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## Revision of Afrotropical *Pachycerina* Macquart (Diptera: Lauxaniidae)

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### ABSTRACT

The flies of the genus *Pachycerina* Macquart (Diptera: Lauxaniidae) in the Afrotropical region are taxonomically revised. Eleven species of *Pachycerina* are found in the Afrotropics (including Madagascar) with seven new species: *P. atrimela* sp. n., *P. gabela* sp. n., *P. micropunctata* sp. n., *P. nigrivittata* sp. n., *P. pellocera* sp. n., *P. potentilla* sp. n., and *P. stuckenbergi* sp. n. The Afrotropical fauna is relatively conservative in coloration and morphological variation; variation most affecting prefrontal (facial) spot size, abdomen colour, wing infuscation and male terminalia. All male Afrotropical *Pachycerina* have the protandrium partially fused to tergite 6 and possess simplified genitalia lacking an aedeagus and hypandrium. The absence of the aedeagus is an apparently unusual condition for lauxaniids, only otherwise recorded in *Minettia* Robineau-Desvoidy (Lauxaniinae) and beetle fly genera (Celyphinae). The male sternite 5 shows notable variability across species and is a useful aid to identification. A generic diagnosis and species identification key to *Pachycerina* males are provided. Two rearing records of larval *Pachycerina* from bird nests in South Africa are reported.

KEY WORDS: Diptera, Lauxaniidae, *Pachycerina*, taxonomy, Afrotropical Region, absence of aedeagus, bird nests.

### INTRODUCTION

*Pachycerina* Macquart, 1835 is an attractive genus of small (*ca* 3–4.5 mm), yellow-brown lauxaniid flies notable for the strongly tumid prefrons (face), black or brown prefrontal (facial) spots, elongated postpedicels (3<sup>rd</sup> antennal segments) and incurved anterior fronto-orbital bristles (Figs 1–3). These distinctive characters make *Pachycerina* one of the most eye-catching genera in the Afrotropical lauxaniid fauna.

The genus is broadly but patchily distributed in the Afrotropical, Palaearctic and Oriental (= Indo-Malayan) realms (Shewell 1977: 190–191; Miller 1980: 607; Papp 1984: 198; Shatalkin 2000: 36–38). *Pachycerina* also marginally intrudes into northern Australia (Stuckenberg 1971: 537; Evenhuis & Okadome 1989: 579). In the Nearctic and Neotropics, *Pachycerina* is replaced by *Pachyopella* Shewell, 1986. The latter genus is especially reminiscent of *Pachycerina* (Shewell 1986: 540–541; 1987, fig. 87.34), and the type species was for many decades retained in *Pachycerina*. Thus, *Pachycerina*, and its presumed close relatives, form a near-cosmopolitan clade of lauxaniid flies.

The Afrotropical *Pachycerina* fauna has hitherto been poorly known, with only brief and sporadic mention in the published literature. Documentation of the fauna began with Thomson (1869: 568) who described *Lauxania crinicornis* from the island of Mauritius. Bezzi (1907: 126) later realized that this taxon was a *Pachycerina* species, although Friedrich Hendel (1908: 31), in his major lauxaniid monograph, retained it in *Lauxania*, probably because he had not read Bezzi's paper. Giglio-Tos (1895: 365) recorded what he called *P. seticornis* (Fallén, 1820: 27) from the Seychelles, and (understandably) expressed surprise at finding this Palaearctic taxon (described from Sweden, and the type species of the genus) thousands of kilometers away on a tropical



Fig. 1. Habitus of *Pachycerina nigrivittata*. Note the bulging prefrons, black prefrontal spots, and elongated antennae.

island in the Indian Ocean. We have not seen this material, but it is reasonable to surmise that Giglio-Tos was looking at what later would be described as *Pachycerina seychellensis* by Lamb (1912: 307).

Adams (1905: 172–173) described the first *Pachycerina* from mainland Africa when he erected *P. vaga* for two female specimens from the neighbourhood of Harare, Zimbabwe. A year later, Bezzi (1907) listed *P. vaga* from Eritrea without comment. Lindner (1956) recorded *P. vaga* amongst the lauxaniids collected during a German expedition to northern Tanzania in the early 1950s, including two males. As mentioned, Adams had described the species solely on females, but Lindner did not, unfortunately, provide any particular data (e.g., genitalia descriptions) of the males he collected.

Moving offshore again, Lamb (1912: 307–308) described two species from the Seychelles islands: *P. seychellensis* and *P. obscuripennis*, and commented briefly that *P. seychellensis* ‘must be closely related to *P. javana* (Macquart, 1851)’ (of the Oriental region). At this point research into the Afrotropical *Pachycerina* fauna essentially stopped.

The above erratic research was summarized in the Afrotropical Diptera catalogue, where the four species known to that point (*P. crinicornis*, *P. obscuripennis*, *P. seychellensis*, *P. vaga*) were listed (Miller 1980: 607). Apart from that listing, it has been difficult to acquire a coherent picture of the African *Pachycerina* fauna, limiting potential comparison against the Palaearctic and Oriental faunas.

Aside from a single sketch by Lamb (1912, pl. 15, fig. 5), the male genitalia of African *Pachycerina* have not been figured or discussed in any publication. Further, there have

also been no data published on the biology, habitat choice, or relationships of the Afrotropical taxa. All together, these beautiful little flies are in need of some revisionary treatment.

#### MATERIAL AND METHODS

Approximately 280 specimens were examined for this study. The type material of all the Afrotropical species described to date (*P. vaga*, *P. crinicornis*, *P. seychellensis* and *P. obscuripennis*) has been examined.

We use the term *prefrons* for what dipterists normally call the *face*. The *frons* of dipterists becomes the *postfrons* under our preferred terminology. For male terminalia, we have followed the terminology used by Stuckenberg (1971), who derived his terms from Hennig (1948).

All *Pachycerina* specimens in fresh condition display a characteristic body colour pattern principally comprising longitudinal vittae; although postmortem discoloration often obscures this colour patterning. On the scutum, two principal longitudinal vittae (stripes) are observed running most of the length of the scutum, one vitta abuts the acrostichal row subdorsally, the other abuts the dorsocentral row sublaterally, the former is here termed the *acrostichal vitta* and the latter the *dorsocentral vitta* (Fig. 5). The *dorsocentral vitta* often has a curved extension running posteriorly from the anterior dorsocentral bristle (Fig. 5). There is also often a vitta of colour running from the anterior edge of the scutum to just before the presutural bristle, here called the *presutural vitta* (Fig. 5). On the pleura of the thorax two longitudinal vittae are also visible (Fig. 7): the *upper lateral vitta* running from the propleuron posteriorly to fade out in the pteropleuron and pleurotergite (this vitta also runs along the lower margin of the humeral callus and notopleuron), and the *lower lateral vitta*, running usually along the top margin of the sternopleuron and ventral margin of the pteropleuron.

For examination of male terminalia, specimens were relaxed in a phenol chamber, the posterior abdominal segments were then excised with small blade and deposited in unheated 10 % solution potassium hydroxide (KOH) overnight. They were then removed and placed in acetic acid, before being rinsed in tap water and finally placed in glycerine on a microscope slide or tiny plastic dish. All measurements are in millimeters (mm).

Abbreviations: T – tergite/s (e.g., T6 – sixth tergite), S – sternite/s (e.g., S5 – fifth sternite), Nat. Park – national park.

Material was examined from the following institutions:

- BMNH – Natural History Museum, London, UK;
- CASC – California Academy of Sciences, San Francisco, USA;
- KU – Snow Entomological Museum, University of Kansas, USA;
- MHNB – Musée d'Histoire Naturelle de Bâle, Basel, Switzerland;
- MNHN – Muséum National d'Histoire Naturelle, Paris, France;
- MRAC – Musée Royal de l'Afrique centrale, Tervuren, Belgium;
- NHMZ – Natural History Museum of Zimbabwe, Bulawayo, Zimbabwe;
- NMSA – Natal Museum, Pietermaritzburg, South Africa;
- NRS – Naturhistoriska Riksmuseet, Stockholm, Sweden;
- NMWC – National Museum and Gallery of Wales, Cardiff, UK.

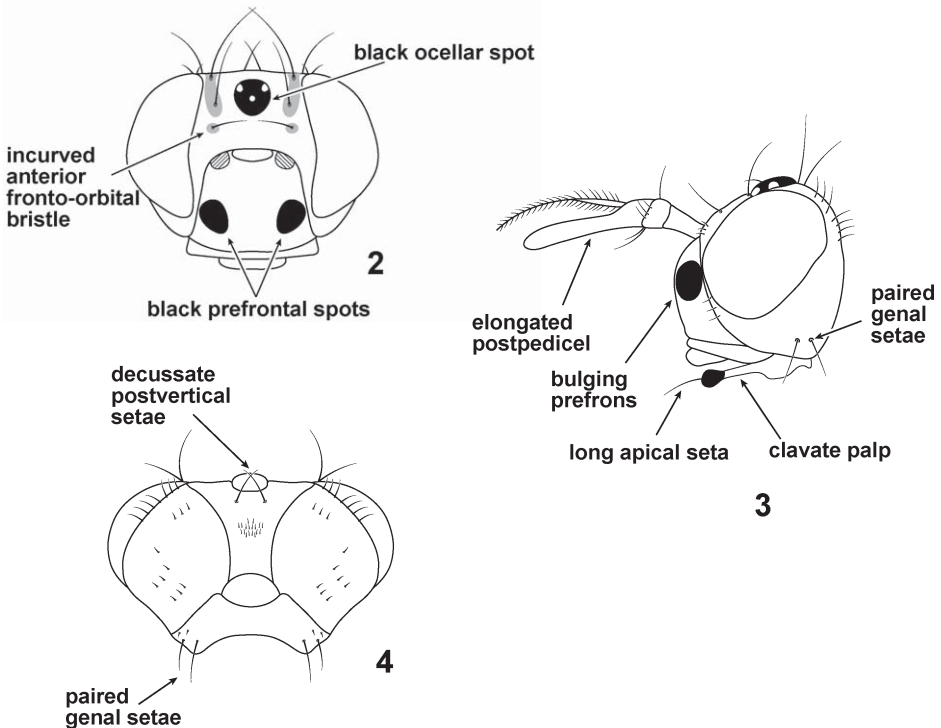
## TAXONOMY

Genus *Pachycerina* Macquart, 1835

*Pachycerina*: Macquart 1835: 511. Type species: *Lauxania seticornis* Fallén, 1820: 27, by monotypy.

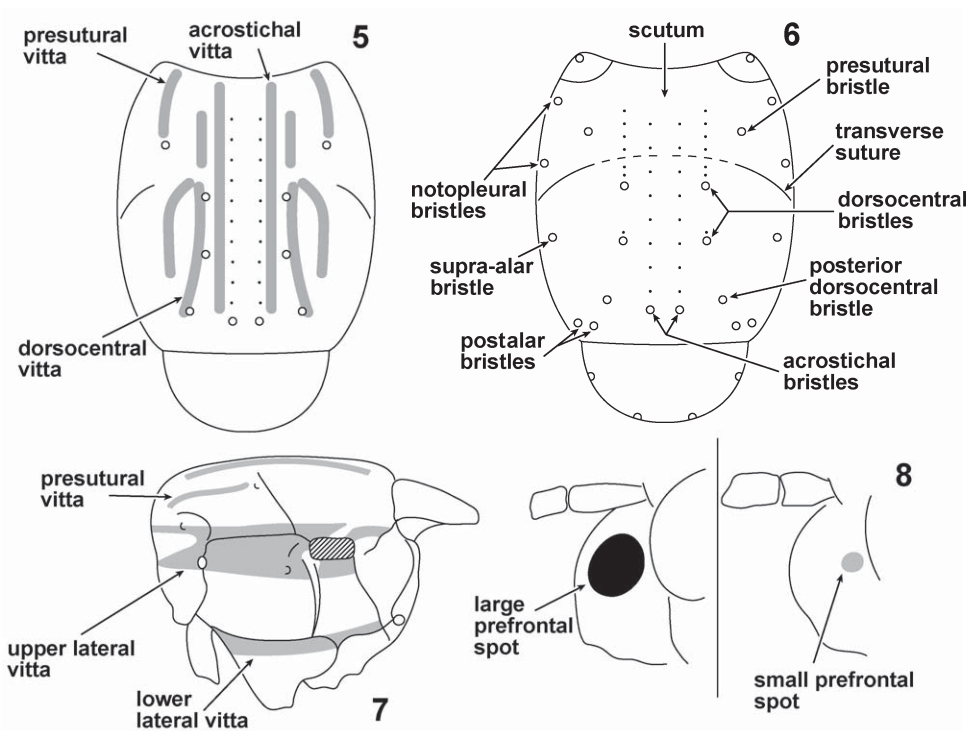
Diagnosis (Afrotropical taxa only):

Small (ca 3–4.5 mm), yellow-brown lauxaniids with bulging, convex, partially translucent prefrons; two lateral black or brown spots on prefrons (Figs 1–3). Head yellow. Arista densely plumose (setulae short, black and closely appressed against stem), except *P. pellocera* sp. n. Postpedicel of antennae elongated, 3–4× longer than pedicel (Fig. 3). Scape long (ca 2× length of the pedicel), expanding distally. Postfrons fairly strongly sloping. Anterior fronto-orbital bristles inclinate (incurved), posterior fronto-orbital bristle reclinate (Fig. 2). Posterior fronto-orbital bristle ca 0.7× length of inner vertical seta. Fronto-orbital bristle alveolus encircled by brown spot (Fig. 2), sometimes faint. Fronto-orbital plates may be infuscated. Ocellar spot conspicuous, black or dark brown, enclosing ocellar triangle (Fig. 2). Ocellar setulae minute and inconspicuous. Postvertical (postocellar) setae decussate, intersection high (Figs 2, 4). Supracervical setulae ca 20. Palpus clavate, orange with black apex. Palpus setulate, very long seta apically (Fig. 3).



