

***Hemeromyia australis* sp. n. and *Meoneura prima* (Becker, 1903)
from Namibia and South Africa, the first Carnidae (Diptera:
Schizophora) recorded from subequatorial Africa**

by

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ABSTRACT

The world fauna, biology and taxonomic history of Carnidae are discussed. The southern African fauna is reviewed and characterised, and a key to the genera is presented. *Carnus* Nitzsch, 1818 has not been recorded from southern Africa, but is likely to occur there. *Hemeromyia australis* sp. n. is described from Namibia, the first record of *Hemeromyia* Coquillett, 1902 from the southern hemisphere; the new species is discussed relative to its Holarctic congeners. The world fauna of *Meoneura* Rondani, 1856 is briefly reviewed and the hitherto Holarctic species, *M. prima* (Becker, 1903), is recorded from Natal, South Africa, the first record of the genus from subequatorial Africa. *Meoneura nitidiuscula* Collin, 1949 is reported from the Cape Verde Islands, the first record of the species from the Afrotropical Region. An unidentified species of *Meoneura* from Gough Island is discussed. Updated catalogue data for the Afrotropical Carnidae are given; the family is now known from six identified species, five in *Meoneura* (Cape Verde Islands, Nigeria, South Africa) and one in *Hemeromyia* (Namibia).

INTRODUCTION

In recent years I have made a concerted attempt to explore the acalyptrate collections of the Natal Museum, in the hopes of discovering families not previously recorded from southern Africa. Such efforts have revealed the first southern African and Afrotropical Aulacigastridae *sensu stricto* (Barraclough 1993b, Duxbury & Barraclough 1994) and Campichoetidae (Barraclough 1992a, Duxbury & Barraclough 1994), and have substantially expanded knowledge of the southern African Camillidae and Ctenostylidae. The Camillidae were previously known from only two specimens in southern Africa, but have now been shown to be a widespread coprophagous family, often associated with rock hyrax droppings in the subregion (Barraclough 1992b 1993a).

Recently, during a trip to The Natural History Museum in London, I discovered a southern African specimen of Carnidae in the unsorted accessions. Upon returning to the Natal Museum a second specimen belonging to a different genus was discovered in the museum's collection. These taxa represent the first record of the Carnidae from subequatorial Africa.

It is now generally accepted that Carnidae should be given family status; the segregate had often previously been treated as a subfamily of Milichiidae (Sabrosky 1987). However, the limits of the family and its superfamily placement have become controversial. McAlpine (1989) includes the Carnidae in the superfamily Carnoidea (= Chloropoidea) with eight other families, including Australimyziidae and Milichiidae. Colless & McAlpine (1991) treat Carnidae in the Opomyzoidea with

five other families, including the Agromyzidae. All these authors agree, however, that Carnidae and Australimyzidae (see Harrison 1959) are closely related, and Colless & McAlpine (1991) even include the Australimyzidae as a subfamily of Carnidae.

The Carnidae have always been considered to be a predominantly Holarctic group (Papp 1984, Colless & McAlpine 1991, Sabrosky 1973 1987) with only occasional records from the southern hemisphere (excluding the Australimyzidae). Two species are recorded from the subequatorial neotropics, one of these being an unidentified female of *Meoneura* Rondani, 1856 from Peru (Sabrosky 1959) and the other being the endemic genus and species *Neomeoneurites chilensis* Hennig, 1972 from Chile (Sabrosky 1973). From the subequatorial afrotropics the only definite record of Carnidae has been of a female of *Meoneura* from Gough Island in the south Atlantic (Oldroyd 1958, Deeming 1976). It is not certain whether Carnidae *sensu stricto* occur in the Australasian Region, but Sabrosky (1989) and Colless & McAlpine (1991) suggest that a recorded *Meoneura* specimen could have a New Zealand provenance, although according to Sabrosky it is probably introduced. The records of two carnid genera from southern Africa (see below), suggest that the family has a much wider distribution, and is probably cosmopolitan. In my experience, micro-Diptera with specialised life histories, such as the Carnidae, are often vastly under-represented in collections, particularly in the southern hemisphere. The Carnidae, which would seem to have comparable associations with animal droppings to Camillidae, could prove to be similarly widespread in the Afrotropical Region.

