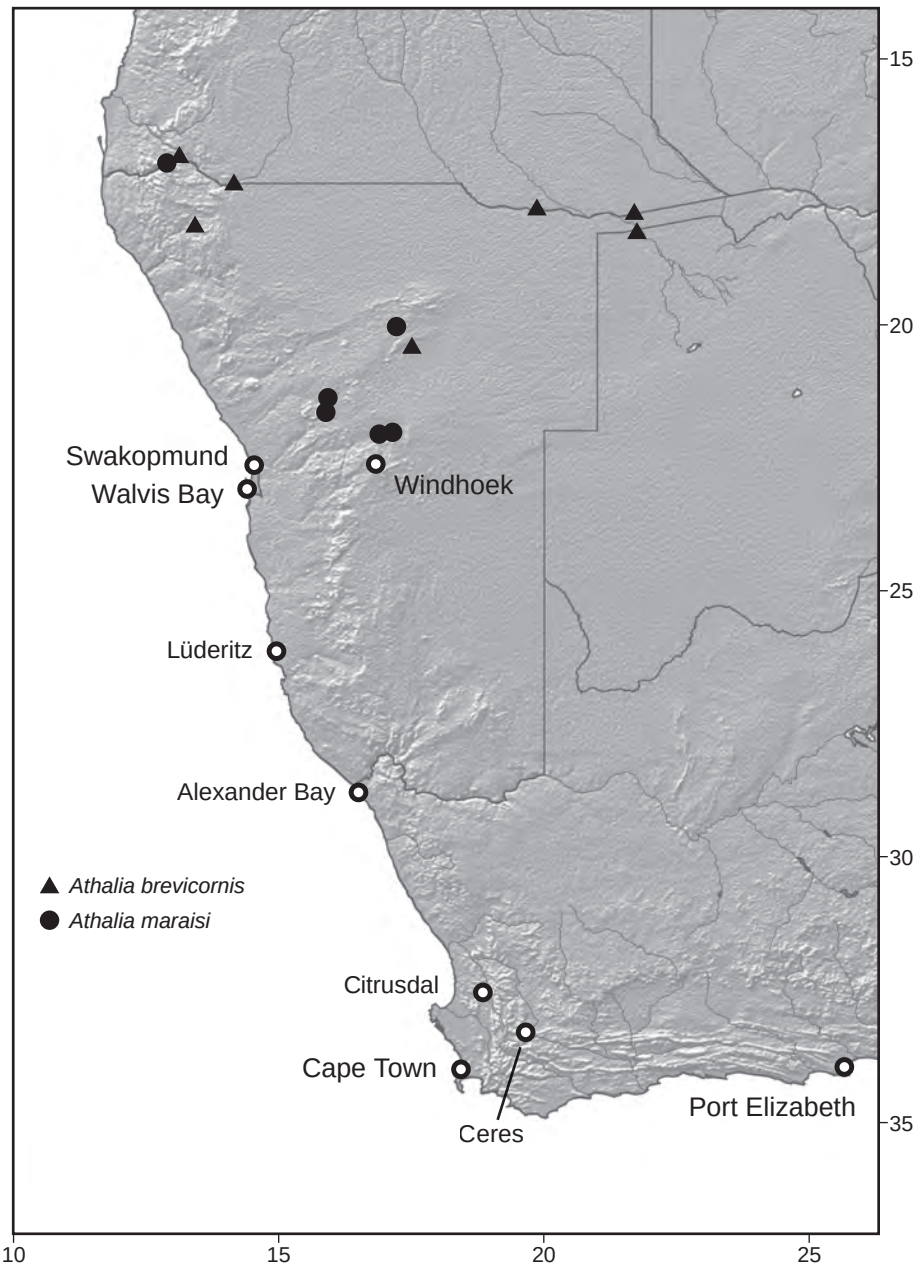

Fig. 178. Distribution map of *Athalia brevicornis* Benson and *A. maraisi* Koch.