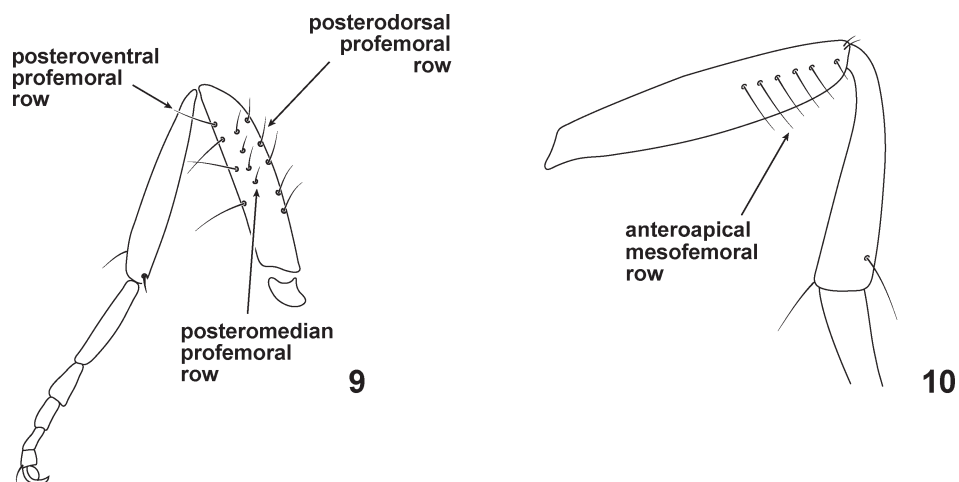
Figs 2–4. Schematic illustrations of *Pachycerina* heads: (2) anterior view (note the black prefrontal spots, inclinate anterior fronto-orbital bristles, infuscated circles around anterior fronto-orbital bristle alveoli, black ocellar spot, infuscated fronto-orbital plates, and decussate postvertical bristles; antennae and smaller setulae omitted in illustration); (3) lateral view (note the bulging prefrons, black prefrontal spot, elongated postpedicel, clavate palpi with black apex and long apical setula and paired genal setae); (4) posterior view (note decussate postvertical bristles and paired genal setae).

Lower edge of gena with pair of robust setae, the *paired genal setae* (Figs 3, 4). Thorax yellow-orange, usually with *acrostichal*, *dorsocentral* and *presutural vittae* dorsally and *upper* and *lower lateral vittae* on pleuron (Figs 5, 7). Acrostichals biseriate; 0+3 dorsocentral bristles, 1 or 2 setulae between anteriormost dorsocentral bristle and transverse suture, posterior dorsocentral bristle displaced laterally from longitudinal dorsocentral axis; anteriormost dorsocentral bristle is *ca* 60% length of posteriormost dorsocentral bristle; 1 humeral, 1 presutural, 2 notopleural, 1 supra-alar (+1 setula), 2 postalar (lower bristle much longer) bristles (Fig. 6); 1 mesopleural bristle (no setulae on sclerite); 1 sternopleural bristle (no setulae on sclerite). Scutellar posterior pair of bristles not decussate. Profemoral ctenidium absent. Front legs usually darker in colour than other legs. Three distinct rows of setae on posterior side of profemur, the *posterodorsal*, *posteromedial* and *posteroventral profemoral setal rows* (Fig. 9). Anterior side of mesofemur with differentiated row of setae apically, the *anteroapical mesofemoral row* (Fig. 10). Mesotibial preapical bristle more robust and apically placed than preapical bristles on other tibiae. Single mesotibial apicoventral spur, flanked by *ca* 9 robust setulae. Wing sapromyziform, stout costal setulae terminating *ca* 50% of distance between apices of



Figs 5–8. Schematic illustrations of *Pachycerina* thorax and head: (5) dorsal view of scutum showing deployment of scutal vittae; (6) dorsal view of scutum and scutellum showing deployment of bristles and setae by position of their alveoli (note the two acrostichal bristle rows, lateral displacement of the posteriormost dorsocentral bristle off the longitudinal dorsocentral axis and setulae between anteriormost dorsocentral bristle and transverse suture); (7) pleuron showing deployment of pleural vittae; (8) lateral view prefronts, *P. vaga* Adams (left) and *P. micropunctata* sp. n. (right) (note the difference in the size of the prefrontal spots between the two species).





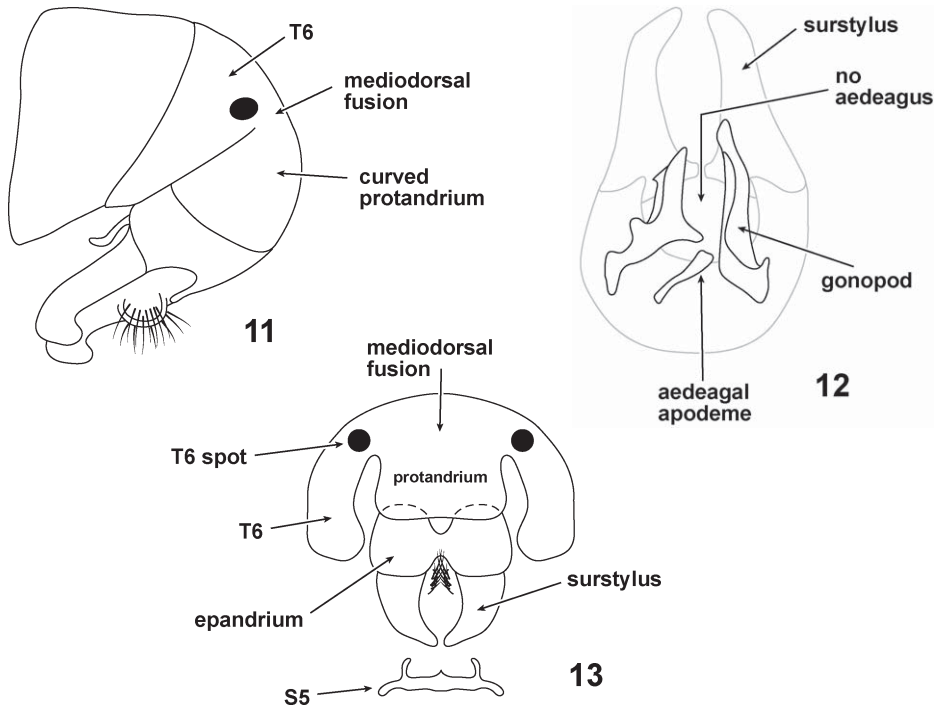
Figs 9, 10. Schematic illustration of *Pachycerina* front leg: (9) posterior view (note the three rows of setae on profemur); (10) anterior view (note apical row of setae on mesofemur).

Vein 2 ( $R_{2+3}$ ) and Vein 3 ( $R_{4+5}$ ). Wing hyaline or partially fumose. Species with infuscated wings do not have clouded/shaded crossveins (cf. crossveins of Palaearctic *P. seticornis*; Hendel 1907, pl. 3, fig. 50). Abdomen yellow to black, usually with two lateral black spots on T6 (in both sexes). Male terminalia, see separate section below. Female terminalia: S5 subquadrate, wider posteriorly than anteriorly, setulose. S6 short (in longitudinal plane), less than half length of S5, conspicuously narrower (in transverse plane) than S7, setulose. S7 fused to T7 (syntergosternite), sternal component of syntergosternite short but very wide (i.e. transversely elongated), much wider than other sternites, setulae along posterior margin. S8 subquadrate, setulose, setulae throughout sclerite. In repose, S8 curled, quasi-cylindrical. Hypoproct subovate, setulose. Cerci simple, setulose. Epi-proct subovate, setulose. 2+1 spermathecae. Egg white, elongate ovoid, slightly curved in lateral view, with *ca* 10 longitudinal ridges on chorion, weak transverse striations between ridges.

#### *Male terminalia*

A separate, non-telegraphic section discussing the male genitalia of *Pachycerina* is felt appropriate. There are two especially notable features of *Pachycerina* male genitalia which we wish to discuss: (1) the partial fusion of the protandrium and T6, and (2) the absence of an aedeagus and hypandrium (Figs 11–13).

Generally speaking, the terminalia are composed of articulated, finger-like surstyli, reniform epandria, hirsute cerci and modified protandria (Figs 11, 13). Internally the genitalia are much simplified relative to other lauxaniid genera; on dissection of inner genitalia one sees two, asymmetric lobes with a short apodeme lying basally (Fig. 12). Our interpretation is that these lobes are gonopods, and the apodeme is the aedeagal apodeme. Shatalkin (1995) calls the gonopods ‘parameres’ in Palaearctic *Pachycerina*; we have merely followed Stuckenberg (1971) and Kim (1994) in labelling them gonopods. The gonopods taper to pointed or rounded apices; they are medially scalloped (hollowed) and show species-specific shapes, most species bearing small spinules or mucros laterally. The gonopods are usually of unequal length, one gonopod exceeding the other in length,



Figs 11–13. Schematic illustrations of Afrotropical *Pachycerina* male terminalia: (11) lateral view (note the mediadorsal fusion of T6 and protandrium and the strong curvature of the protandrium); (12) ventral view (note the simplified inner genitalia with two asymmetric gonopods and aedeagal apodeme and the absence of an aedeagus or hypandrium); (13) flattened terminalia (note the mediadorsal fusion of T6 and protandrium, the paired black spots on T6 and the modified S5).

sometimes markedly (e.g., *P. atrimela*, Fig. 31), but they may be equal in length (e.g., *P. nigrivittata*, Fig. 34). There is no evidence of a distinct hypandrium in any male dissected and the sclerite is presumably absent, although it is conceivable that the hypandrium has become fused to the base of the gonopods, which extend out laterally as fairly pronounced flanges.

The aedeagal apodeme in *Pachycerina* is a simple, laterally compressed, longitudinal structure with no spinules or ornamentation and articulates loosely with the medial base of the gonopods. The ejaculatory apodeme is a small, 'L'-shaped structure having a slightly expanded anterior terminus; it usually lies above the base of the gonopods.

Although not typically included under terminalia, we found the male S5 in *Pachycerina* to be variable and to often show species-specific shapes. In most instances, S5 has been reduced to a narrow band with a small medial spur or mucro and two processes projecting posteriorly from the sublateral corners of the band (Fig. 13).