On present information, there are only four extant genera of Carnidae *sensu stricto*, these being *Carnus* Nitzsch, 1818, *Hemeromyia* Coquillett, 1902, *Meoneura* Rondani, 1856 and *Neomeoneurites* Hennig, 1972. All but *Neomeoneurites* are here recorded from the Afrotropical Region. *Carnus* was apparently first reported from this Region by de Coninck (1986), as being found on the nestlings of *Halcyon albiventris*, an endemic African kingfisher. This kingfisher species is distributed from South Africa to Gabon, Zaïre, Kenya and Somalia (Maclean 1985), and the unidentified carnid parasites, apparently a new species, could be similarly widespread. This would confirm my contention that Carnidae, including *Carnus*, are likely to be widespread in the Afrotropical Region. De Coninck (*pers. comm.*) has given me the following data for the species referred to in the 1986 publication: 'collected by Mr René Verheyen (14/X/1947): KASWABILENGA (S 08°51' - E 26°43', near Mitwaba, Zaïre)'. Mitwaba is in southern Zaïre, about 150 km west of Lake Mweru. Papp (1984: 119) reports the Holarctic *C. hemapterus* Nitzsch, 1818 from the Afrotropical Region, but I cannot confirm this. *Carnus* is an unusual genus in that adults become de-alated when mature (de Coninck 1986); they are assumed to be blood-sucking avian parasites, although they could feed on skin excretions (Sabrosky 1980 1987).

RECOGNITION OF SOUTHERN AFRICAN CARNIDAE

As discussed above, only *Hemeromyia* and *Meoneura* are known from southern Africa, although *Carnus* is likely to occur there. Carnidae are similar to certain small to minute species of Milichiidae, this being the family with which they are most likely to be confused. They are, however, readily distinguished from Milichiidae by

having at least one distinct mesopleural bristle (the mesopleuron is bare in southern African Milichiidae). The known southern African Carnidae (including *Carnus*) are distinguishable from all other acalyptrate families occurring in the subregion, by the following combination of character states: vibrissae well-developed, sometimes two or three apparent pairs; two pairs incurved lower fronto-orbital bristles and two pairs outcurved upper bristles; postocellar bristles absent or parallel; mesopleural bristle(s) present; humeral costal break present; pre-apical tibial bristles absent. Other features of regional carnids are: antennae short and somewhat sunken in deep antennal grooves, third segment rounded; proboscis short and stout; one sternopleural bristle, although sometimes weakly developed; subcosta weakly developed, evanescent distally.

Ecological and biological information could also help to confirm an identification. As already stated, *Carnus* species are commonly found on birds, particularly nestlings, and in their nests. Information about *Hemeromyia* is limited, but *Meoneura* is strongly associated with animal droppings, birds' nests and other dead organic material, including excrement (Sabrosky 1959, Papp 1984).

MATERIALS AND METHODS

This study was based on the examination of dry, adult Carnidae from the following depositories:

Natal Museum, Pietermaritzburg, South Africa (NMSA)

National Museum of Wales, Cardiff (NMWC)

The Natural History Museum, London, United Kingdom (BMNH)

The term 'subequatorial' is used in several places in this paper. It is intended to mean all of the land mass concerned, south of the equator.

Wing terminology follows Sabrosky (1987). Bilaterally symmetrical structures are described in the singular. Holotype label data are quoted exactly as they appear; a slash (/) denotes the end of a line of print and a semicolon separates data quoted on different labels; supplementary information is given in square parentheses. Head/thorax length was measured from the anterior margin of the third antennal segment to the abdominal base. Wing length was measured from the humeral cross-vein to the wing-tip. All illustrations were drawn using a Wild M5 stereomicroscope, and a drawing-tube.

