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A revised generic classification of the wormlion flies of Southern Africa previously placed in *Lampromyia* Macquart, with reinstatement of *Leptynoma* Westwood 1876, and descriptions of a new subgenus and two new species (Diptera, Vermileonidae)

by

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ABSTRACT

The generic classification of Southern African Vermileonidae is revised in the light of a new cladistic analysis of the lineages present. Most of the species formerly included in *Lampromyia* Macquart 1835, are transferred to a new genus for which the name *Leptynoma* Westwood 1876, is retrieved from synonymy. *Leptynoma* is divided into the subgenera *Leptynoma s. str.* with four species, and *Perianthomyia* subgen. n. with two species. As a result, *Lampromyia* becomes a genus primarily of the south-western Palaearctic Region, with a clade of three species in eastern Southern Africa. The new species *Leptynoma (Perianthomyia) phantasma* sp. n. (Namibia) and *Lampromyia rebecca* sp. n. (Zimbabwe) are described. Keys are provided to genera, subgenera and species, and new records are given for previously known species.

INTRODUCTION

This study is the third in a series directed at revising the taxonomy of the Vermileonidae of Southern Africa. Previous studies dealt with *Vermilynx* Stuckenberg 1995 (1995*a*), and *Vermipardus* Stuckenberg 1960 (1995*b*). In this contribution, the species formerly classified in *Lampromyia* Macquart 1835, are examined. Among them are some of the most distinctive and interesting palaeoendemic flies of the Cape Floral Kingdom and Namaqualand, which are as characteristic of these regions as the fynbos and succulent karoo floras they inhabit.

Earlier taxonomic work (Bezzi 1926, Stuckenberg 1960) on this fauna followed a traditional classification in which wormlions were ranked as a subfamily Vermileoninae of the Rhagionidae. After many years of uncertainty over their true relationships, the vermileonines were given family status by Nagatomi (1977), but their affinities are still obscure (Griffiths 1994, Stuckenberg 1995*a*). Currently, the Vermileonidae are segregated, with the fossil families Eremochaetidae and Protobrachycerontidae (Kovalev 1987), in the infraorder Vermileonomorpha (Griffiths 1994).

Progress in improving understanding of the relationships of the various lineages of vermileonids in Southern Africa has depended to a considerable extent on the acquisition of new material and the discovery of important new species. Fresh insights have been derived from examination of a few critical specimens, especially males. These flies continue to be rare in collections, and some particularly interesting species are recent discoveries.

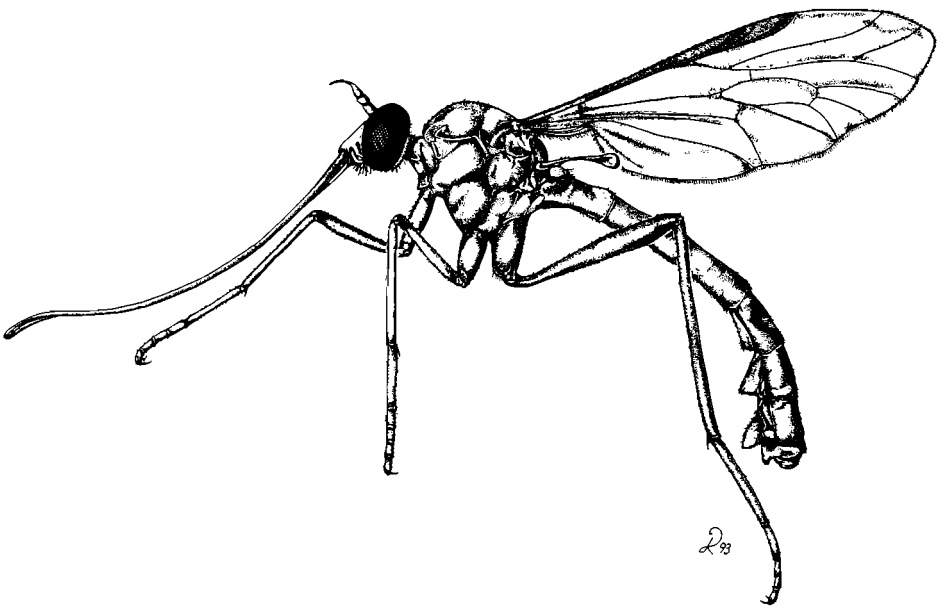


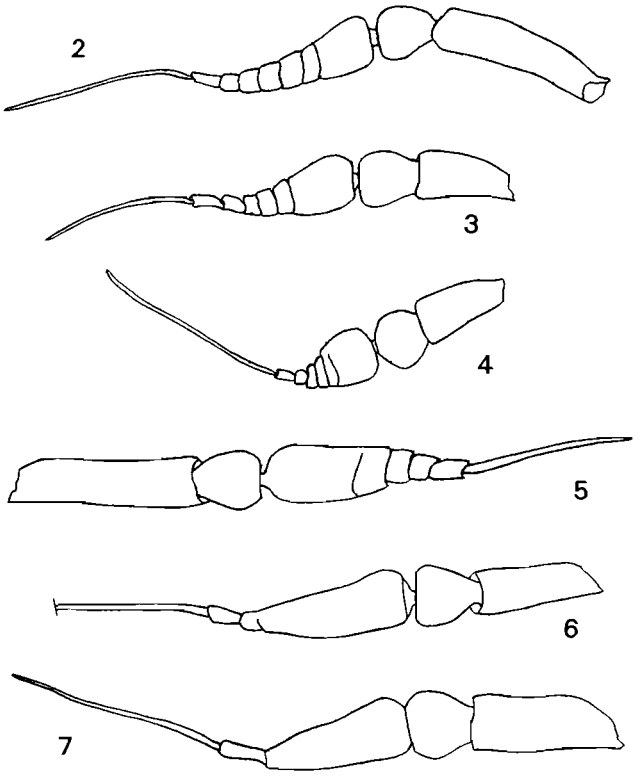
Fig. 1. *Lampromyia flavida* Engel & Cuthbertson, lateral habitus of a female from the type series. [Protrusion of sternites near the end of the abdomen is a consequence of postmortem shrinkage.]