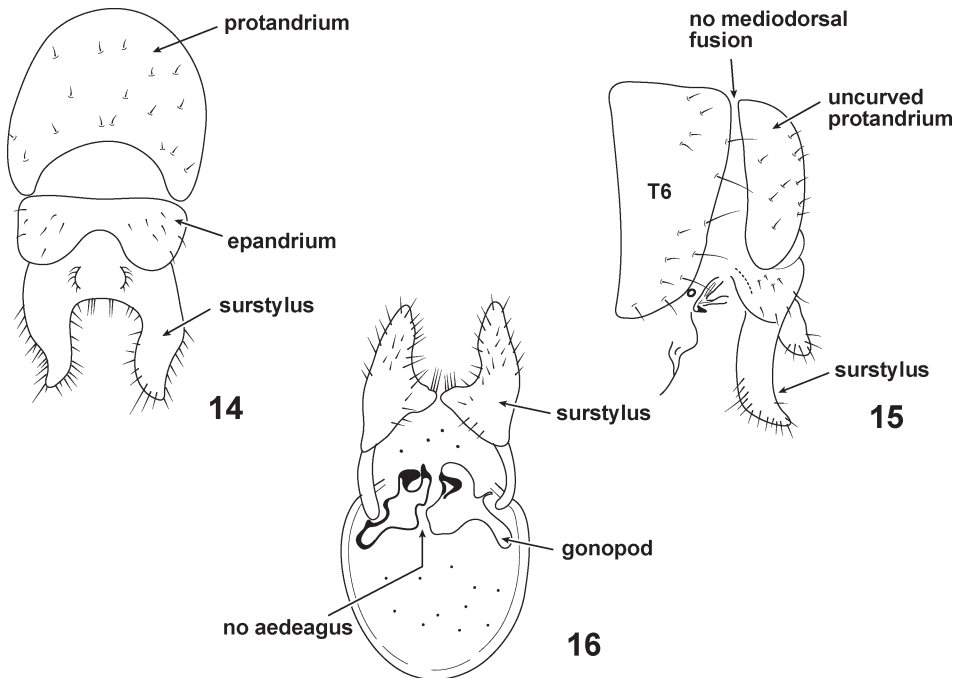
#### Fusion of protandrium and sixth tergite

In all Afrotropical species of *Pachycerina* the protandrium (= combined abdominal segments 7 and 8) is fused to T6 mediadorsally (Figs 11, 13), and strongly curved such that the epandrium, surstylus and inner genitalia are nestled under T4–T6 (Fig. 11). In all Afrotropical *Pachycerina* protandria the ventral portion of the sclerite has been lost.



Aside from merely counting the abdominal tergites (beginning with the sytergite 1+2), our identification of the protandrium is corroborated by what we interpret to be the 7<sup>th</sup> spiracle in the sclerite preceding the epandrium. If our identification of the abdominal segments is correct, then *Pachycerina* represents an apparent deviation from the characteristic that Hennig (1948: 407) first identified in lauxaniids, viz. that the 6<sup>th</sup> tergite is not associated with the postabdomen ('in der allgemeinen Gliederung des Abdomens der Lauxaniidae fällt zunächst auf, dass das 6. Abdominalsegment nicht in den Komplex des Postabdomens einbezogen ist'). We have attempted to illustrate the situation as lucidly as possible so that other dipterists can form their own conclusions. Potentially, a partially fused T6 and protandrium may be an apomorphy of *Pachycerina*, or at least a subclade of the genus.

Unfortunately, no guidance can be found in the Palaearctic literature on the fusion of T6 and protandrium. Remm and Elberg (1979) gave two relevant illustrations of *P. seticornis* (recall that this is the type species of the genus) reproduced here as Figs 14–16, which show the male terminalia in dorsal, lateral and ventral views respectively. They illustrate a large, crescent-shaped protandrium (identified as such in their figure caption) unattached to any preceding sclerite (Figs 14, 15). Their lateral view (Fig. 15) shows a large T6, a narrower protandrium and a ventrally placed 'hypopygium' (all these structures are identified as such in their figure caption). No connection between



Figs 14–16. *Pachycerina seticornis* male terminalia reproduced from Remm & Elberg (1979): (14) posterior view (note the protandrium is a single sclerite evidently unattached to any other sclerite); (15) lateral view (note the protandrium is not fused to preceding T6 that also lacks black spots, protandrium also lacks any strong curvature); (16) ventral view (note simplified inner genitalia lacking aedeagus or hypandrium).

T6 and the protandrium can be seen in their figure, and furthermore the protandrium is not strongly curved. Their text does not discuss the *Pachycerina* male terminalia (Remm & Elberg 1979: 66–69). We take their illustrations to show that (1) the T6 and protandrium are not fused mediodorsally in *P. seticornis*, and (2) the protandrium lacks any strong curvature.

Shatalkin (1995, figs 6, 7; 2000: 74) is the only other researcher to have figured male terminalia of Palaearctic *Pachycerina*. His illustrations of *P. ninae* Shatalkin regrettably, however, omit the protandrium and preceding tergites, and thus one cannot form any opinion on their structure; his text also does not comment on these structures. We have not found any illustrations or discussion of the male terminalia of Oriental species in the literature.

Stuckenberg (1971: 504) called attention to the variation he had observed in the structure of the protandrium in lauxaniids and observed that ‘differences in development, exposure and vestiture of the protandrium do not appear to have been used in lauxaniid taxonomy’. The situation in *Pachycerina* would appear to suggest the shape of the protandria may have phylogenetic value in elucidating relationships amongst lauxaniids. Stuckenberg did, however, illustrate intrageneric variation in the structure of *Cestrotus* Loew protandria (Stuckenberg 1971, figs 3, 4 and 7), principal differences concerning the ventral development of the sclerite.

#### Loss of aedeagus and hypandrium

In all Afrotropical *Pachycerina* species we did not observe any aedeagus (sclerotised or membranous) and nothing that could be identified as a hypandrium (Fig. 12).

The absence of an aedeagus in *Pachycerina* was a somewhat surprising discovery. The only other possibility is that treatment with KOH may have obliterated the aedeagus and hypandrium during extractive treatment, but we discount this as a cause because (1) the same result was achieved for all *Pachycerina* males we dissected and (2) Shatalkin’s (1995) and Remm & Elberg’s (1979) diagrams are similarly without any structures that could be called an aedeagus or hypandrium (e.g., Fig. 16 of *P. seticornis*). They did not, however, comment on the absence of these structures.

Interestingly, amongst other lauxaniids, the aedeagus is also absent in certain *Minettia* Robineau-Desvoidy species and celyphid (beetle fly) genera (Tenorio 1969: fig. 1; 1972: 371). Could this absence of an aedeagus be indicative of phylogenetic relationship, or is it a convergent resemblance? J.F. McAlpine (1981: 53) also reported similar instances in *Amiota* Loew (Drosophilidae), *Dasiops* Rondani (Lonchaeidae), and some Piophilidae. If these flies lack an intromittent organ, how is sperm transferred during copulation? We are not familiar with the literature on the evolution of mating organs in Diptera, but the disappearance of the aedeagus in unrelated acalyptrates hints at some unusual biological phenomenon, perhaps mediated by sexual selection?

#### Discussion of male genitalia

To recapitulate, the male inner genitalia of Afrotropical *Pachycerina* are simplified, lacking a hypandrium or aedeagus and having only a pair of contorted, asymmetric lobes (usually bearing spinules) and a rod-shaped apodeme basad of these lobes (Figs 11–13, 16). The protandrium is partially fused to the T6 (in Afrotropical species, at least), and this may represent a phylogenetically important modification not shown by any other lauxaniids.

### General comments

*Pachycerina* is one of the more easily recognized lauxaniid genera in Africa, and is unlikely to be confused with any other lauxaniid genus. To briefly summarise, features of the African *Pachycerina* that are immediately striking include: (1) tiny ocellar setulae ('außerordentlich klein' [extraordinarily small] in Becker's (1895: 250) words), (2) incurved anterior fronto-orbital bristles (reclinate in most Afrotropical lauxaniids, except *Chaetolauxania* Kertész), (3) bulging prefrons and lateral black spots (other Afrotropical lauxaniid genera lack such a tumid prefrons and maculation), (4) elongated postpedicel, (5) two acrostrichal bristle rows on mesoscutum, (6) no profemoral ctenidium, (7) usually dark brown protibia and protarsi (relative to yellow meso- and metatibiae and tarsi), (8) the presence of paired black spots on T6 in some species, and (9) the absence of an aedeagus in the male of all species.

The Afrotropical *Pachycerina* fauna forms a small, compact and morphologically uniform grouping. In the Palearctic and Oriental faunas it is notable that there seems to be more variability in coloration and morphology. For example, species in these other biogeographic provinces may have white arista, single prefrontal spots or even lack the prefrontal spots entirely (see Malloch 1929: 20; Shatalkin 2000: 36–38 for further details). The most divergent Afrotropical species have an all-black abdomen (e.g., *P. atrimela* sp. n.) or reduced prefrontal spots (*P. micropunctata* sp. n.).

Most of the Afrotropical species (e.g., *P. vaga* Adams, *P. seychellensis* Lamb) appear most similar (phenotypically-speaking) to the Oriental *P. javana* Macquart. Indeed those Afrotropical species without a black abdomen run easily to *P. javana* in Malloch's (1929) Oriental key. We are not necessarily implying phylogenetic propinquity with these comments, although such resemblance, *faute de mieux*, is suggestive of close relationship.

Within the Afrotropics, the Malagasy *Pachycerina micropunctata* sp. n. is immediately distinguishable from the remainder of the Afrotropical fauna by the tiny, brown prefrontal spots (Fig. 8). In the other Afrotropical taxa, these spots are distinctly larger and black (Fig. 8). Our personal knowledge of the *Pachycerina* fauna in other biogeographic provinces is very limited, but it is interesting that *P. sexlineata* de Meijere from Java, Indonesia was described as having tiny, pale brown prefrontal spots (de Meijere 1914: 235; Malloch 1929: 20). De Meijere (1914: 235–236) also described *Pachycerina parvipunctata* de Meijere as having small prefrontal spots, although in this case the spots were black. Both *P. sexlineata* and *P. parvipunctata*, however, have the arista setulae described as 'not dense, erect, and the longest very distinctly longer than basal width of third antennal segment' (Malloch 1929: 20), a feature not in accord with *P. micropunctata*. The postabdomens of these two Asian species do not appear to have been illustrated or described in the literature. It is possible that *P. micropunctata* could be closely related to these Asian species, speculation that can only be corroborated once the necessary postabdominal dissections of these Oriental taxa have been undertaken and a phylogeny for the whole genus constructed. There are examples in Diptera where a Malagasy species appears to have a sister-species, or at least a close relative, in the Orient, e.g., *Chrysopilus* rhagionids (Stuckenberg 1997: 235).

### Life history data

Unsurprisingly, there is little biological data on these inconspicuous flies. However, RMM reared two specimens of *P. vaga* from ground-nesting bird nests (probable

*Cisticola* species (Sylviidae)) collected in Bisley Valley, Pietermaritzburg, South Africa. The habitat was dense *Acacia* grass-savannah on the sides of a stream. The bird nests were collected in December 1978, and the adult flies emerged in January 1979. RMM also reared an adult *P. vaga* collected as a puparium from leaf-litter in February 1977 at Drummond, KwaZulu-Natal, South Africa; the fly emerged during the same month. There are no recorded rearing records for Palaearctic *Pachycerina*.

From these scraps of data, it is probable that Afrotropical *Pachycerina* are detritivorous or saprophagous in the larval stage, as with other lauxaniid larvae (Miller 1977), but possibly specializing on bird nests or other restricted microhabitats. Miller (1977, table 1) summarized the lauxaniid taxa known to have been reared from bird nests in the Northern Hemisphere. Records of nidicolous species were noted for the following genera: *Calliopum* Strand, *Lyciella* Collin, *Minettia* Robineau-Desvoidy, *Poecilominettia* Hendel, *Pseudocalliope* Malloch and *Sapromyza* Fallén. It is possibly of significance that these genera are all in the subfamily Lauxaniinae, as is *Pachycerina*.