The postabdomen was removed and cleared in warm lactic acid (80 %), so that the terminalia could be dissected free and examined in glycerine. The postabdomen and dissected terminalia were then stored in glycerine, in a microvial pinned beneath the source specimen.

KEY TO SOUTHERN AFRICAN GENERA OF CARNIDAE

[I have not seen any African species of *Carnus*; *C. hemapterus* (Holarctic) was used to establish this key. Note that the wings are frequently shed in mature specimens of *Carnus*.]

- 1 Anal cell closed, anal vein elongate and well-developed (Fig. 2). M₁ with ultimate section clearly evident, not faint (Fig. 2). Costa extending to M₁ (Fig. 2).....*Hemeromyia* Coquillett, 1902

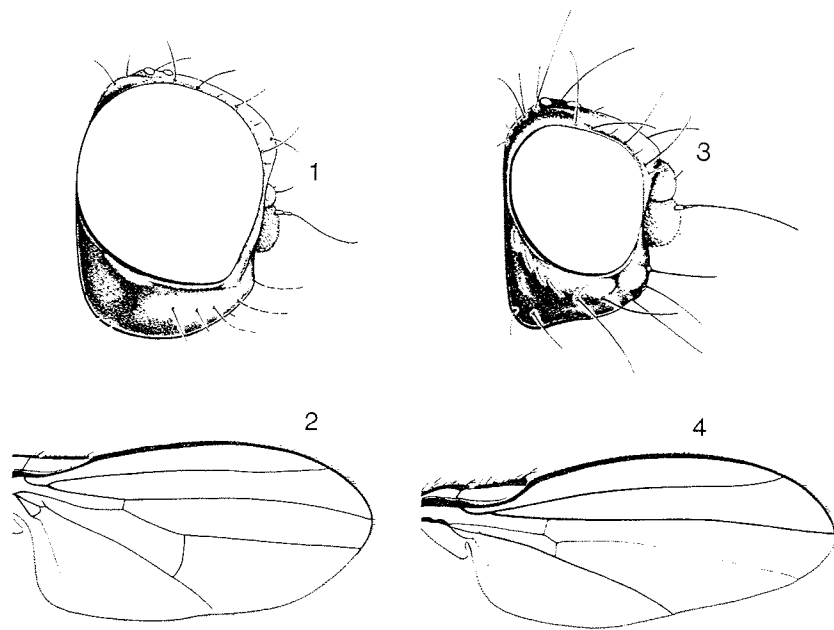
Barracough, 1994

- Anal cell not apparent or not closed, anal vein absent (Fig. 4). M_1 with ultimate section faint (weakly sclerotised) and barely visible (Fig. 4). Costa extending to R_{4+5} (Fig. 4) 2
 - 2 Crossvein dm-cu present, closely approximated with crossvein r-m (Fig. 4); wings never detached near base. Head profile as in Fig. 3.....
- Meoneura** Rondani, 1856
- Crossvein dm-cu always absent; wings sometimes detached near base.....
- Carnus** Nitzsch, 1818

TAXONOMY

Hemeromyia Coquillett, 1902

Hemeromyia Coquillett, 1902: 190. Type-species: *Hemeromyia obscura* Coquillett, 1902 (Nearctic), by monotypy.



Figs 1-4. Southern African species of Carnidae. 1-2. *Hemeromyia australis* sp. n. 1. Head profile, showing all vestiture (dotted lines = broken bristles). 2. Wing. 3-4. *Meoneura prima* (Becker, 1903). 3. Head profile, showing all vestiture. 4. Wing.