In the present study, a new understanding of affinities among lineages in Southern Africa has been reached through a cladistic analysis. It emerged that a considerable level of diversity and endemism exists at the genus-group level; this resulted in a revised generic and subgeneric classification for many of the species. *Lampromyia* is now seen to be a genus having its main centre of diversity in the south-western Palaearctic Region, and a clade with three species in eastern Southern Africa.

MATERIAL AND METHODS

The specimens are pinned flies in the following collections: Natal Museum, Pietermaritzburg (NMSA); the South African Museum, Cape Town (SAMC); the South African National Collection of Insects, Pretoria (SANC). Hypopygia were macerated in hot KOH and dissected in water prior to mounting in glycerine jelly for drawing. Drawings were made with a WILD drawing tube; wings were mounted in balsam and photographed with a WILD photomicroscope. Label data are cited as originally given; a slash (/) indicates the end of a line of print, and two (//) indicate data either on a second label or on the reverse side of a label; supplementary information is given in square brackets. Body length measurement excludes the antennae, and is approximate as there is usually inconsistent postmortem curvature of the abdomen. Wing length was measured from the wingtip to the basal end of the basicosta. To express the degree of elongation of the proboscis, a ratio was calculated by dividing the length of the proboscis by the length of the mesonotum; the proboscis was measured from its extreme base to the apex of the labella (a small degree of undermeasurement is unavoidable when the proboscis is curved); mesonotal length is

best measured in lateral view, and extends from the anterior face overhanging the pronotum to the suture bounding the anterior edge of the scutellum. Details of antennal structure were ascertained from slide-mounted specimens; antennae were removed by gentle pressure with a microneedle on the scape, placed directly into absolute alcohol for at least one hour to displace internal air, transferred to xylene, and then mounted in a thin layer of balsam.



Figs 2–7. Antennae in lateral view. 2. *Leptynoma (Perianthomyia) maculata* (Stuckenberg) ♂. 3. *Leptynoma (L.) namaquaensis* (Stuckenberg) ♂. 4. *Leptynoma (L.) appendiculata* (Bezzi) ♂. 5. *Lampromyia pilosula* Engel ♀. 6. *Lampromyia rebecca* sp. n. ♂ paratype. 7. *Lampromyia flavida* Engel & Cuthbertson ♀.

The terminology used for male genitalic structures follows that used for *Vermipardus* (Stuckenberg 1995*b*). The following terms require explanation: *synsternite* (sn) – the compound structure formed by fusion of the gonocoxites with one another and (presumably) with the hypandrium; *dorsal bridge* (db) – a transverse sclerotisation spanning the dorsobasal edges of the gonocoxites, to which the aedeagus is attached; *ventral aperture* (va) – a ventromedian opening in the apical part of the synsternite, separating the ends of the gonocoxites where the gonostyles are attached; *apical guides* (ag) – paired ventromedial extensions at the posterior end of the synsternite, one on each side of the distal end of the ventral aperture.

ANTENNAL STRUCTURE AND DESCRIPTIVE NOMENCLATURE

The nomenclature of antennal parts requires consideration in order to systematise descriptions of antennal modifications. In earlier publications (Stuckenberg 1995*a*, 1995*b*) the term *flagellum* was used inconsistently; it was applied either to the third segment alone, or to the compound unit comprising the third segment plus the succeeding segments. The term *style* was used collectively for all segments distal to the third segment. In the taxa under consideration, the following antennal features occur:

- The primitive brachycerous number of 10 segments (scape, pedicel, and eight flagellar segments) is still preserved in one clade (described below as *Perianthomyia*) (Fig. 2).
- An apical *stylus* is always present, comprising both the terminal segment (morphologically no. 10) which is elongate and slender, and the penultimate segment (no. 9) which is small and narrow; these segments have evidently been modified jointly to form a tactile sensory organ, and have lost the trichoid sensilla (Figs 2–7).
- The remaining five segments (4–8) between the penultimate and the third segments, undergo various degrees of reduction, shortening, compaction and fusion, at the species-group or the species level; thus, in *Leptynoma s. str.* segment 4 has fused with 3, and segment 5 is partially fused (Figs 3, 4). In the *pilosula* group, more segments have become fused, to the extent that in *Lampromyia flavida* Engel & Cuthbertson (Fig. 7), only the two apical segments (nos 9 and 10) remain distal to an enlarged segment which is numerically no. 3, but presumably is a composite product of fusion of nos 3–8.
- Fusion of segments may be incomplete; an intersegmental suture may be present on the outer surface of the antenna but does not continue onto the inner surface; this can be determined with certainty only in slide-mounted material.

To ensure unambiguous descriptions, the following numbering system is used:

1. The slender terminal segment 10 and the penultimate segment 9 are never lost, and are numbered as such; collectively, they are referred to as the *stylus*, and individually as the apical and basal stylus segments respectively.
2. Segments 3–8 are identified by these numbers; the assumption is made (the sequence of conditions seen in Figs 2–7 justifies it) that when fewer segments than the primitive number exist, fusion has affected nos 4–8 progressively distad. The segments are most easily counted backwards, the apical stylus segment always being no. 10. Segment 3 is nearly always fused with one or more of the succeeding segments; to maintain morphological correctness, the antenna's compound nature is indicated by the range of fused segments; for example, in *flavida* (Fig. 7) segments 1, 2, 3–8, 9 and 10 are present.
3. If a segment is partially fused, it is counted as present; for example, in *L. sericea* Westwood and *L. appendiculata* (Bezzi) (Fig. 4), segments 1, 2, 3–4, 5, 6, 7, 8, 9, and 10 are present, although the suture between 3–4 and 5 exists only on the outer surface of the antenna.