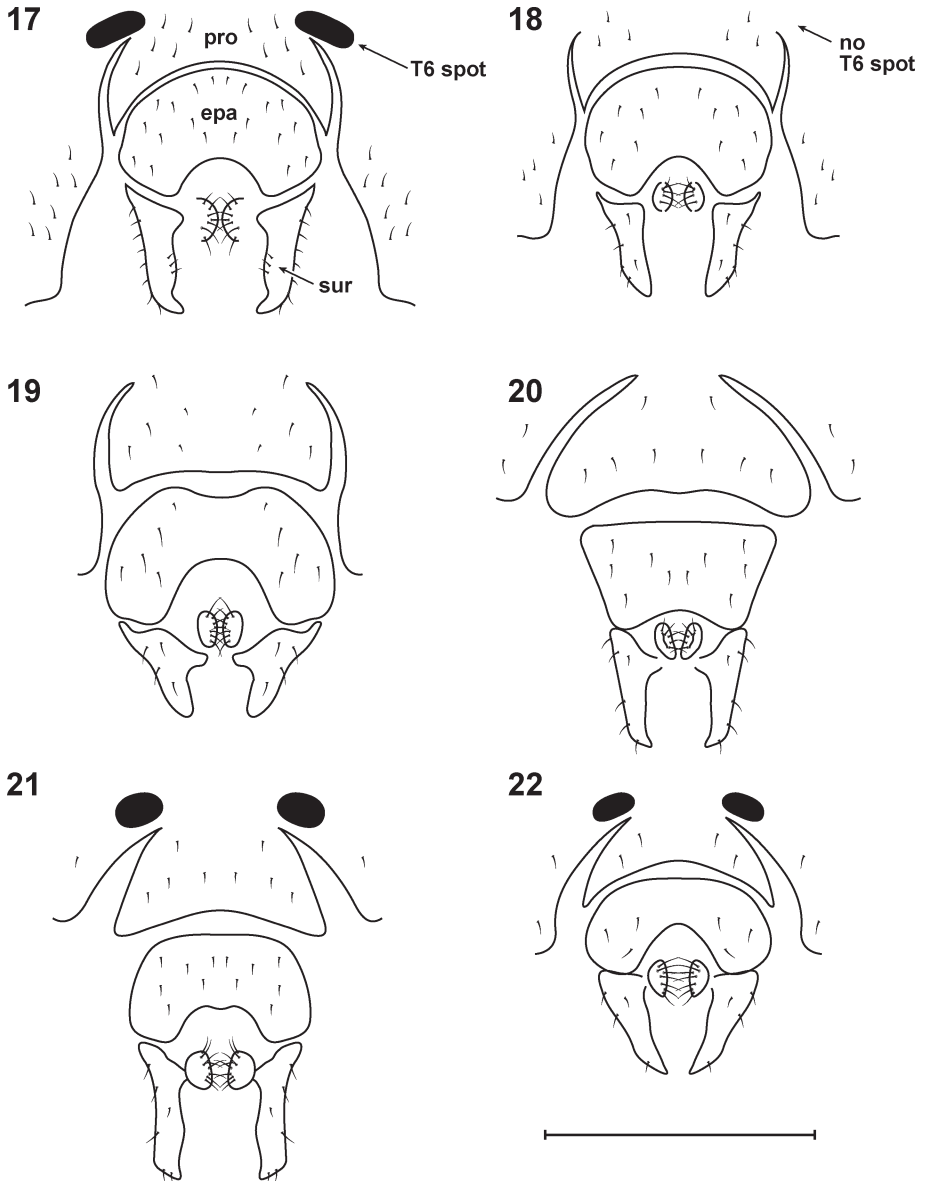
The hyper-extended postpedicels of *Pachycerina* are indicative of some special sensory requirement. In discussions between the two authors, we mooted that possibly such elongated postpedicels were required for finding a restricted or localized microhabitat for oviposition (such as bird nests), but the nidicolous genera discussed in the previous paragraph generally do not have elongated third antennal segments. Possibly then the elongated postpedicels serve to find some localized microfungi that adults graze? This is based on the assumption that the adults are fungivorous grazers, although *Pachyopella ornata* (Melander) was found to be a liquid-feeder by Broadhead (1984). We have not yet investigated the proboscides of *Pachycerina* with Scanning Electron Microscopy. Whatever the case, hyper-extended postpedicels, which are also notable in genera such as *Lauxania* and *Melanomyza* (e.g., Shewell 1987, figs 87.13 and 87.16), call out urgently for a functional explanation.

In our experience, *Pachycerina* occurs at low densities. For example, in *Acacia* savannah at Bisley Valley, Pietermaritzburg, sweeping the herbage often only results in the capture of 1 or 2 *Pachycerina* per hour of sweeping; this contrasts with other lauxaniid genera that may co-occur in the same habitat such as *Mycterella* Kertész, which may be locally common. This scarcity is also reflected in Malaise trapping. Quite a large number of *Pachycerina* specimens have been collected in Malaise traps (see material examined for *P. vaga*), but when present *Pachycerina* is only represented by a few specimens (in KwaZulu-Natal, both *P. vaga* and *P. nigrivittata* have been caught in Malaise traps set by RMM in open thornbush and forest edge).

In South Africa, *Pachycerina* has been swept from *Isoglossa* herbage in the understorey of coastal, subtropical forest, from the understorey of high-altitude (>1500 m) *Podocarpus* forest, in thick grass and shrubs under shade along a seepage line, and in thick shaded shrubbery in *Acacia* savannah and sub-montane, temperate (mist-belt) forest. In Madagascar, most records come from the (formerly) forested east-facing escarpment; according to label data, *P. atrimela* sp. n. having been swept along paths in the lush rainforest at Andasibe (Périnet) and Amber Mountain (Antsiranana). In our experience, the genus has a preference for shaded areas under trees.

A series of *P. seychellensis* collected on Silhouette Island, Seychelles were all captured at a light trap. Specimens of female *P. vaga* and *P. nigrivittata* from Maguga, Kenya were recorded as having been collected 'at light' and a female *P. nigrivittata* from

Howick, South Africa was taken at ‘domestic lights’. These records indicate some attraction to lights (phototaxy) in the genus, which is also corroborated by Greve and Kobro’s (2004) report of catching 35 specimens of *P. seticornis* at light funnel traps in Norway.



Figs 17–22. Posterior view of male terminalia: (17) *Pachycerina potentilla* sp. n.; (18) *Pachycerina pellocera* sp. n.; (19) *Pachycerina atrimela* sp. n.; (20) *Pachycerina obscuripennis* Lamb; (21) *Pachycerina seychellensis* Lamb; (22) *Pachycerina nigrivittata* sp. n. Abbreviations: pro – protandrium, epa – epandrium, sur – surstylus. Scale bar = 0.8 mm.

From species with sufficient specimen records such as *P. vaga*, there does not appear to be any strong seasonality as specimens have been caught throughout the year, even in the dry and frequently cold austral winter. Supporting this fact, in northern Europe, *P. seticornis* was found to regularly occur on snow throughout the frigid Norwegian winter (Hågvar & Greve 2003: 414) !

Key to Afrotropical species of male *Pachycerina*

- 1 Prefrons (face) lateral spots large, black; wing hyaline or infuscated anteriorly .... 2
- Prefrons (face) lateral spots small, brown; wing hyaline .....  
..... **P. micropunctata** sp. n. (Madagascar)
- 2 Abdomen yellow or orange-brown, with paired T6 spots ..... 3
- Abdomen black, without paired T6 spots ..... 8
- 3 Ventral margins of abdominal tergites with clear black edging ..... 4
- Ventral margins of abdominal tergites orange-brown, without any black edging ..... 5
- 4 Wing strongly fumose, male gonopods about equal in length .....  
..... **P. nigrivittata** sp. n. (southern Africa)
- Wing weakly fumose, male gonopods unequal in length .....  
..... **P. stuckenbergi** sp. n. (Madagascar)
- 5 Antenna dark brown, distinct infuscation of scape, pedicel and/or postpedicel ... 6
- Antenna yellow (no infuscation of scape, pedicel, postpedicel) ..... 7
- 6 Thoracic vittae orange to dark brown (markings often diffuse); pedicel dark brown,  
postpedicel blackish brown; artistal plumosity rather sparse .....  
..... **P. pellocera** sp. n. (Madagascar)
- Thoracic vittae black (intensely marked); postpedicel yellow, outer half of pedicel  
and scape brown; aristal plumosity dense ..... **P. potentilla** sp. n. (São Tomé)
- 7 Profemur posteriorly yellow with brown area apically; lower lateral corners of  
prefrons (face) with brown smudge ..... **P. seychellensis** Lamb (Seychelles)
- Profemur posteriorly all yellow-orange; lower lateral corners of prefrons (face) not  
infuscated ..... **P. vaga** Adams (southern and eastern Africa)
- 8 Lower lateral thoracic vitta restricted to upper margin of sternopleuron, mid- and  
hind-legs yellow-orange ..... 9
- Lower lateral thoracic vitta expanding to cover entire sternopleuron, mid- and hind-  
legs mainly blackish ..... **P. atrimela** sp. n. (Madagascar)
- 9 Wing fumose ..... 10
- Wing hyaline ..... **P. crnicornis** (Thomson) (Mauritius)
- 10 Profemur all yellow-orange, haltere orange ..... **P. gabela** sp. n. (Angola)
- Profemur yellow with black tip, haltere black .....  
..... **P. obscuripennis** Lamb (Seychelles)

***Pachycerina atrimela* sp. n.**

Figs 19, 31, 42

Etymology: From Latin *ater* (black) and *melos* (limb), in reference to the black legs of this species (including coxae, trochanters and femora).



Diagnosis: *P. atrimela* is characterised by the following distinctive traits: (a) black legs (the coxa, trochanter and femur of all the legs are black or dark brown), (b) having the sternopleuron and meropleuron completely black or dark brown, and (c) the abdomen completely black. The combination of black legs, lower thorax and abdomen gives the species a distinctive swarthy aspect that can be noticed with the naked eye. The shape of the male S5 is also diagnostic (Fig. 42), lacking the medial spur and having the posterior processes short and medially extended for a short distance. When cleared in KOH, no paired spots can be seen in the darkened cuticle of T6.

#### Description:

*Head:* Fronto-orbital plate from posterior fronto-orbital bristle to inner vertical seta brown. Prefrontal spots large and black and touching sides of prefrons laterally. Scape and pedicel brown (lightly infuscated), postpedicel yellow.

*Thorax:* Striping pattern on scutum indistinct, dorsum largely orange-brown with thin, medial vitta of yellow, edges of scutum yellow. Scutellum yellow, no infuscation. Upper lateral thoracic vitta from humeral callus to pteropleuron. Lower lateral thoracic vitta expanding to cover all of sternopleuron and meropleuron. Postscutellum and postnotum blackish brown. All legs black or dark brown, except meso- and metatibia and meso- and metatarsus yellow-brown. Wing hyaline. Haltere basally yellow, distally black.

*Abdomen:* Black.

Male terminalia (Figs 19, 31, 42): S5 posterior processes not elongate but medially expanded, no medial spur. No T6 spots. Surstyli short (shorter in length than epandrium). Gonopods strongly asymmetric, right gonopod long with hooked apex and tiny lateral spinule (not shown in illustration), left gonopod short with lateral spinule. Aedeagal apodeme rounded anteriorly and tapering posteriorly.

*Measurements:* ♂ (n=2), ♀ (n=4): head length – ♂ 0.8, ♀ 0.7; thorax length (incl. scutellum) – ♂ 1.9, ♀ 1.9; abdomen length – ♂ 1.7, ♀ 1.8; wing length – ♂ 3.9, ♀ 3.8.

Holotype: ♂ MADAGASCAR: Andasibe (= Périnet) [18°49'S:43°26'E], 6.x.1958, F. Keiser (MHNB).

Other material examined: MADAGASCAR: 3♂ 2♀ Andasibe (= Périnet) [18°49'S:43°26'E], 12.x.1970, P. Hammond (BMNH); 2♂ 2♀ same locality, 9.iv.1958, F. Keiser (MHNB); 6♂ 4♀ same locality, 21.ix–6.x.1958, F. Keiser (MHNB); 5♂ 3♀ same locality, xii.1955, B.R. Stuckenberg (NMSA); 2♂ 2♀ Montagne d'Ambre [12°32'S:49°10'E], 16.x.1970, P. Hammond (BMNH); 1♀ near Anjiro, 21.x.1970, P. Hammond (BMNH); 3♂ 12♀ Mandraka [18°55'S:47°55'E], 4.iv.1958, F. Keiser (MHNB); 1♂ Mananjary [21°17'S:47°56'E], 20.viii.1958, F. Keiser (MHNB).

### *Pachycerina crinicornis* (Thomson, 1869)

Figs 25, 36, 45

*Lauxania crinicornis:* Thomson 1869: 568. Type locality: Mauritius.