With the description of a Namibian species of *Hemeromyia*, the total number of species is raised to seven. It is likely that additional species of these tiny flies await discovery, particularly in the afrotropics and perhaps the neotropics. There are four

Palaeartic species and two Nearctic species; unlike *Meoneura*, none of these taxa has a Holarctic distribution (Deeming & Baez 1984, Papp 1984, Sabrosky 1965). Only one Palaeartic species, *H. anthracina* Collin, 1949, has been recorded from Africa, namely Egypt/Libya, as well as the Canary Islands (Deeming & Baez 1984) and Hungary (Papp 1979 1984). The Nearctic species are recorded from the western and southern United States and Mexico (Sabrosky 1965). Cole (1969) reported one of the American species as reared from the nest of the white-footed mouse *Peromyscus truei* in New Mexico. It seems that *Hemeromyia* species are more frequently collected in arid regions, but confirmation is needed.

Hemeromyia australis sp. n.

Figs 1 & 2

Etymology: *Australis* (L.) = southern, refers to the occurrence of this species in the southern hemisphere.

Holotype ♂ : NAMIBIA: 'S.W.AFRICA (11) / Aar Farm. / 25 mls. ESE.Aus [26°40'S:16°16'E] / 15-17.i.1972'; 'Southern / African Exp. / B M. 1972-1'; 'HOLOTYPE ♂ / *Hemeromyia / australis* / Barraclough, 1994' [Rectangular card, red perimeter]. In BMNH. In fair condition, some bristles on head and thoracic dorsum missing; glued to card.

Description (based on holotype):

Male: Head/thorax length 1.0 mm; wing length 1.3 mm.

Colour/Pollinosity: Ground colour mainly dark brown to black. Pollinosity mostly silver and more conspicuous on thoracic and abdominal dorsa; abdominal terga with some pale yellow pollinosity. Frons predominantly yellow-brown, black ground colour restricted to ocellar triangle and narrowly on orbital plate adjacent to eye margin, as far anterior as foremost outcurved fronto-orbital bristle. Antennae, entire facial region, epistome, peristome and anterior section of cheek yellow-brown, although more darkly so on third antennal segment. Thoracic dorsum black, pleuron very slightly paler, i.e. dark brown. Haltere knob white. Legs mainly dark; mid and hind trochanters yellow-brown; fore tibia paler along much of length, mid and hind tibiae paler apically; tarsi yellow (noticeably paler). Abdomen predominantly black.

Head (Fig. 1): Frons bristles noticeably short, weak and inconspicuous. Postocellar bristles parallel (one missing). Ocellar triangle width about quarter maximum width of frons, anterior margin positioned at anterior three-quarters of frons. Fronto-orbital bristles shorter than ocellar bristles, positioned as in Fig. 1 (posterior incurved fronto-orbital missing). Mesofrons bare except for paired proclinate interfrontal bristles near anterior margin. Profrons relatively protuberant. Antenna short, somewhat recessed in profile, length just less than half eye depth in frontal view; arista virtually bare. Vibrissal angle about coincident with anterior extent of profrons in profile. Maximum cheek depth slightly more than length of third antennal segment. Proboscis short (retracted), palpus length just less than that of third antennal segment. Vibrissal angle and region just posterior to this with 3 relatively strong bristles (all broken). Profile eye depth about 3.0 X maximum cheek depth.

Thorax (Fig. 2): Mesonotal bristles: 1 humeral, 2 notopleural, 1 presutural, 1 supra-alar, 1 postalar with additional much smaller and weaker setula just mesad (possibly a small posterior intra-alar), 1 + 3 dorsocentrals (mainly detached), very small pair presutural acrostichals. Scutellar bristles detached, probably two pairs. Pleural bristles: 1 strong marginal mesopleural with 3 setulae below it and 1 upcurved discal near lower margin, 1 sternopleural, pteropleural absent. Fore femur with 3 elongate posteroventral bristles in apical half. Wing venation as in Fig. 2, membrane completely hyaline, veins yellow; subcostal break inconspicuous or apparently so.

Female: Unknown.