GENERIC CLASSIFICATION OF THE SOUTHERN AFRICAN VERMILEONIDAE

Developments in the classification of the vermileonids of Southern Africa were summarised by Stuckenberg (1995*a*, 1995*b*). In the first monograph on this fauna, Bezzi (1926) assigned all the species to *Lampromyia* Macquart 1835. Subsequently, a subgenus *Vermipardus* Stuckenberg 1960, was described for a distinctive set of species having a more primitive form of rostrum, antenna and hypopygium. More recently, it was found that a species described originally as *Lampromyia (Vermipardus) vansoni* Stuckenberg 1965, represents a separate clade, for which the genus *Vermilynx* Stuckenberg 1995*a*, was erected. As *Vermilynx* proved to be more closely related to *Lampromyia s. str.* than to *Vermipardus*, revised status for *Vermipardus* was required, and this taxon was ranked as a full genus by Stuckenberg (1995*b*). These three genera were considered to be related in the following way: *Vermipardus* + *(Vermilynx* + *Lampromyia).*

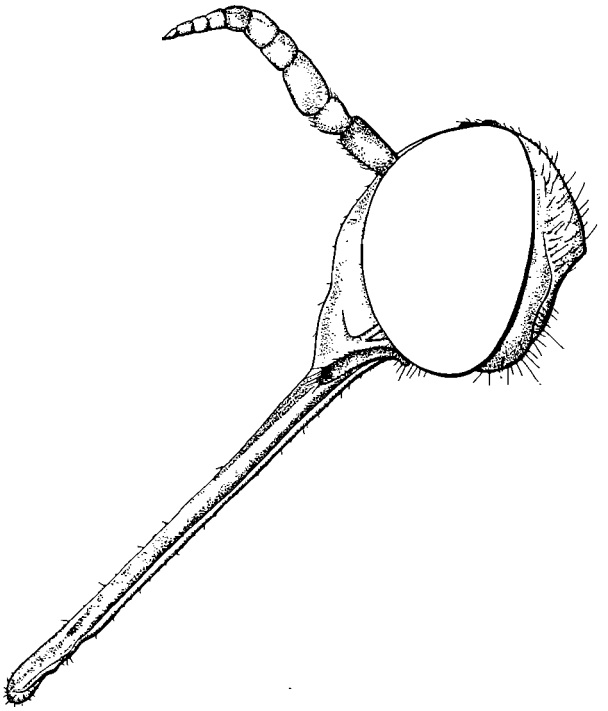


Fig. 8. *Vermipardus sylphe* Stuckenberg. ♀ Head in lateral view.

The Southern African species of *Lampromyia* (exclusive of *Vermipardus*) were formerly considered to fall into two groups (Stuckenberg 1960): the *sericea* group, containing five species occurring in the south-western Cape Province and Namaqualand, and the *pilosula* group with one species in the south-eastern highveld and Lesotho, and one species in the eastern highlands of Zimbabwe. The *pilosula* group was seen to be related to the species of *Lampromyia* occurring in north-western Africa, the Canary Islands, and the Iberian Peninsula.

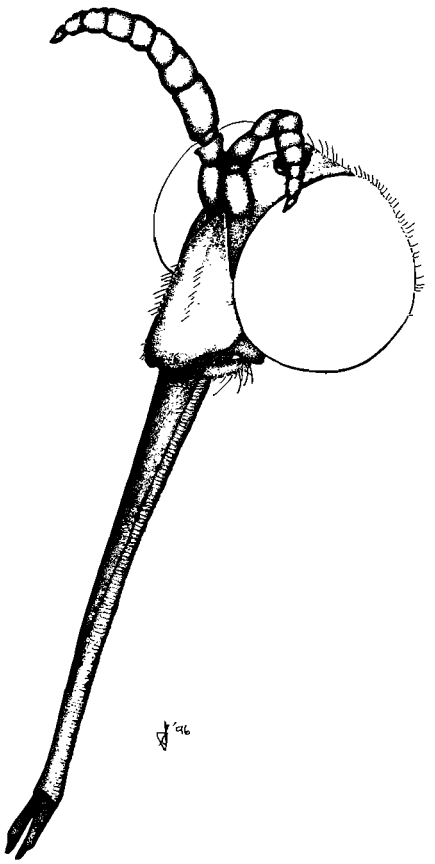


Fig. 9. *Vermilynx vansoni* (Stuckenberg). ♂ Head in fronto-lateral view.

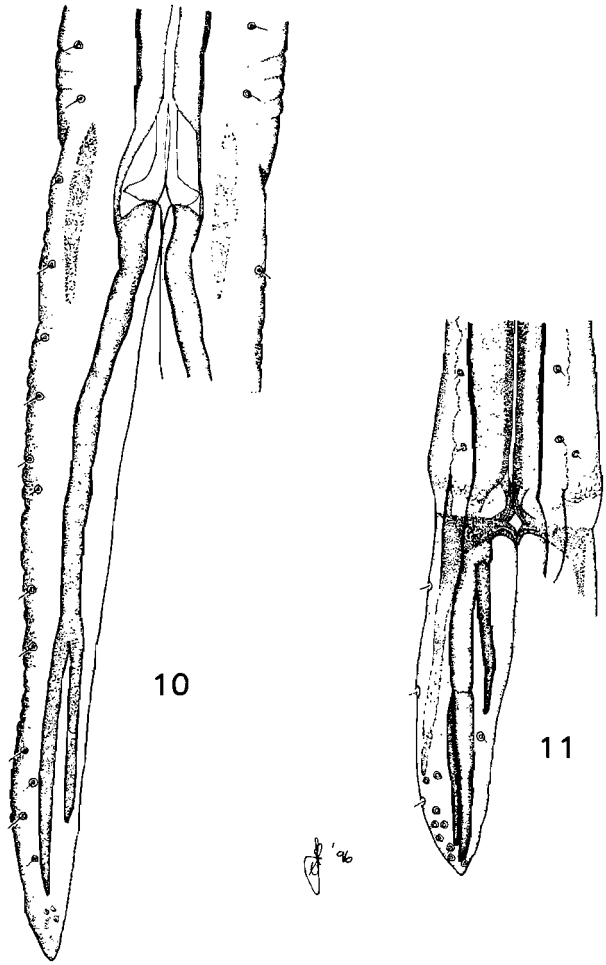
In the *sericea* group was *Lampromyia maculata* Stuckenberg 1960, described on a unique female holotype; this species was poorly known but obviously differed in several features from the other four species. Through the recent discovery of the male of *maculata*, and a related new species in southern Namibia, it became clear that two separate clades are involved. In order to resolve the complex interrelationships between all these lineages in Southern Africa, a cladistic analysis of important characters was manually derived, and the cladogram shown in Fig. 12 was obtained. This cladogram was rooted through reference to *Vermileo* Linnaeus as the outgroup. In the following discussion of characters used, the paragraph numbers correspond to numbers in the cladogram; the italicised opening phrase of each paragraph specifies the apomorphic state.