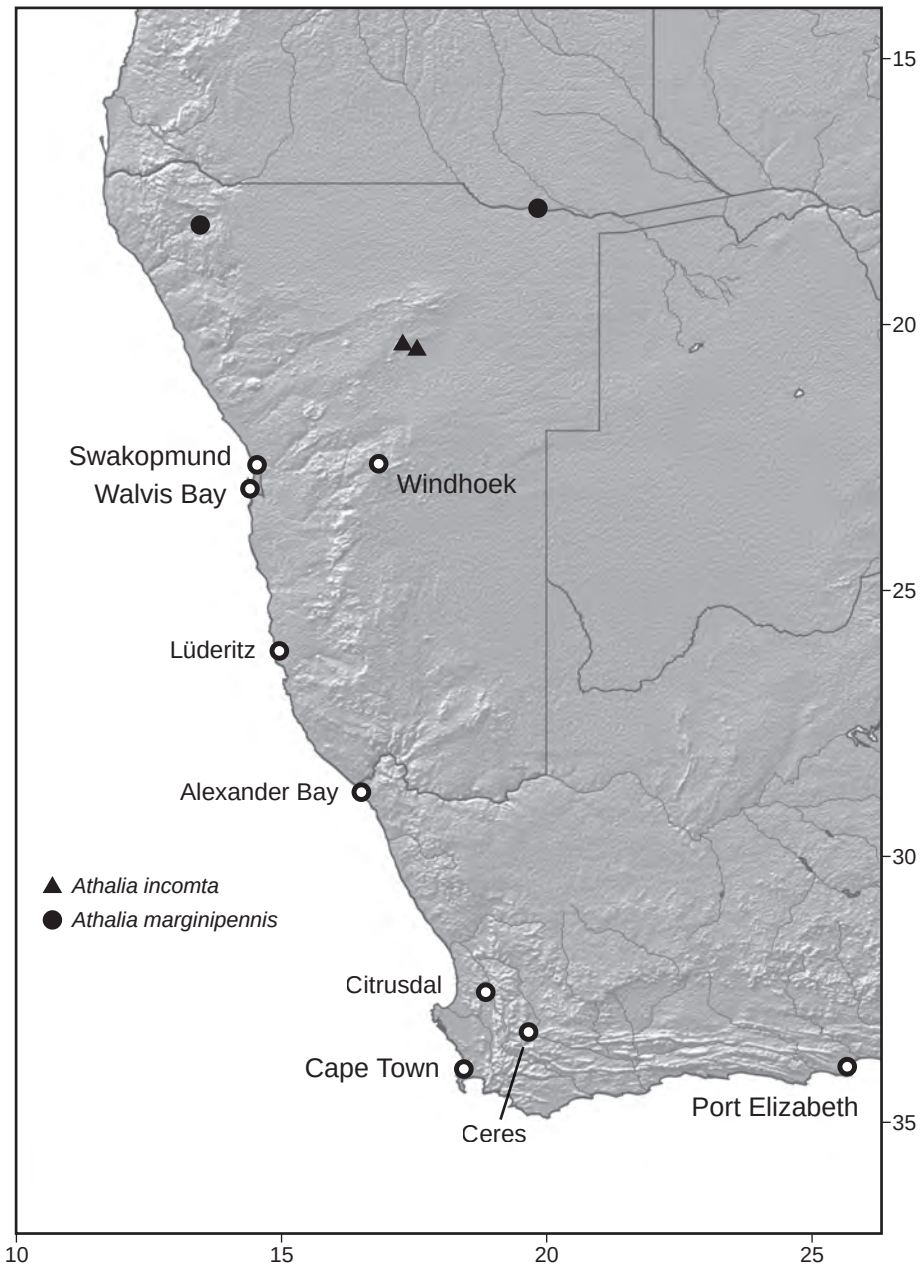

Fig. 179. Distribution map of *Athalia incomta* Konow and *A. marginipennis* Enderlin.