*Pachycerina crinicornis* (Thomson): Bezzi 1907: 126.

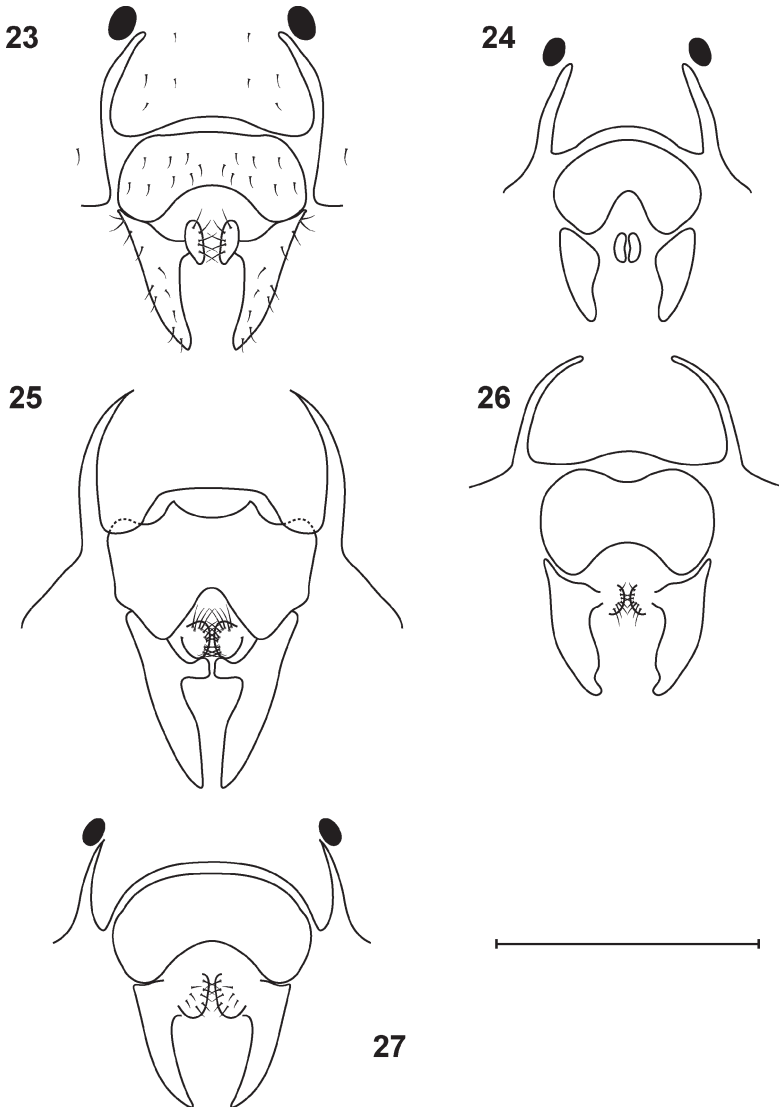
The holotype is a female specimen that is in rather poor condition (grimy and faded), but most parts are still intact, including one complete antenna. Noteworthy features of *P. crinicornis* are: (1) dark fronto-orbital plates, (2) distinctly brownish scape, orange-brown pedicel and yellow postpedicel (colour contrast between the scape and postpedicel is noticeable), (3) small ocellar spot and triangle, (4) hyaline wings, (5) glossy black abdomen.

Male terminalia: Surstyli long (longer than epandrium). T6 without paired spots. Gonopods asymmetric, left gonopod slightly shorter than the right gonopod. Left

gonopod bearing small lateral spinule. Aedeagal apodeme short and anteriorly rounded. S5 with straight posterior processes and medial spur.

Holotype (examined): ♀ MAURITIUS: [no other details on label, e.g., date, collector] (NRS).

Other material examined: MAURITIUS: 3♂ 5♀ Macchabee Forest [20°25'S:57°25'E], 1.vi.1971, A.M. Hutson (BMNH); 2♀ same locality, 21.x.1961, C.M. Courtois (MNHN); 1? same locality, 10.vi.1962, C.M. Courtois (MNHN); 1♂ Macchabee Forest, Brise Fer Road, 11.i.1962, C.M. Courtois (MNHN); 1♂ 1♀ Black R. [20°25'S:57°25'E], 1.vi.1971, A.M. Hutson (BMNH); 1♀ Nicoliere Mt [20°09'S:57°36'E], 9.vi.1971, A.M. Hutson (BMNH); 1♂ Vacoas [20°18'S:57°25'E], 5–8.ix.1931, W.H. Ingrams (BMNH); 1♀ 'Mauritius', J.E.M. Brown (BMNH); 1♀ Phoenix [20°15'S:57°33'E], ix.1934, W.F. Jepson (BMNH); 1♀ 'Ile Maurice' Guérin-



Figs 23–27. Posterior view of male terminalia: (23) *Pachycerina stuckenbergi* sp. n.; (24) *Pachycerina vaga* Adams; (25) *Pachycerina crnicornis* (Thomson); (26) *Pachycerina gabela* sp. n.; (27) *Pachycerina micropunctata* sp. n. Scale bar = 0.8 mm.

Méneville (MNHN); 3♀ Le Pouce Mt [20°11'S:57°31'E], 29.xi.1962, C.M. Courtois (MNHN); 1♀ Beau Bassin [20°13'S:57°29'E], 29.vi.1937, C.M. Courtois (MNHN); 1♀ same locality, 18.iv.1939, C.M. Courtois (MNHN); 1♀ Trou-aux-Cerfs [20°19'S:57°31'E], 11.iv.1965, C.M. Courtois (MNHN); 4♂ 2♀ Macabe, 5.iv.1969, C.M. Courtois (MNHN); 1♀ Grand Bassin [20°25'S:57°29'E], 17.x.1969, C.M. Courtois (MNHN); 1♀ Mt Currie, 8.xii.1960, C.M. Courtois (MNHN); 1♂ Le Petrin [20°24'S:57°27'E], 15.xii.1962, C.M. Courtois (MNHN); 1♂ same locality, 2.vi.1971, A.M. Hutson (BMNH). REUNION: 1♂ 6♀ Forêt de Bélouze [21°15'S:55°32'E], 23–26.i.1955 (MNHN); 2♂ 4♀ Plaine des Marsouins, 25–26.i.1955 (MNHN); 1♀ Plaine des Cafres [21°10'S:55°32'E], 27.i.1955 (MNHN); 1♀ same locality, 4.ii.1956, J. Hamon (MNHN); 1♂ 2♀ Hellbourg [21°03'S:55°31'E], 22.i/ii.1955 (MNHN); 1♀ same locality, 27.x.1958, F. Keiser (MHNH); 1♂ Saint Philippe, Forêt de Brulé de Mare Longue [21°15'S:55°48'E], 1–3.ii.1955 (MNHN); 1♂ St Philippe, 28.xii.1973, L. Matile (MNHN); 1♂ Saint Denis [20°53'S:55°26'E], La Montagne, 31.xii.1955, J. Hamon (MNHN); unstated locality, R. Oberthür, 1899 (MNHN).

### ***Pachycerina gabela* sp. n.**

Figs 26, 32, 41

**Etymology:** Named after the type locality. Gabela is a celebrated area of faunal endemism centered on the subtropical escarpment forests in north-western Angola.

**Diagnosis:** Identifiable by its black abdomen (both sexes), absence of any T6 spots and shape of male S5. *P. gabela* is the only mainland African species to lack the paired T6 spots. Other features are the large black ocellar spot, large black prefrontal spots, long yellow postpedicel, very faintly infuscated scape and pedicel, and that only the protarsus is darkened.

**Description:**

**Head:** Prefrontal spots large and black. Ocellar spot large and black. Fronto-orbital plates not infuscated. Postpedicel yellow, scape and pedicel light orange.

**Thorax:** Acrostichal, dorsocentral and presutural vittae present (pattern indistinct on holotype). Scutellum yellow, no stripes. Upper and lower lateral vittae present. Profemur and protibia yellow, protarsus blackish. Other legs yellow. Wing with faint infuscation in costal cell, stigma and marginal cell. Haltere yellow-orange, slightly darkened knob.

**Abdomen:** Black, but syntergite 1+2 with slight yellow tinge.

**Male terminalia** (Figs 26, 32, 41): S5 with straight posterior processes and medial spur. T6 without paired spots. Surstyli fairly short (slightly longer than epandrium). Gonopods asymmetric, left gonopod slightly shorter than right gonopod. Both gonopods with lateral spinules.

**Measurements:** ♂ (n=2), ♀ (n=2): head length – ♂ 0.8, ♀ 0.7; thorax length (incl. scutellum) – ♂ 2.1 (2.0–2.1), ♀ 1.9; abdomen length – ♂ 1.8, ♀ 1.8 (1.7–1.9); wing length – ♂ 3.7, ♀ 3.5.

**Holotype:** ♂ ANGOLA: *Cuanza Sol*: 7 miles west of Gabela [10°48'S:14°25'E], 16–18.iii.1972 (BMNH). Other material examined: ANGOLA: 2♂ 2♀ same data as holotype (BMNH); 2♂ 3 miles south-west of Salazar, 15.iii.1972 (BMNH); 1♂ 1♀ Salazar, 9–15.iii.1972 (BMNH). SOUTH AFRICA: *Limpopo*: 1♂ Mariepskop [24°31'S:30°52'E], 8.iv.1964 (NMSA); Ofcolaco [24°06'S:30°23'E], Selati R., 7–8.xii.1976, R.M. Müller (NMSA).

### ***Pachycerina micropunctata* sp. n.**

Figs 8, 27, 37, 48

**Etymology:** From Greek *mikros* (small or little) and Latin *punctum* (dot or spot), in reference to the tiny prefrontal (facial) spots, which are much smaller than those of other Afrotropical species (Fig. 8).

**Diagnosis:** Small prefrontal spots are distinctive (Fig. 8); prefrons is also less bulging than in other *Pachycerina* species. *P. micropunctata* is restricted to Madagascar and the Comoros.

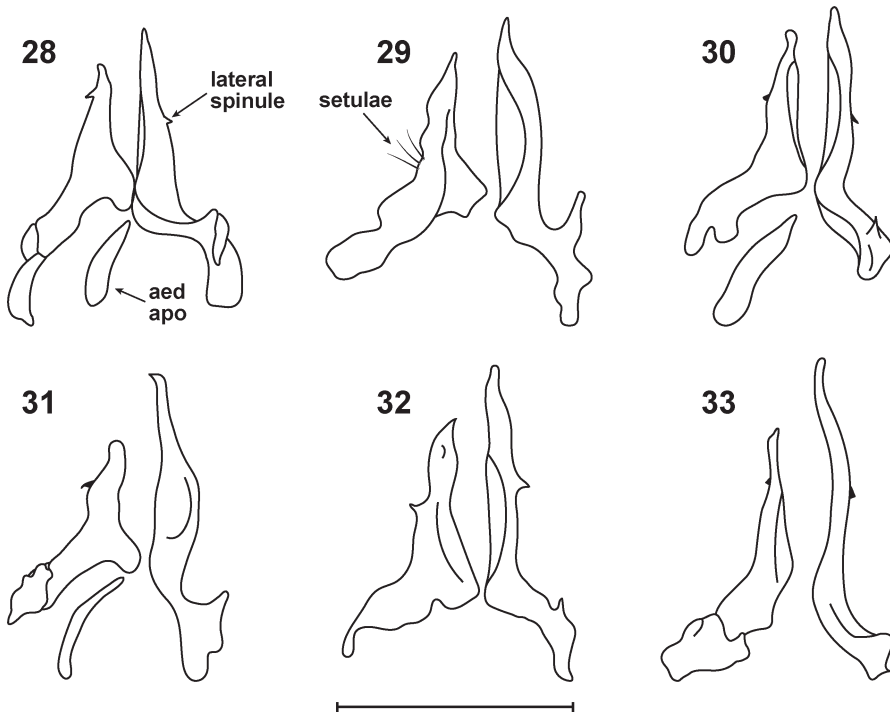
**Description:**

**Head:** Brown spots encircling fronto-orbital bristle alveoli faint. Ocellar spot black, anterior edge of ocellar spot abruptly truncate. Prefrontal spots small, dark brown. Prefrontal lower lateral corners infuscated. Prefrons in profile not as tumid as other *Pachycerina* species. All flagellomeres yellow, specimens from Comoros with distally infuscated postpedicel.