1. *Proboscis elongate.* The proboscis is lengthened through extension of the labial prementum as a stiff, slender tube (Figs 1, 8, 9). This is a synapomorphy of all the Afrotropical vermileonids as well as the extralimital species of *Lampromyia*. The plesiomorphic condition is a very short prementum, with the labella

consequently close to the ventral surface of the head, as in *Vermileo*.

2. *Face protruding.* This is associated with elongation of the labium, and is probably an adaptation for increased muscular efficiency for sucking during nectar-feeding, and for forward extension of the proboscis in those clades having a very elongate proboscis. In *Vermileo* the face is flat and curves below the head, following the lateral profile of the eyes, and is not visible in lateral view.
3. *Labella modified.* Two separate anagenetic lines exist, representing adaptations for nectar-feeding: (a) the condition in *Vermipardus*, and (b) the condition in other clades, as described for character 4. This is also a synapomorphy of the Afrotropical vermileonids and the extralimital species of *Lampromyia*. The plesiomorphic condition in *Vermileo* features large, expandable labella which project anteriorly beyond their attachment to the prementum; this form evidently is associated with a more generalised feeding mode.
4. *Labella compacted.* In *Vermipardus* (Fig. 8; Stuckenberg 1960, Fig. 7) the labella are reduced, laterally compressed, and joined over about one-half of their length. The other clades (Fig. 9) have a different modification: the labella are in the form of elongate, dorsoventrally somewhat flattened tubes, separated over their entire length though normally held pressed together. These conditions are interpreted as different autapomorphies that distinguish *Vermipardus* from the other clades collectively, and demonstrate their monophyly.
5. *Pseudotracheae modified. Vermipardus* has a more primitive condition in retaining 6–7 pseudotracheae in a dendritic cluster in each labellum. In the other clades, more extreme apomorphic reduction has occurred; the main pseudotrachea in each labellum has only either two or three branches, and forms a relatively elongate entity corresponding to the modified form of the labellum (see character 7); this is an apomorphic state.
6. *Aedeagus trifid.* In *Vermipardus* (figures in Stuckenberg 1960, 1995*b*) the aedeagus is primitively tubular without lateral extensions. In the other clades (figures in Stuckenberg 1960; this paper, Figs 33, 34, for *Lampromyia* species; 1995*a* for *Vermilynx*), the aedeagus is highly apomorphic, having large lateral extensions on each side of the median intromittent tube.
7. *Pseudotracheae differently reduced.* In *Vermilynx* and the *sericea* group (inferred for the *maculata* group), the main pseudotrachea (Fig. 11) divides at its base on entering the labellum, and one of these branches then divides at about the labellar midlength, thus producing three branches. In *Lampromyia s. str.* each labellum (Fig. 10) has a large pseudotrachea which divides into two branches at about its midlength or more distally. While it appears to be a parsimonious argument that the two-branched condition could be derived from the three-branched and is thus more apomorphic, no evidence exists for such a progression, so these two conditions are regarded as unlinked autapomorphies indicating two monophyletic lineages.
8. *Hind tibia swollen apically.* In the *sericea* and *maculata* groups, the hind tibia is considerably swollen apically and is as enlarged as the hind femur; this condition also occurs in a new species of *Vermilynx*, and in the male of *Vermilynx vansoni* though it is not so marked in the female. This form of the hind leg contributes to

the characteristic appearance of these flies and is apomorphic. In *Lampromyia s. str.* the hind tibia is clearly narrower apically than the hind femur, a common condition in Diptera.



Figs 10–11. Labellum and pseudotracheae. 10. *Lampromyia flavida* Engel & Cuthbertson ♀. 11. *Leptynoma (L.) hessei* (Stuckenberg) ♀.

9. *Proboscis greatly elongated.* A more plesiomorphic condition exists in *Vermilynx* (Fig. 9), in which the proboscis is shorter (about 1.3–1.6 times mesonotal length), directed rigidly downwards, and is apparently incapable of forward or posterior flexure (as indicated by observations of reared living specimens of a new *Vermilynx* species). A highly apomorphic condition exists in the *sericea* and *maculata* groups, in which the proboscis is extremely elongate and slender (as in Fig. 1); at rest, the proboscis is folded beneath the body, directed obliquely backwards between the legs. In addition, the flies are able to flex the proboscis forwards when feeding at flowers.