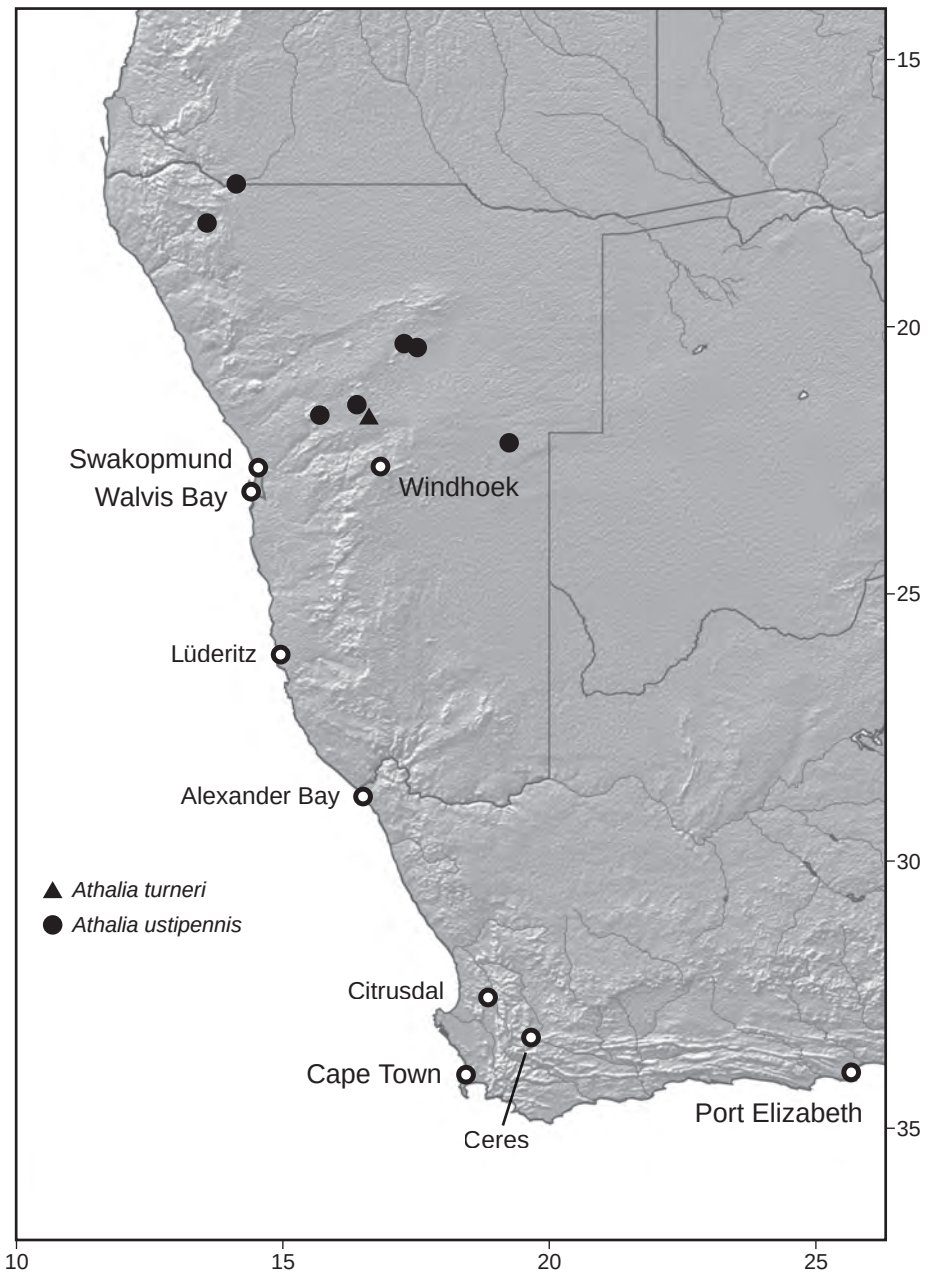

Fig. 180. Distribution map of *Athalia turneri* Forsius and *A. ustipennis* Mocsáry.