**Thorax:** Yellow, coloration darker on scutum but acrostichal, dorsocentral and presutural vittae not easily seen. Meso- and sternopleura yellow-orange with no upper and lower lateral thoracic vittae. Scutellum yellow. Legs all yellow to orange, protibia and protarsus orangish (not blackish as in other species). Wing hyaline. Haltere yellow-orange.

**Abdomen:** Yellow-orange, but frequently discoloured to black.

**Male terminalia (Figs 27, 37, 48):** S5 with acuminate posterior arms; medial spur present. T6 with paired black spots. Surstyli long (longer than epiandrium). Gonopods asymmetric. Left gonopod slightly shorter than right gonopod. Left gonopod with small lateral spinule. Aedeagal apodeme long, thin and curved.



Figs 28–33. Dorsal view of male inner genitalia: (28) *Pachycerina obscuripennis* Lamb; (29) *Pachycerina potentilla* sp. n.; (30) *Pachycerina stuckenbergi* sp. n.; (31) *Pachycerina atrimela* sp. n.; (32) *Pachycerina gabela* sp. n.; (33) *Pachycerina pellocera* sp. n. Abbreviation: aed apo – aedeagal apodeme. Scale bar = 0.5 mm.

**Measurements:** ♂ (n=1), ♀ (n=4): head length – ♂ 0.6, ♀ 0.6; thorax length (incl. scutellum) – ♂ 1.7, ♀ 1.6; abdomen length – ♂ 1.1, ♀ 1.7; wing length – ♂ 3.3, ♀ 3.2.

**Holotype:** ♂ MADAGASCAR: Navana-Antongil, Maroantsetra [15°26'S:49°45'E], 20–25.iii.1958, B.R. Stuckenberg (NMSA).

**Other material examined:** MADAGASCAR: 4♀ Navana-Antongil, Maroantsetra [15°26'S:49°45'E], 20–25.iii.1958, B.R. Stuckenberg (NMSA); 1♂ Vakoana, Andringitra, Ambalavao, 21–24.i.1958, B.R. Stuckenberg (NMSA); 1♀ Andasibe (= Périnet) [18°49'S:48°26'E], 1.x.1958, F. Keiser (MHNB); 6♂ 1♀ Ifanadiana [21°15'S:47°27'E], 23 & 24.viii.1958, F. Keiser (MHNB); 2♂ 1♀ Mananjary [21°17'S:47°56'E], 17 & 20.viii.1958, F. Keiser (MHNB); 1♂ 1♀ Ambodimanga [14°59'S:50°12'E], 8 & 19.viii.1958, F. Keiser (MHNB). COMOROS: 1♀ Anjouan, Lac de Dzilandzé, 15.i.1974, L. Matile (MNHN); 1♀ Anjouan, Col de Moya, 16.i.1974, L. Matile (MNHN); 1♂ Grande Comore, Kartala, Convalescence, 20–21.xi.1973, L. Matile (MNHN).

### ***Pachycerina nigrivittata* sp. n.**

Figs 1, 22, 34, 40

**Etymology:** From Latin *niger* (black) and *vitta* (stripe), in reference to the black longitudinal stripes along ventral edges of abdominal tergites.

**Diagnosis:** *P. nigrivittata* is sympatric with *P. vaga* in KwaZulu-Natal, South Africa. They are very similar in coloration and chaetation, but *P. nigrivittata* (of both sexes) may be distinguished easily from *P. vaga* by having black vittae along the ventral margins of the abdominal tergites (these areas are uniformly yellow-orange in *P. vaga*). A further clear difference is in the shape of the male S5. *P. nigrivittata* has straight posterior processes with a tiny medial spur (Fig. 40), whereas *P. vaga* has incurved posterior processes with a more prominent medial spur (Fig. 39).

**Description:**

**Head:** Ocellar spot large, black. Fronto-orbital plates not infuscated. Prefrontal spots large and black, touching edge of prefrons laterally. Scape and pedicel weakly infuscated orange-brown, postpedicel yellow.

**Thorax:** Scutal striping not distinct, but acrostichal, dorsocentral and presutural orange-brown vittae present. Scutellum yellow to orange. Postnotum orange-yellow. Upper lateral thoracic vitta present, but indistinct posterad of mesopleuron. Lower lateral thoracic vitta more pronounced in intensity. Meropleuron all yellow. Procoxa to profemur yellow, protibia to protarsus dark brown. Other legs yellow-orange. Wing anteriorly strongly fumose (costal cell, stigma, marginal cell and anterior part of submarginal cell infuscated). Haltere yellow, knob orange-brown.

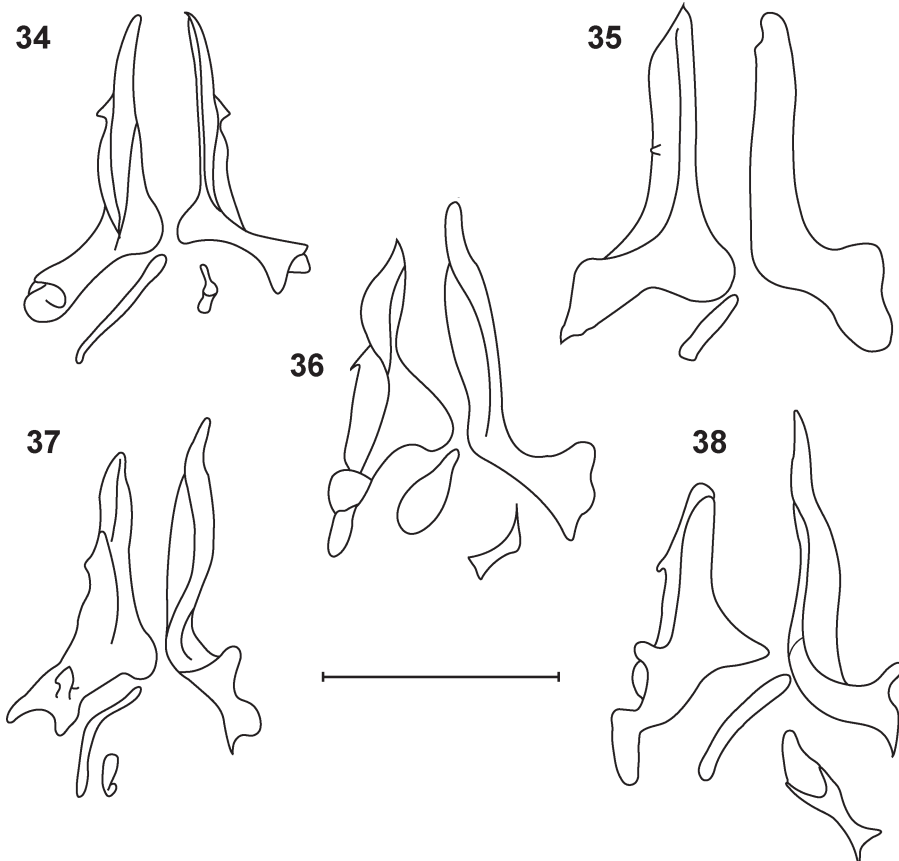
**Abdomen:** Yellow, longitudinal black or dark brown vitta along ventral margin of syntergite 1+2 through T6.

**Male terminalia** (Figs 22, 34, 40): S5 with straight posterior processes and small medial spur. Surstyli slightly longer than epandrium. Paired black spots on T6. Gonopods asymmetric, about equal in length and with distinct lateral spinules. Aedeagal apodeme long, thin and tapering anteriorly.

**Measurements:** ♂ (n=3), ♀ (n=2): head length – ♂ 0.8, ♀ 0.8; thorax length (incl. scutellum) – ♂ 2.2, ♀ 2.0; abdomen length – ♂ 1.6, ♀ 1.6; wing length – ♂ 4.4, ♀ 4.2.

**Holotype:** 1♂ SOUTH AFRICA: *KwaZulu-Natal*: Pietermaritzburg, Town Bush [29°34'S:30°21'E], vii.1976, Malaise trap, R.M. Miller (NMSA).

Other material examined: CAMEROON: 1 ♀ Mt Cameroon [04°13'S:09°10'E], Musake, 13.i.1932, M. Steele (BMNH). KENYA: 2 ♀ Kakamega Forest [0°15'N:34°52'E], 18.xii.1970, A.E. Stubbs (BMNH); 1 ♀ Maguga [01°11'S:36°39'E], viii.1969, C.F. Dewhurst, at light (BMNH); 2 ♀ same locality, x.1969, C.F. Dewhurst (BMNH). SOUTH AFRICA: *KwaZulu-Natal*: 1 ♂ Cathedral Peak [28°57'S:29°19'E], 14–16.i.1985, Malaise trap, R.M. Miller (NMSA); 1 ♀ same locality, 14–16.xii.1984, R.M. Miller (NMSA); 1 ♂ same locality, 1.i.1954, B.R. Stuckenberg (NMSA); 2 ♀ Cathedral Peak, Indumeni Forest, 5.xi.1965, B.R. Stuckenberg (NMSA); 1 ♂ Royal Natal Nat. Park [28°40'S:28°50'E], 11.ix.1963, montane forest, B.R. & P. Stuckenberg (NMSA); 1 ♂ Pietermaritzburg, University of KwaZulu-Natal golf course [29°38'S:30°24'E], 15.viii.1991, R.M. Miller (NMSA); 1 ♀ Pietermaritzburg, Ashburton [29°40'S:30°27'E], ix.2004, Malaise trap, R.M. Miller (NMSA); 3 ♀ Pietermaritzburg, Town Bush [29°34'S:30°21'E], ix.1976, Malaise trap, R.M. Miller (NMSA); 1 ♂ same locality, x.1976, Malaise trap, R.M. Miller (NMSA); 3 ♀ same locality, xi.1976, Malaise trap, R.M. Miller (NMSA); 2 ♀ same locality, xii.1976, Malaise trap, R.M. Miller (NMSA); 1 ♂ Albert Falls Dam, nr Crammond [30°24'S:30°25'E], 17.vii.2001, R.M. Miller (NMSA); 1 ♀ Howick [29°28'S:30°13'E], 23.xii.1990, A.E. Whittington [NMSA]; 1 ♀ Rietvlei [29°09'S:30°16'E], Karkloof forest, 31.v.1977, Malaise trap, I. Bampton (NMSA); 1 ♀ Karkloof Mts, nr Mt Alida [29°12'S:30°20'E], 24.xii.1961, B. & P. Stuckenberg (NMSA); 1 ♂ Lion's Bush [29°24'S:29°55'E], Nottingham [Road], 9.viii.1954, B. Stuckenberg (NMSA); 1 ♂ Richmond [29°52'S:30°17'E], 19.vii.2001, citrus orchard, R.M. Miller (NMSA); 3 ♀ Richmond, Enon Farm [29°49'S:30°13'E], i.1964, B. & P. Stuckenberg (NMSA); 1 ♂ Deepdale [30°33'S:29°54'E], Umkomaas River Valley, v.1959, B.R. Stuckenberg (NMSA); 1 ♀ Umtentweni [30°43'S:30°28'E], vii.1951, A.L. Capener (NMSA).



Figs 34–38. Dorsal view of male inner genitalia: (34) *Pachycerina nigrivittata* sp. n.; (35) *Pachycerina vaga* Adams; (36) *Pachycerina crinicornis* (Thomson); (37) *Pachycerina micropunctata* sp. n.; (38) *Pachycerina seychellensis* Lamb. Scale bar = 0.5 mm.



*Pachycerina obscuripennis* Lamb, 1912

Figs 20, 28

*Pachycerina obscuripennis*: Lamb 1912: 308. Type locality: Mare-aux-Cochons forest, Silhouette Island, Seychelles.