10. *Wing form modified.* In the *maculata* and *sericea* groups the wing has an apomorphic form (Figs 14–19); the stalk is elongate, the anal lobe is narrow, fore and hind margins are relatively straight and almost parallel, the costal cell is very narrow, and the wing apex is asymmetrical about the median longitudinal axis of the wing, with the extremity of the wing towards the hind margin. These conditions are more pronounced in the *sericea* group. In *Vermilynx* the wing form is unremarkable and generalised; the costal cell is broader and gives a convex curve to the leading edge, the wing apex is much more symmetrically rounded, the hind margin is more convex, and the stalk is shorter.
11. *Modifications of radial-sector veins.* In the *sericea* and *maculata* groups, R_{2+3} shows a variety of strongly apomorphic modifications, with each group having its own specialisations. The *sericea* group also has associated modifications of the fork of R_4 and R_5; the conditions in these groups are described in the key. *Vermilynx* has no marked apomorphies in the radial field.
12. *Antennal stylus developed.* In the *maculata* and *sericea* groups (Figs 2–4), segment 10 is in the form of an elongate, slender stylus. The antenna of *Vermilynx* (Fig. 9) is of a plesiomorphic form and resembles that of *Vermipardus* (Fig. 8), with eight segments distal to the pedicel, forming a tapering unit, and segment 10 short and unspecialised.
13. *Wing pattern well developed.* All *sericea* group species have a distinctive type of wing pattern (Figs 14–18) which is unique and apomorphic in Vermileonidae. In the *maculata* group there is no strong pattern (Fig. 19).
14. *Antennal segmentation reduced.* In the *sericea* group the antenna is 9-segmented; segment 4 has fused with 3, and segment 5 is partially fused with 3–4. The primitive number of 10 segments is retained in the *maculata* group.
15. *Compaction of antenna.* The antenna is shorter and more compact in the *sericea* group, as a consequence of shortening of segments 5,6,7 and 8 (Figs 3, 4). Antennal form in the *maculata* group is more plesiomorphic (Fig. 2); segments 4 to 8 are subequal and form a more elongate unit, terminating in the stylus formed by 9 and 10.
16. *Frons strongly narrowed.* In the *sericea* group the frons is uniquely narrow, being clearly longer than wide and tapering towards the ocelli. The frons in the *maculata* group is more or less parallel-sided and about as long as wide, as in *Vermilynx* and *Lampromyia*.
17. *Gonostyles compact.* In the *sericea* group the gonostyles are apomorphically short, asymmetrically bifid, and incurved (Stuckenberg 1960, Figs 17–20). In the *maculata* group the gonostyles (Figs 23–28) are elongate, posteriorly directed, and incompletely bifid in having no more than a short, dorsal extension at the base, approaching the condition in *Vermilynx*.

The following conclusions are evident from the cladogram: 1) The Afrotropical vermileonids, together with the extralimital species of *Lampromyia*, form a monophyletic clade. 2) *Vermipardus* is the sister-group basal to all the other lineages. 3) *Vermilynx* and the *maculata* and *sericea* groups together form a monophyletic

lineage whose sister-group is *Lampromyia* in a restricted sense. 4) *Vermilynx* is the sister-group of the monophyletic clade formed by the *maculata* and *sericea* groups. 5) The *maculata* group is the sister-group of the *sericea* group.

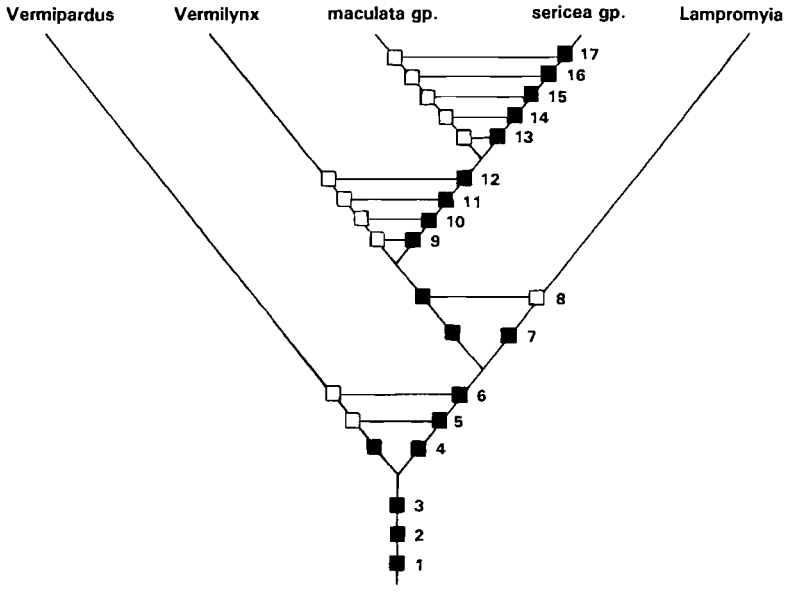


Fig. 12. Cladogram representing relationships of vermileonid lineages in Southern Africa. Apomorphic states are indicated by black squares.

The taxonomic outcome is as follows: 1) The monophyly of the *sericea* + *maculata* groups is recognised through the erection of a new genus, for which the name *Leptynoma* Westwood 1876, is resurrected. Autapomorphies of this genus are given in the second alternative of couplet 4 in the key below. 2) The distinctiveness of the *maculata* group is expressed through the erection of a subgenus, *Perianthomyia* subgen. nov. Autapomorphies for this taxon include the form of R_{2+3}, the complex mesonotal pattern, enlargement of the epandrium, presence of two dark sclerotised bodies on the inner surface of the epandrium, and elongation of the proctiger. 3) *Lampromyia* is now restricted to the species of the *pilosula* group and to the palaearctic species described in that genus. It is more speciose and morphologically diverse in its palaearctic centre, where at least eight species occur (Stuckenberg, in prep.). Although there is a strong similarity between *Leptynoma* and *Lampromyia* resulting from great elongation of the proboscis in both genera, this is considered to be a homoplasy. It is possible that *Lampromyia* evolved from a *Vermilynx*-like form outside Southern Africa. The suite of autapomorphies characteristic of *Lampromyia* will be discussed more fully in a forthcoming revision (Stuckenberg, in prep.).