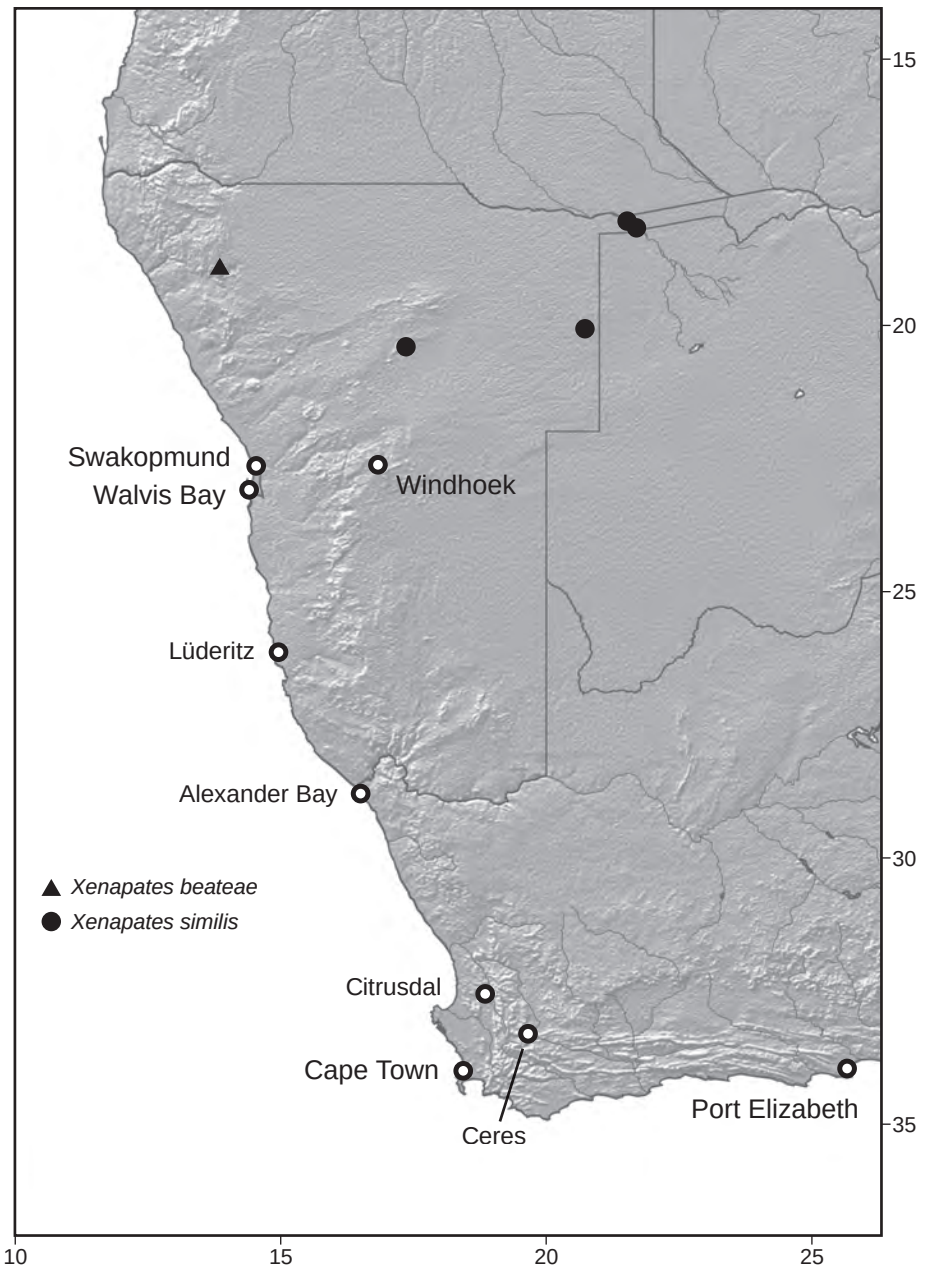

Fig. 181. Distribution map of *Xenapates beateae* Koch, 1996 and *X. similis* Benson, 1939.