The type is a male mounted on cork and is in reasonable condition (e.g., all antennae and legs intact). Lamb's description is good and relevant features of this species are: (1) prefrontal spots large and black, (2) postpedicel mainly yellow except for dark brown base, (3) scape and pedicel dark brown, (4) ocellar spot rather small, (5) fronto-orbital plates weakly infuscated, (6) scutal vittae replaced by two broad, dark brown longitudinal bands separated by a thin, medial, longitudinal yellow vitta (this colour pattern not the result of postmortem discoloration), (7) scutellum all dark brown except for yellow edges, (8) mesopleuron orange with dark brown upper lateral vitta, (9) sternopleuron completely infuscated dark brown, (10) profemur yellow-orange with blackish mark apically, (11) protibia and protarsus black (apex of protibia with ring of yellow), (12) wing strongly infuscated especially stigma and costal, marginal and submarginal cells, (13) abdomen all black with no T6 spots. The species is still only known from the holotype. We have dissected out the terminalia which Lamb (1912) did not describe. Male terminalia (Figs 20, 28): S5 lost in dissection. No T6 spots. Surstyli about as long as the epandrium. Gonopods asymmetric, gonopods about equal in length, left gonopod damaged in dissection and artificially truncated. Both gonopods with lateral spinules. Aedeagal apodeme short and anteriorly rounded, tapering posteriorly.

Holotype (examined): ♂ SEYCHELLES: Silhouette I., forest above Mare-aux-Cochons 1908, J.S. Gardiner (BMNH).

***Pachycerina pellocera* sp. n.**

Figs 18, 33, 43

**Etymology:** From the Greek *pellos* (dusky or dark-coloured) and *keras* (horn), in reference to the infuscated postpedicel.

**Diagnosis:** The darkened postpedicel and absence of T6 spots despite the yellow-brown abdomen are distinctive. Front legs are not as dark as in other Malagasy *Pachycerina* species. The male S5 is also distinctive with a long medial spur. Arisetal setulae are less dense than in other Afrotropical species.

**Description:**

**Head:** Fronto-orbital plates not darkened. Ocellar spot large and black. Prefrontal spots large and black, touching sides of prefrons. Scape, pedicel and especially postpedicel deeply infuscated. Arisetal plumosity rather sparse.

**Thorax:** Scutum striping patterning diffuse, notum largely brown-orange, except for yellow anterior of scutum and also postalar bristles and transverse suture. Scutellum yellow-orange. Upper lateral vitta present. Entire sternopleuron infuscated dark brown by expanded lower lateral vitta; meropleuron largely dark brown. Profemur orange-yellow, slightly darker protibia (with yellow rings proximally and distally). Protarsus orange-brown, somewhat darker distally. Other legs yellow-orange. Wing faintly infuscated, especially stigma and costal and marginal cells. Haltere yellow-orange.

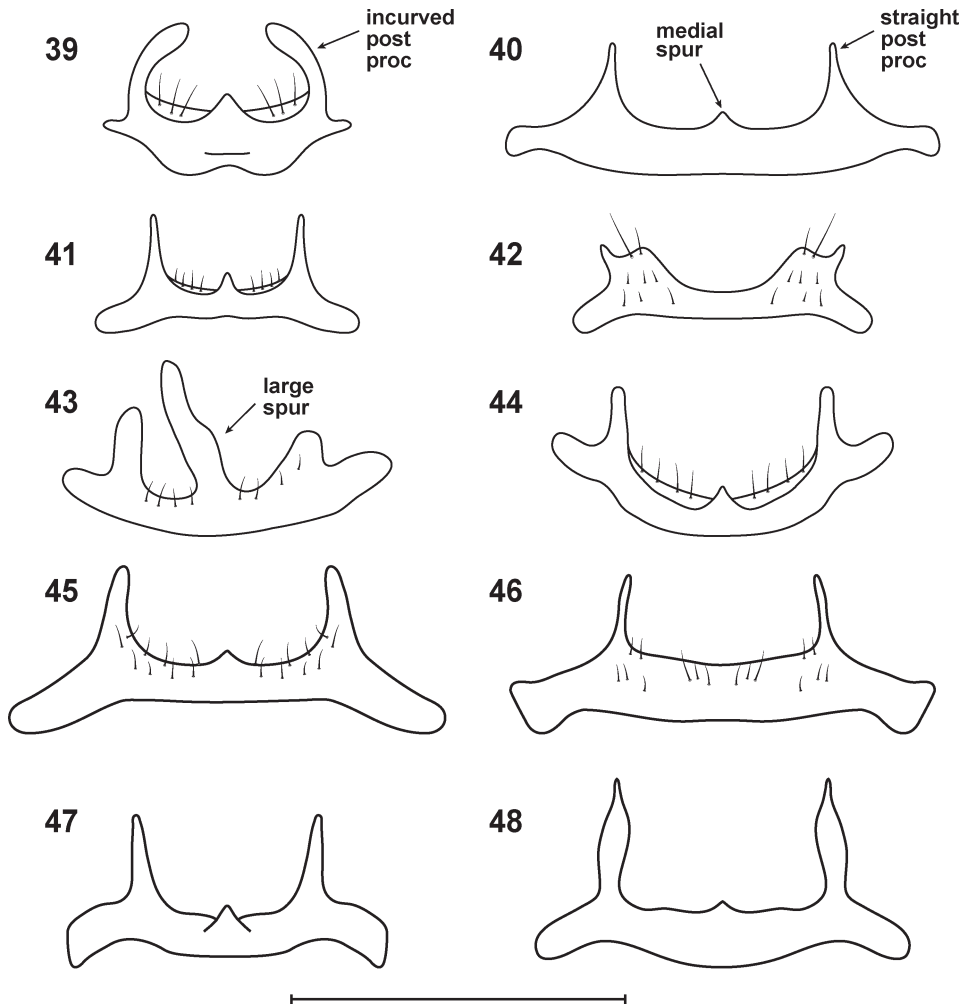
**Abdomen:** Yellow (may be discoloured to blackish in some specimens).

Male terminalia (Figs 18, 33, 43): S5 with short posterior processes and large, extended medial spur exceeding posterior processes in length. T6 spots absent. Surstyli about as long as epandrium. Gonopods asymmetric, right gonopod longer than left gonopod. Right gonopod narrow and sinuous. Both gonopods with small lateral spinules.

*Measurements*: ♂ (n=1), ♀ (n=3): head length – ♂ 0.7, ♀ 0.7; thorax length (incl. scutellum) – ♂ 1.8, ♀ 1.8; abdomen length – ♂ 1.8, ♀ 1.8; wing length – ♂ 3.9, ♀ 4.1.

Holotype: ♂ MADAGASCAR: Anjavidilava [22°09'S:46°57'E], Andringitra Massif, 17–21.i.1958, B.R. Stuckenberg (NMSA).

Other material examined: MADAGASCAR: 1♂ 5♀ same data as holotype (NMSA).



Figs 39–48. Sternite 5 of male *Pachycerina* species: (39) *P. vaga* Adams; (40) *P. nigrivittata* sp. n.; (41) *P. gabela* sp. n.; (42) *P. atrimela* sp. n.; (43) *P. pellocera* sp. n.; (44) *P. stuckenbergi* sp. n.; (45) *P. crinicornis* (Thomson); (46) *P. potentilla* sp. n.; (47) *P. seychellensis* Lamb; (48) *P. micropunctata* sp. n. Abbreviation: post proc – posterior process. Scale bar = 0.5 mm.

***Pachycerina potentilla* sp. n.**

Figs 17, 29, 46

**Etymology:** From the Latin *potens* (powerful or strong), in reference to the intense black pigmentation of the body markings (vittae), which makes this a visually striking taxon, even when viewed with the naked eye.

**Diagnosis:** The pronounced intensity of the black body markings is distinctive contrasting starkly with the yellow body colour. The elongated black ocellar spot, infuscation of the outer (lateral) half of scape and pedicel, largely black abdomen and lack of medial spur on S5 are also notable. *P. potentilla* is endemic to the island of São Tomé, Gulf of Guinea, West Africa and is the only *Pachycerina* recorded from this island.

**Description:**

**Head:** Fronto-orbital plates dark brown to black, contrasting with yellow of postfrons. Ocellar spot black, noticeably elongated extending halfway down postfrons. Prefrontal spots large, black and touching prefrons laterally. Lateral side of pedicel and scape orange-brown (infuscated), inner side yellow. Postpedicel yellow.

**Thorax:** Patterning intensely coloured. Scutum with prominent, black acrostichal, dorso-central and presutural vittae. Posteriorly, acrostichal and dorsocentral vittae coalesce. Upper lateral vitta running longitudinally from lower half of humeral callus posteriorly to postnotum. Lower lateral vitta running along dorsal margin of sternopleuron. Procoxa lightly infuscated, profemur lightly infuscated (but inner face yellow), protibia and protarsus heavily infuscated (black). Remaining legs all yellow, no infuscation, including tarsus (except darkened meso- and metapretarsus). Wing with anterior third of wing infuscated. Haltere pale yellow, distal knob weakly infuscated.

**Abdomen:** Brownish black, T6 predominantly yellow with large, paired black spots. Sternites yellow.

**Male terminalia (Figs 17, 29, 46):** S5 with straight posterior processes and lacking a medial spur. Surstyli about equal in length to epandrium. Gonopods asymmetric, right gonopod with small lateral spinule (not shown in illustration). Left gonopod with small tuft of setulae laterally.

**Measurements:** ♂ (n=2), ♀ (n=2): head length – ♂ 0.7, ♀ 0.7; thorax length (incl. scutellum) – ♂ 2.0, ♀ 1.9; abdomen – ♂ not measured, ♀ 1.6; wing length – ♂ 3.7, ♀ 3.8.

**Holotype:** ♂ SÃO TOMÉ: Bom Sucesso [0°17'N:6°38'E], 7–8.vi.1999, A. Polaszek (NMWC).

**Other material examined:** SÃO TOMÉ: 3 ♀ same data as holotype (NMWC); 2 ♂ 1 ♀ São Tomé [0°20'S: 06°40'E], 6.xi.1932, W.H. Tams (BMNH).

**Comment:** Simmonds (1969: 26) recorded *P. seychellensis* from Principé Island, Gulf of Guinea. The whereabouts of this material is not known to us, but on distributional grounds this identification is highly questionable, and it is likely that Simmonds had collected specimens of *P. potentilla* or a new, undescribed species. Simmonds' putative record is the source of the entry 'Principe' in the Afrotropical Catalogue (Miller 1980).

***Pachycerina seychellensis* Lamb, 1912**

Figs 21, 38, 47

*Pachycerina seychellensis*: Lamb 1912: 307. Type locality: Seychelles (Silhouette & Mahé).

Lamb's description is good, and allows confident recognition of *P. seychellensis*. The pin bearing the 'type' label has two specimens mounted on cork, a male and a female. General coloration and chaetation of *P. seychellensis* is as per the genus (i.e. Afrotropical species). Several specimens from Silhouette Island and one specimen from Mahé Island show an interesting feature in having milky white stigmata; the stigma is usually transparent. In his description, Lamb (1912) did not describe a whitened stigma from *P. seychellensis*. Other notable features are: (a) blackish protibia with apical collar of yellow, (b) profemur posteriorly yellow, but with brown area apically, (c) poorly defined fronto-orbital plates (faintly coloured), and (d) brownish smudge in lower lateral corner of prefrons (face).

Male terminalia (Figs 21, 38, 47): Surstyli slightly longer than epandrium. T6 spots present. Gonopods asymmetric, right gonopod longer than left gonopod. Both gonopods with lateral spinules (not illustrated on right gonopod). Aedeagal apodeme short and rotund. S5 with straight posterior processes and medial spur.

Simmonds (1969: 26) listed the species without comment from Principé Island in the Gulf of Guinea, West Africa. The identification as *P. seychellensis* is highly questionable.

Syntypes (examined): ♂ ♀ SEYCHELLES: Silhouette, 1908, J.S.Gardiner (BMNH).

Other material examined: SEYCHELLES: 7♂ 10♀ Mahé, La Misere, 18–19.viii.1976, light trap, I.H. & J.B. Haines (NMSA); 1♂ Mahé, Morne Séychellois [04°38'S:55°26'E], 13–17.vii.1972, P.L.G. Benoit & J.J. van Mol (MRAC); 3♀ Silhouette, Mare Cochons, 2–8.vii.1972, P.L.G. Benoit & J.J. van Mol (MRAC); 1♀ Mahé, Beau Vallon [04°36'S:55°25'E], 20–24.iv.1965, Tams & Nye (BMNH).

### ***Pachycerina stuckenbergi* sp. n.**

Figs 23, 30, 44

**Etymology:** Patronym for the late Brian R. Stuckenberg, former Director of the Natal Museum, and pre-eminent dipterist, whose rich collections of Malagasy Diptera greatly enriched the Natal Museum Diptera collection.