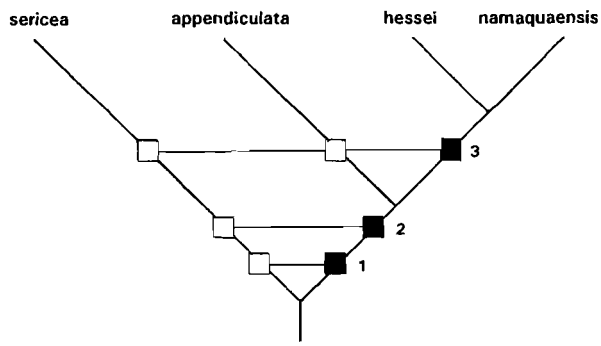


Fig. 13. Cladogram representing relationships of species in subgenus *Leptynoma* Westwood *s. str.* Apomorphic states are indicated by black squares.

KEY TO AFROTROPICAL GENERA AND SUBGENERA OF VERMILEONIDAE

1 Antenna of primitive form (Figs 8, 9), 10-segmented, segments 3–10 forming an elongate, tapering unit, segment 10 not modified to form a long, slender stylus of the sort shown in Figs 2–7; proboscis relatively short (Figs 8, 9), rigid and directed downwards 2

– Antenna more specialised, a stylus present, segment 10 elongate and slender, segment 9 with a short, narrow, subcylindrical form; proboscis very elongate and slender, 2.5–4.5 times mesonotal length (usually more than 3.0), capable of posterior flexure between the legs when the fly is at rest 3

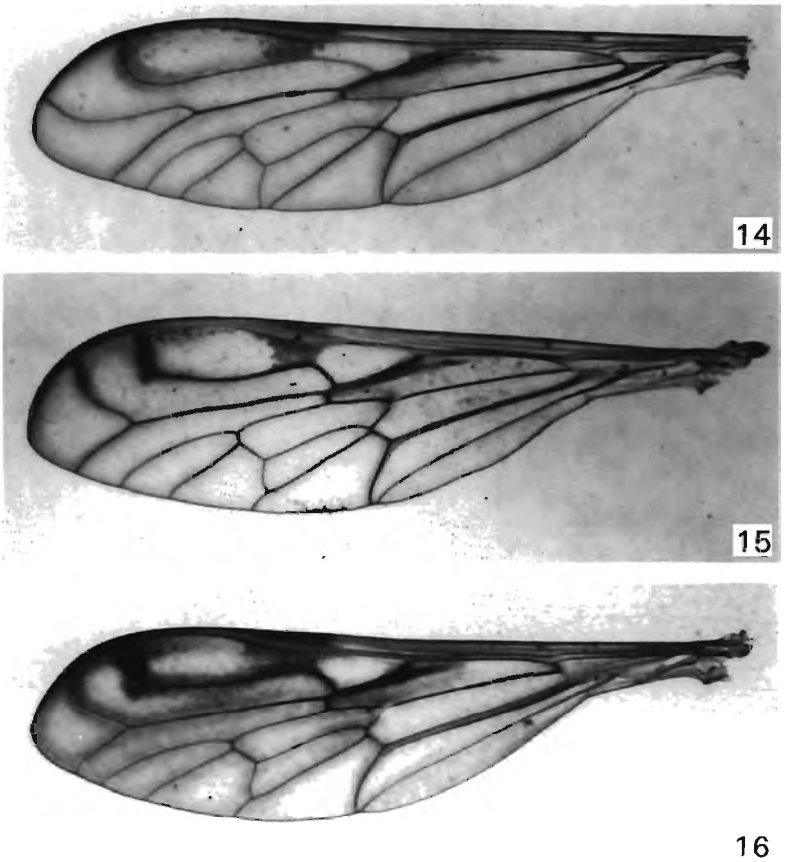
2 Labella laterally compressed, short, subtriangular, fused over about half their length, bearing stiff setae; about 6–7 pseudotracheae in each labellum; aedeagus without lateral extensions ..... Genus **Vermipardus**

– Labella elongate tubular, dorsoventrally flattened in dried specimens, separated over their entire length though usually held pressed together, without setae; one trifid pseudotrachea in each labellum; aedeagus trifid, prominent lateral extensions present ..... Genus **Vermilynx**

3 Wing shape unspecialised (Figs 29–31); costal and posterior wing margins more convexly curved, costal cell relatively broad; apex of wing almost symmetrically rounded; stalk relatively short, about one-sixth to one-seventh of total wing length; radial veins unspecialised; a bifid pseudotrachea in each labellum; hind tibia not markedly swollen apically, clearly more slender than hind femur. [More hairy flies, especially males; silvery pruinescence, if present in males, inconspicuous and confined to basal part of tergites.].....Genus **Lampromyia**

– Wing shape apomorphic (Figs 14–19), stalk long, about one-fifth to one-quarter of total wing length, form narrower, with more nearly parallel fore and hind margins; costal cell narrow, costal margin almost straight; wing apex more bluntly curved, asymmetrical, its most distal part posterior to median longitudinal axis of wing; radial veins usually with conspicuous modifications (see couplet 4); a trifid pseudotrachea in each labellum; hind legs appearing robust because tibia is swollen apically as much as femur. [Sparsely haired flies;

males with conspicuous silvery pruinescence dorsally on abdomen.] 4
Genus **Leptynoma**