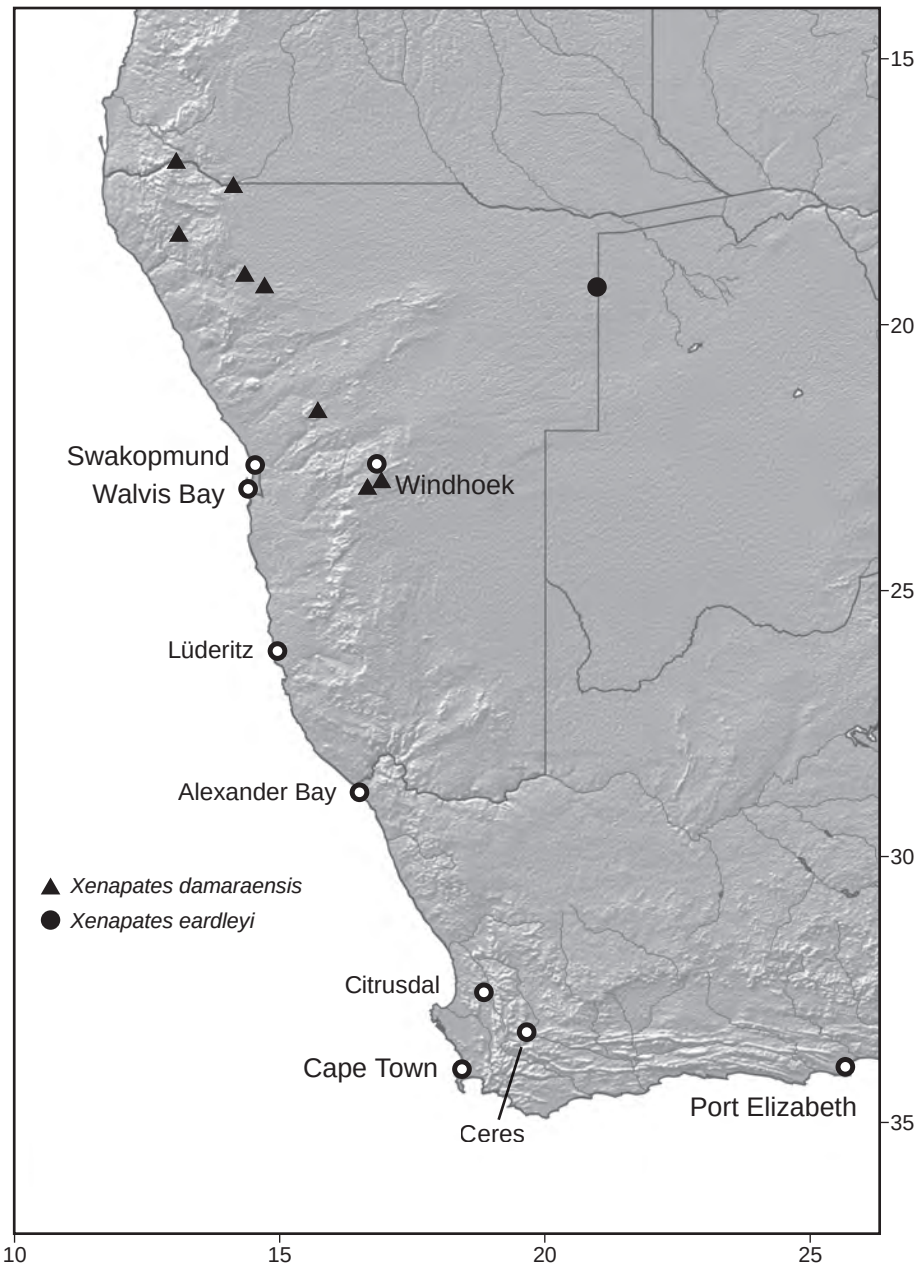

Fig. 182. Distribution map of *Xenapates damaraensis* Koch and *X. eardleyi* Koch.