**Diagnosis:** *P. stuckenbergi* is the only species in Madagascar to have a yellow abdomen with blackish edging to the ventral margins of the tergites. In this feature, *P. stuckenbergi* recalls *P. nigrivittata* of the African mainland, but the two can be distinguished on the basis of the male terminalia. A Malagasy endemic, only known from the eastern escarpment.

**Description:**

**Head:** Fronto-orbital plates weakly delineated (coloured). Ocellar spot large, not elongated, weakly truncated anteriorly, rounded and weakly tapered posteriorly. Prefrontal spots large, blackish, touching sides of prefrons. Scape and pedicel yellow-orange, postpedicel yellow but proximally brown (around arista base).

**Thorax:** Striping pattern indistinct on scutum, but appears to have standard subdorsal and sublateral longitudinal orange-brown vittae. Scutellum yellow-orange. Mesopleuron with upper lateral thoracic vitta (not strong). Sternopleuron with lower thoracic vitta in upper third of sclerite. Profemur orange-yellow, dark anterior surface. Protibia black, distally yellow and proximally yellow. Protarsus blackish. Other legs yellow-orange. Wing with costal cell, stigma and marginal cell lightly fumose. Haltere orange to brown.

**Abdomen:** Yellow, syntergite 1+2 through T5 with thick black edge to ventrolateral margins of tergites. T6 without black edging.

Male terminalia (Figs 23, 30, 44): S5 with straight posterior arms and medial spur. T6 with black spots. Surstyli longer than epandrium. Gonopods asymmetric, right gonopod slightly longer, small lateral spinules. Right gonopod with strongly narrowed distal apex with hooked tip (not evident in illustration). Aedeagal apodeme with rounded anterior margin.

*Measurements*: ♂ (n=2), ♀ (n=2): head length – ♂ 0.8, ♀ 0.8; thorax length (incl. scutellum) – ♂ 1.9, ♀ 1.9; abdomen length – ♂ 1.6, ♀ 1.6; wing length – ♂ 3.9, ♀ 3.9.

Holotype: ♂ MADAGASCAR: Ranomafana [21°15'S:47°27'E], 2.viii.1958, F. Keiser (MHNB).

Other material examined (all MHNB): MADAGASCAR: 3♀ same data as holotype; 1♂ 3♀ same locality, 27.vii.1958, F. Keiser; 2♂ 4♀ same locality, 1–4.x.1958, F. Keiser.

### *Pachycerina vaga* Adams, 1905

Figs 8, 24, 35, 39

*Pachycerina vaga*: Adams 1905: 172. Type locality: near Harare, Zimbabwe.

Adams's (1905) description is good and agrees well with our re-examination of the type material. The type material consists of two female specimens, one mounted on a triangular card-point, the other specimen is on the cusp of a cork strip. Both are marked as 'co-types' and are unfortunately in rather poor condition (flagellomeres missing from both specimens, some legs missing, ocellar triangle sunken, bits of wing broken off or torn, etc.).

Because the postpedicels are missing from all antennae of both specimens we cannot evaluate Adams's remarks comparing the postpedicel with that of *P. seticornis*. Adams said that those of *P. vaga* were not so broad basally and less pointed distally than *P. seticornis*. Adams (1905: 172–173) also referred to an inverted 'T' of brown on the postfrons: 'a median brown line from ocelli to antennae, where it becomes transverse'. This potentially useful marking is, however, a colour artifact resulting from discoloration of the cuticle. As with other *Pachycerina* species, specimens are subject to postmortem discoloration.

In southern Africa, *P. vaga* is sympatric with *P. nigrivittata*. Superficially the two species appear similar, but *P. vaga* lacks the black edging to the ventral margins of the tergites. The male terminalia are also different, and especially the shape of the male S5 differs strongly (compare Figs 39 and 40). No other Afrotropical species has a similar fifth sternum, the incurved posterior processes being especially noteworthy.

Male terminalia (Figs 24, 35, 39): Surstyli short and ending in spatulate apex. T6 with paired black spots (length of surstyli about equal to length of epandrium). Gonopods about equal in length, left gonopod with lateral spinule. Aedeagal apodeme small and rod-shaped. S5 with short lateral arms and prominently incurved posterior processes.

Syntypes (examined): 2♀: ZIMBABWE: near Harare (= Salisbury), iv.1901, F.L. Snow (KU).

Other material examined: ANGOLA: 1♂ 1♀ 7 miles west of Gabela [10°48'S:14°25'E], 16–18.iii.1972 (BMNH). ETHIOPIA: 1♀ Djem-Djem Forest [64 km W of Addis Ababa, 8°56'N:38°09'E], 5–10.x.1925, H. Scott (BMNH). KENYA: 1♂ Nairobi [01°13'S:36°46'E], 2.vii.1995, R.M. Miller (NMSA); 1♂ 5♀ Kakamega Forest [0°15'N:34°52'E], 18.xii.1970, A.E. Stubbs (BMNH); 1♀ same locality, 20.xii.1970, A.E. Stubbs (BMNH); 1♀ same locality, 18–22.i.1972, C.F. Huggins (BMNH); 2♀ Maguga [01°11'S:36°39'E], iv.1969, C. Dewhurst (BMNH); 1♀ Karura [01°13'S:36°46'E], vi.1937, G. Van Someren, caught on lantana bush (BMNH). LIBERIA: 1♂ Mt Nimba [07°36'N:08°23'W], 15.viii.1966, E.S. Ross & K. Lorenzen (CASC). MALAWI: 1♂ Mulanje Mt [15°58'S:35°38'E], Likabula River Valley, 28–30.xii.1980, *Brachystegia* woodland, B.R. Stuckenberg & J. Londt (NMSA). SOUTH AFRICA: *Eastern Cape*: 2♂ 3♀ East London [33°02'S:27°50'E], 1–9.v.1923, H.K.

Munro (NMSA); 1 ♀ Port St Johns [31°38'S:29°33'E], 15–31.v. 1923, R.E. Turner (BMNH); 1 ♀ same locality, 23.viii.1984, J. Manning (NMSA); 1 ♀ The Haven [32°14'S:28°54'E], 24–28.vi.1979, R.M. Miller & P. Stabbins (NMSA). *KwaZulu-Natal*: 1 ♂ 1 ♀ Vernon Crookes Nat. Res. [30°17'S:30°36'E], Mthakati Valley, 1.vii.2007, G.B.P. Davies (NMSA); 1 ♂ Pietermaritzburg [29°36'S:30°23'E], 21.xii.1954, B. Stuckenberg (NMSA); 1 ♀ Pietermaritzburg, Prestbury [29°37'S:30°21'E], 2.ii.1986, A.E. Whittington (NMSA); 3 ♂ 1 ♀ Pietermaritzburg, Ashburton [29°40'S:30°27'E], viii.1980, Malaise trap, R.M. Miller (NMSA); 3 ♀ same locality, ix.1980, ix.2004, x.2004, Malaise trap, R.M. Miller (NMSA); 1 ♂ same locality, xi.2004, Malaise trap, R.M. Miller (NMSA); 1 ♂ 7 ♀ same locality, 16.i–10.iv.2005, Malaise trap, R.M. Miller (NMSA); 2 ♂ same locality, 1–15.vii.2008, 27–31.viii.2008, Malaise trap, R.M. Miller (NMSA); 1 ♀ same locality, 16–30.xi.2008, Malaise trap, R.M. Miller (NMSA); 2 ♀ same locality, 16–22.xii.2008, Malaise trap, R.M. Miller (NMSA); 1 ♂ same locality, v.2009, Malaise trap, R.M. Miller (NMSA); 1 ♂ Pietermaritzburg, University of KwaZulu-Natal Botanical Garden [29°37'30"S:30°24'15"E], ix. 2000, Malaise trap, R.M. Miller (NMSA); 1 ♂ same locality, xi.2000, Malaise trap, R.M. Miller (NMSA); 1 ♂ 2 ♀ same locality, ii.2001, Malaise trap, R.M. Miller (NMSA); 2 ♂ Pietermaritzburg, Town Bush [29°34'S:30°21'E], 12.xii.1961, 27.xii.1961, B. & P. Stuckenberg (NMSA); 1 ♂ same locality, x.1976, R.M. Miller (NMSA); 1 ♀ same locality, 31.viii.1980, R.M. Miller & P. Stabbins (NMSA); 1 ♂ same locality, 10.i.1981, T. Martin (NMSA); 1 ♀ Pietermaritzburg, Ukulinga Research Farm [29°40'S:30°24'E], 5.iii.2009, G.B.P. Davies (NMSA); 1 ♀ Pietermaritzburg, Bisley Valley [29°39'S:30°24'E], 11.xii.1978, puparium [from ground-nesting bird], R. Earlé, adult emerged 2.i.1979 (NMSA); 1 ♂ same locality, 11.xii.1978, puparium [from ground nesting bird], R. Earlé, adult emerged 4.ii.1979 (NMSA); 1 ♀ Drummond [29°45'S:30°42'E], 5.ii.1977, puparium, R.M. Miller, adult emerged 15.ii.1977 (NMSA); 2 ♂ Richmond [29°52'S:30°16'E] 19.vii.2001, citrus orchard, R.M. Miller (NMSA); 1 ♀ Cumberland Nat. Res. [29°30'S:36°30'E], picnic area, 22.xii.2007, R.M. Miller (NMSA); 1 ♂ Karkloof [29°18'S:30°13'E], ii.1897, G.A.K. Marshall (BMNH); 2 ♂ Durban [29°51'S:31°00'E], vii.1948, J.C. Faure (PPRI); 1 ♂ same locality, 1902, F. Muir (BMNH); 1 ♂ Durban, Kloof [29°47'S:30°48'E], ix.1926, R.E. Turner (BMNH); 1 ♂ Durban, Pinetown, Gillitts [29°49'S:30°47'E], 1.x.1961, B. Stuckenberg (NMSA); 1 ♂ Durban, Hillcrest [29°47'S:30°47'E], 10.x.1956, L. Bevis (NMSA); 1 ♂ Shongweni Dam [29°51'S:30°43'E], 13.ix.1974, B. Stuckenberg & M.E. Irwin (NMSA); 1 ♂ 3 ♂ Umtentweni [30°43'S:30°28'E], vii.1951, A.L. Capener (NMSA); 1 ♀ same locality, vii.1950, A.L. Capener (NMSA); 1 ♀ same locality, vii.1955, A.L. Capener (NMSA); 2 ♂ Eshowe, Dhlinda Forest [28°53'40"S:31°26'50"E], 20–23.xi.1978, J.G.H. Londt (NMSA); 4 ♂ same locality, 21.i.1980, indigenous forest, R.M. Miller & P. Stabbins (NMSA); 1 ♂ Dukuduku forest [28°20'S:32°15'E], 2.xii.1978, D.J. Brothers (NMSA). TANZANIA: 1 ♂ Marungu [06°10'S:36°21'E], xi.1949, J. Phipps (BMNH); 1 ♂ 1 ♀ Lueke-Tol, nr Songea [10°41'S:35°39'E], Matengo Highlands, 9–19.iv.1936, Zerny (NMSA); 1 ♀ Ugano, nr Songea [10°41'S:35°39'E], Matengo Highlands, 1–10.xii.1935, Zerny (NMSA). UGANDA: 1 ♂ Fort Portal [0°41'N:30°15'E], Nyakabuiro, 24.i.1935, F.W. Edwards (BMNH); 1 ♂ 2 ♀ Namanve, 7.x.1934, J. Ford (BMNH). ZAMBIA: 1 ♀ Ndola [12°58'S:28°38'E], 17.xii.1979, T. Grout (NMSA). ZIMBABWE: 2 ♀ Mutare [18°58'S:32°38'E], Nyachowa Falls, 16.i.1955, B.R. Stuckenberg (NMSA); 1 ♀ North Vumba [Mts], 3.ix.1964, D. Cookson (NMSA); 2 ♀ North Vumba [Mts], 16.viii.1964, D. Cookson (NMSA); Chirinda Forest [20°25'S:32°42'E], Mt Selinda, 22.ix.1973, E. Pinhey & F. de Moor (NHMZ).

Literature records: Msingi, Tanzania (Lindner 1956: 33), Mendefera (= Adi Ugri), Eritrea (Bezzi 1907: 128).

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