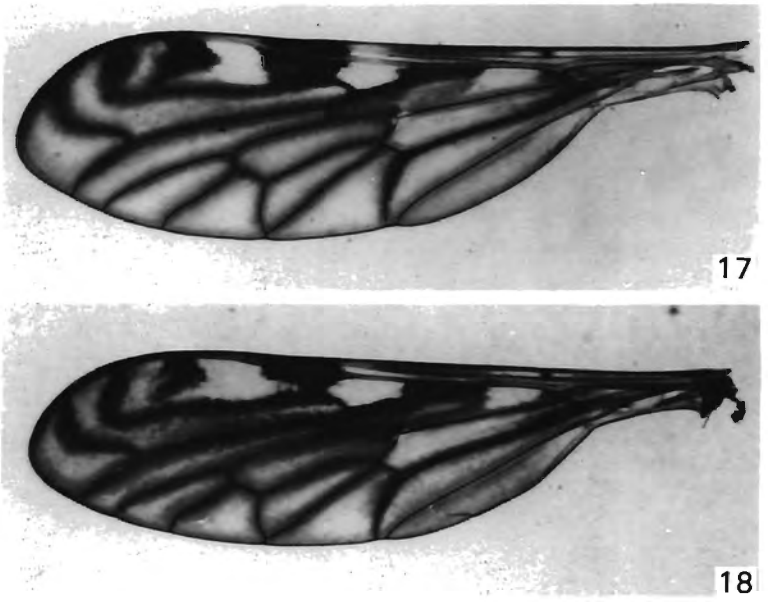


Figs 14–16. Wings. 14. *Leptynoma (L.) sericea* Westwood. 15. *Leptynoma (L.) appendiculata* (Bezzi). 16. *Leptynoma (L.) hessei* (Stuckenberg).

4 Wing strongly patterned (Figs 14–18); R_{2+3} and fork of R_4 and R_5 with various unusual modifications (see key to species of this subgenus), but not as described below; petiolation of wing pronounced, anal lobe narrower than anal cell and markedly attenuated basally; frons narrow, clearly longer than wide, usually narrowing towards ocelli; antenna 9-segmented, 4 fused with 3, 5 partially fused; antenna relatively shorter due to strong progressive reduction and compaction of segments 5–8 (Figs 3, 4). [Slender, elongate, reddish-brown species; mesonotum always with a dark median vitta; dense silvery abdominal pruinescence conspicuous in males.] .....Subgenus **Leptynoma** *s. str.*

– Wing not patterned apart from moderately differentiated, uniformly coloured costal and subcostal cells (Fig. 19); R_{2+3} emerging from radial sector at right angle and approaching R_1 closely, then curving strongly distad along a straight section, terminating in a strong forward flexure to costa; fork of R_4 and R_5 unremarkable; petiolation of wing less pronounced, anal lobout as wide as

anal cell and equally tapered at both ends; frons subquadrangular, about as long as wide, wider than ocellar tubercle; antenna (Fig. 2) more elongate and primitive, 10-segmented, segments 3–8 forming a graded, tapering series. [Slender, elongate flies with mesonotal pattern (Fig. 20) of 2 dark, narrow vittae enclosing a wider pale midline stripe, and 3 pairs of dark spots where shining integument is apruinose, also an intensely dark mark above anterior thoracic spiracle; male abdomen and much of thorax with fugitive silvery pruinescence.] ..... Subgenus **Perianthomyia** *nov.*



Figs 17–18. Wings from different specimens of *Leptynoma (L.) namaquaensis* (Stuckenberg); in Fig. 18 the inner branch of the secondary fork of R_{2+3} is without its basal section.

TAXONOMY

Genus *Leptynoma* Westwood, **stat. rev.**

Leptynoma Westwood 1876: 517. Type species: *Leptynoma sericea* Westwood 1876, by monotypy.

Westwood considered that his new genus belonged in Asilidae. Osten-Sacken (1883) recharacterised *Lampromyia* and synonymised *Leptynoma* after an examination of Westwood's material; the synonymy was accepted by all subsequent authors. *Leptynoma* is now retrieved from synonymy because its type species is a member of the clade defined above that unites the *sericea* and *maculata* species groups and separates them generically from *Lampromyia*. *Leptynoma* is defined in the key; additional characters relating to the hypopygium are as follows: aedeagus trifid, strongly upcurved, lateral extensions dorsally directed, a basal keel present ventrally; gonostyles either bifid or with a ridge terminating in an angular point on dorsal margin.

Subgenus *Leptynoma* Westwood, *s. str.*

This subgenus is defined in couplet 4 of the key. Among its autapomorphies are

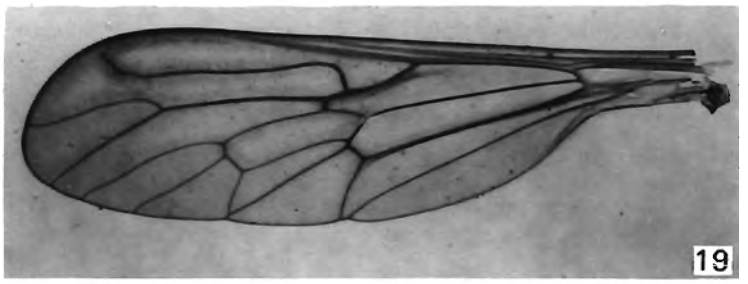


Fig. 19. Wing of *Leptynoma (Perianthomyia) maculata* (Stuckenberg) ♂.

the narrow frons, fusion of antennal segments 3 and 4, patterned wings, and characteristic form of the gonostyles. Male genitalic features are as follows: hypopygium relatively inconspicuous, extending posteriorly in same axis as abdomen; epandrium short, about as long as broad, its margins progressively incurved posteriorly, not projecting beyond gonostyles; proctiger large and broad, occupying much of ventral surface of epandrium; apical guides in form of incurved flanges; gonostyles short, stout, incurved, asymmetrically bifid; lateral extensions of aedeagus arising almost on same plane as upcurved median intromittent tube, with minute denticles in most species (Stuckenberg 1960, Figs 17–24).