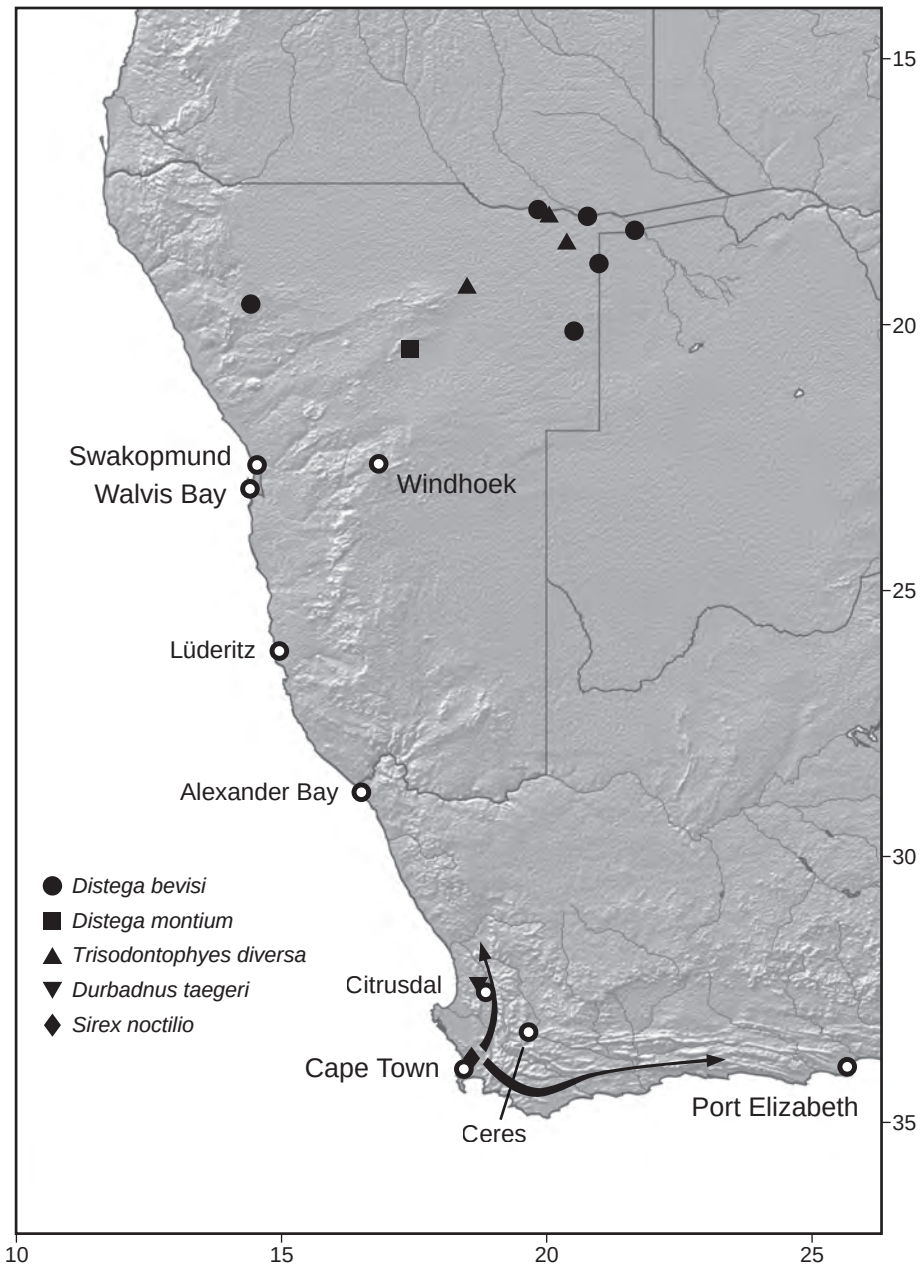

Fig. 183. Distribution map of *Distega bevisi* Forsius, *D. montium* Konow, *Durbadnus taegeri* Koch & Liston, *Trisodontophyes diversa* Koch and *Sirex noctilio* Fabricius.