Discussion: I did not dissect the unique holotype to examine the male terminalia, as this would risk considerable damage to the specimen, which is glued to card. Nevertheless, it is not difficult to compare *H. australis* with its congeners and discuss affinities. In the key (Papp 1979) to Palaearctic *Hemeromyia*, *australis* runs to *H. afghanica* Papp, 1979 (Afghanistan), although unlike this species it has a very small pair of prescutellar acrostichal bristles. Other distinctions (with reference to Papp's original description) include the presence of three bristles in the vibrissal angle region (two in *afghanica*) and the yellow tarsi (apparently brown in *afghanica*). There may also be affinities with the American species *H. obscura* Coquillett, 1902, but *obscura* differs in having a pteropleural bristle present (Deeming & Baez 1984) and the frons with only the anterior margin yellow (Cole 1969); *australis* has at least the anterior three-quarters of the frons yellow-brown. *H. australis* is obviously distinct from the Spanish species *H. longirostris*, recently described by Carles-Tolrá (1992). Unlike *australis*, *longirostris* has a strikingly elongate proboscis, which is noticeably longer than head height.

Meoneura Rondani, 1856

Meoneura Rondani, 1856: 128. Type-species: *Agromyza obscurella* Fallén, 1823 (Holarctic), by original designation.

Meoneura is the dominant genus of Carnidae and is recorded mainly from the northern hemisphere, with some species having an Holarctic distribution. Further specialised collecting is likely to reveal many additional species in the southern hemisphere, and it would not surprise me if the genus has a virtually cosmopolitan distribution, although probably absent from Australia. A number of species has been described in recent years. Papp (1984) lists 49 species from the Palaearctic Region, 6 of these occurring also in the Nearctic Region. Ozerov (1991) described four additional new species from the former Soviet Union. Two of the Palaearctic species range into the northwestern fringes of the Oriental Region (Pakistan). Sabrosky (1977) records only three species from the Oriental Region, all from Pakistan. Sabrosky (1959 1965) records 13 species from the Nearctic region. The distribution of outlying species in the southern hemisphere has already been discussed.

It seems that, based on the limited available information, Afrotropical *Meoneura* species are associated with the droppings of small mammals and of birds (see below). An undescribed Nigerian species was taken from the stomach of a ruff (wader) species, namely *Philomachus pugnax* (see Deeming 1976).

Meoneura prima (Becker, 1903)

Figs 3–4

Psallidotus prima Becker, 1903: 192.

Meoneura seducta Collin, 1937: 250; Sabrosky, 1959: 22; Sabrosky, 1965: 729; Papp, 1977: 186 (synonymy).

Meoneura prima: Papp, 1977: 186; 1979: 107; 1984: 123.

Discussion: Despite its montane provenance in the Natal Drakensberg, an area noted for high levels of endemism in its insect fauna, the specimen listed below belongs to a widespread Holarctic species. This disjunction in range is almost certainly an artefact, and the species is probably widespread in Africa. Papp (1984) records it from western and eastern Europe, Jordan, Afghanistan, Tunisia and Egypt. Sabrosky (1959) records the species as widespread in the United States and from Ottawa, Canada. Sabrosky also states that specimens have been collected or reared from the excrement of pigs, mink, cows and chickens.

The South African specimen was collected from a rocky hillside inhabited by the rock hyrax *Procavia capensis*, and is almost certainly associated with its droppings. I have compared it with Sabrosky's (1959: 22) redescription and find it to agree closely in virtually all characters. The male terminalia are also very similar to Sabrosky's (1959: 21) figure, and are characterised by extraordinarily long tufts of sinuous pale hairs extending backwards from paired processes of the hypoproct (see also Sabrosky 1987: 910). These long tufts were easily visible *in situ*, before dissection. There are some subtle distinctions in the profile shape of the surstylus and more noticeably of the epandrium, which seems to be more expansive in the specimen drawn by Sabrosky. However, I do not consider these to be significant differences, and treat them as intraspecific variation.