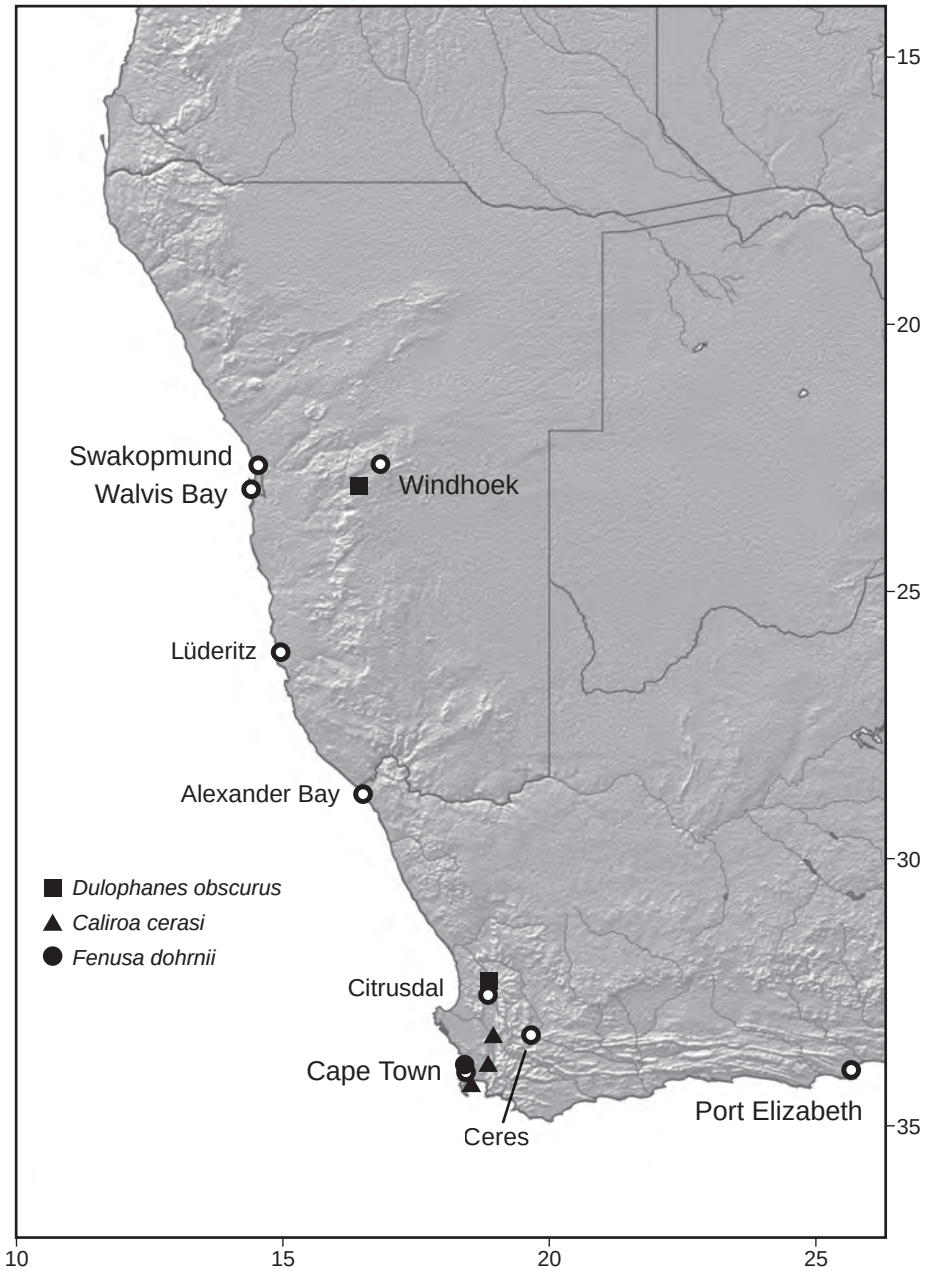

Fig. 184. Distribution map of *Dulophanes obscurus* Forsius, *Caliroa cerasi* (Linnaeus) and *Fenusa dohrnii* (Tischbein).

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14. Taxonomic index to the families, subfamilies, genera and species

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Frank Koch (°1951) is curator of Hymenoptera at the Museum für Naturkunde Berlin, Germany. Since 1992, his main research interests are taxonomy, systematics, ecology, biodiversity and biogeography of Afrotropical sawflies. He has numerous co-operations with African entomologists in different projects and countries especially of southern Africa. In more than 30 expeditions to the Afrotropical Region he gained a lot of experience on the behaviour of sawflies, in their different habitats and established a sound basis for monitoring programs for these still incompletely investigated insects.

Georg Goergen (°1959) is a research entomologist at the International Institute of Tropical Agriculture, Cotonou, Benin where he developed an institutional taxonomic capacity building program to study arthropods of agricultural importance with focus on biological control against pests introduced into tropical Africa. In order to cover the rich native insect fauna, Georg has over the last 20 years been active in building one of the largest reference collections in West Africa.

Simon van Noort (°1964) is curator of Entomology at the Iziko South African Museum in Cape Town (South Africa) where he specializes on the systematics, evolution and biology of wasps. His broad interest in insect diversity has led to numerous collecting expeditions to remote areas of central, eastern and southern Africa. He has published over 95 scientific papers and is currently developing interactive identification keys to all genera of Afrotropical Hymenoptera.

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