Material examined: SOUTH AFRICA: Natal: 1 ♂, Royal Natal Nat. Park [28°41'S:28°57'E], Barracloough [&] Whittington, 3.ix.1992, 1400 m, rock scree (NMSA).

Meoneura nitidiuscula Collin, 1949

Meoneura nitidiuscula Collin, 1949: 224; Deeming, 1976: 33.

Discussion: Cape Verde material of this species was kindly sent to me by Mr J. Deeming (NMWC), after acting as a referee for a draft of this paper. I refer to it here, as an updated catalogue of Afrotropical Carnidae is given at the end of this paper, and as far as I can establish, *M. nitidiuscula* was previously known only from the Palaearctic Region. Mr Deeming had ascertained, in 1989, that the specimens were conspecific with the type material (male type examined) of *nitidiuscula*, described on a series from Siwa, Egypt. The Cape Verde specimens compare favourably with Collin's original description.

It should be noted that *M. nitidiuscula* was omitted from the catalogue of Palaearctic *Meoneura* species by Papp (1984: 122).

Material examined: CAPE VERDE ISLANDS: 1 ♂ 1 ♀, São Jorge dos, Orgãos, A. van Harten, 28–31.xi.1988 (NMWC).

Meoneura sp.

Discussion: This unidentified female from Gough Island is the specimen referred to by Oldroyd (1958: 79). It is not possible to identify the species without reference to the terminalia of an associated male. It has a comparable suite of character states to the Natal male of *M. prima*, and may well prove to be conspecific. *Meoneura* is likely to have been transported to Gough Island by migratory birds, human agency or with livestock.

Meoneura has not been collected from Inaccessible Island of the nearby Tristan da Cunha group, despite a particular search (Deeming, pers. comm.). Inaccessible Island is uninhabited with no livestock. I have also recently reviewed an extensive collection of Inaccessible Island Diptera, and no Carnidae are present.

Material examined: GOUGH ISLAND: 1 ♂, Sophora Glen, M. Holdgate, 22.i.1956, Penguin rookery in small cave (BMNH).

AFROTROPICAL CARNIDAE: UPDATED CATALOGUE DATA

At the time the 1980 Afrotropical Diptera Catalogue was published, no named species of Carnidae were recorded from the Afrotropical Region (Sabrosky 1980), although Deeming had described three new species of *Meoneura* from northern Nigeria, apparently in 1976. These descriptions were published in a volume of the little-known *Nigerian Journal of Entomology*, which claims publication in 1976, but Deeming (pers. comm.) advises that publication must have been much later than 1976. The paper and the species described therein have never been listed in *Zoological Record*. The dating of the Nigerian *Meoneura* species names are therefore open to question. The following catalogue data are given in the same format as the Afrotropical Diptera Catalogue (Crosskey 1980). All Deeming's holotypes are deposited in BMNH. Reference should be made to Papp (1984) for bibliographic details not included in the reference list of this paper:

Genus CARNUS Nitzsch

CARNUS Nitzsch, 1818: 305. Type-species: *Carnus hemapterus* Nitzsch, 1818, by monotypy. Undescribed sp.—Zaire.

Genus HEMEROMYIA Coquillett

HEMEROMYIA Coquillett, 1902: 190. Type-species: *Hemeromyia obscura* Coquillett, 1902, by monotypy.
australis Barraclough, 1994: 19. Namibia.

Genus MEONEURA Rondani

MEONEURA Rondani, 1856: 128. Type-species: *Agromyza obscurella* Fallén, 1823, by original designation.
biseta Deeming, 1976: 30. Nigeria.
nigeriensis Deeming, 1976: 30. Nigeria.
nitidiuscula Collin, 1949: 224. Cape Verde Islands, Egypt.
prima Becker, 1903: 192. (*Psalidonus*). South Africa. Holarctic Region (widespread).
seducta Collin, 1937: 250. England.
scutellata Deeming, 1976: 30. Nigeria.
Undescribed sp.—Nigeria.
Unidentified sp.—Gough Island.

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