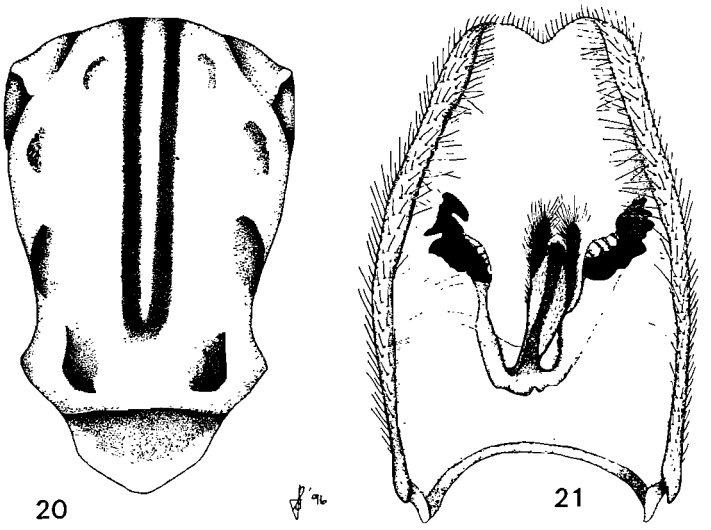
The relationships of the four known species are revealed by the cladogram in Fig. 13, which is based on the following apomorphies:

1. Radial venation specialised, R_{2+3} sharply angled apically, fork of R_4 and R_5 short and widely divergent.
2. Lateral arms of aedeagus with minute, sessile, flat, triangular denticles; these are absent in *sericea*.
3. Silver pruinescence on male abdomen restricted to tergites 6–9; the alternative condition, in which the entire male abdomen is silvery pruinose dorsally, is also found in the sister-group, subgenus *Perianthomyia*, so is plesiomorphic.

The following apomorphic features are notable in *Leptynoma*:

Loss of fore tibial spurs: This trend is unique to the subgenus. In *namaquaensis* normal spurs are present in all specimens seen; in *hessei* only a small minority of specimens have these spurs present, or a spur on only one fore leg (Stuckenberg 1960), but they are always much reduced; *sericea* and *appendiculata* lack spurs on the fore tibiae. *Instability of the radial venation:* The most plesiomorphic form, showing little variation, is that of *sericea* (Fig. 14), in which R_{2+3} is sinuous and the fork of R_4 and R_5 is relatively long. A condition in which R_{2+3} is sharply angled apically, usually with a short stump vein at the angle, has evolved in *appendiculata* and *hessei* (Figs 15, 16); a similar state occurs in *Lampromyia pallida* Macquart of north-western Africa. This angled form was evidently the precursor of the remarkable condition in *namaquaensis* (Figs 17, 18), in which veins R_2 and R_3 both seem to be present; distal extension of a stump vein and its forward curvature to the costa could result in a complete spurious vein distal to R_{2+3}. This seemingly primitive venation with five radial veins, not otherwise recorded in Brachycera, was discussed previously (Stuckenberg 1960). Its possibly primitive nature was mooted, but the

condition is now seen to be secondary and highly apomorphic; a four-branched radial sector is unknown in fossil Brachycera, even in the ancient Alinkidae from the Upper Triassic (Krzeminski 1992) and Rhagionidae from the Lower and Middle Jurassic (Kovalev 1982). Also, as the cladogram for this subgenus reveals, *namaquaensis* is one of the youngest and most derived of the species.



Figs 20–21. 20. *Leptynoma (Perianthomyia) maculata* (Stuckenberg) ♀ mesonotal pattern. 21. *Leptynoma (Perianthomyia) phantasma* sp. n. epandrium in ventral view.

This quartet of species has an association with the Cape Floral Kingdom and Namaqualand. On biogeographical and ecological grounds, the species fall into two pairs: (1) *sericea* + *appendiculata* – these two species occur in the distinctive 'fynbos' shrubland of the south-western and southern Cape; their wide altitudinal range is explained by this association, as the fynbos extends from the coastal plain uninterruptedly to the summits of the Cape Fold Mountains. (2) *hessei* + *namaquaensis* – these species are associated with succulent karoo flora, but in contrastingly different situations; *hessei* occurs in the southern Cape particularly in the intermontane areas and valleys, where rainshadow effects produce xeric conditions and succulent or mixed floras – this species also ranges northwards into Namaqualand, via intermontane valleys where rainshadow effects are strong; *namaquaensis* occurs on the Knersvlakte, a late Tertiary plain bordering the Atlantic coast in southern Namaqualand, and it probably ranges northwards over the coastal hinterland and into valleys in the east that open onto the coastal plain. It is interesting that this pairing of species, while not congruent with the cladogram in Fig. 13, is matched by antennal form: *sericea* and *appendiculata* have a shorter and more compact antenna (both as in Fig. 4), whereas *hessei* and *namaquaensis* have a more elongate antenna (both as in Fig. 3). This may reflect convergent responses to different floristic habitats. It is also notable that the extraordinary diversity of the fynbos and its abundant sources of nectar have elicited such limited cladogenesis in the regional vermileonid lineages.

Existing collections contain few females of these flies, and females of *appendiculata* and *namaquaensis* are still unknown. The males are easily identified, so a separate key is provided for them.

Keys to species of subgenus *Leptynoma* Westwood, *s. str.*

Males only:

1 Entire abdomen dorsally with dense silvery pruinescence 2
– Silvery pruinescence present only on apical part of abdomen (tergites 6–9) 3

2 R_{2+3} evenly curved forwards apically (Fig. 14) ..... **sericea** Westwood
– R_{2+3} sharply angled apically, meeting costa in almost a right-angle, usually with short stump vein at angle (Fig. 15) ..... **appendiculata** (Bezzi)

3 Second radial vein forked, thus apparently five radial veins present (Figs 17–18), some variation occurring in development of apparent R_3, including stump veins and apical forking; tibial spur present on fore leg ..... **namaquaensis** (Stuckenberg)
– Second radial vein not forked, with sharply angled bend apically, a short stump vein usually at angle (Fig. 16); tibial spur of fore leg absent ..... **hessei** (Stuckenberg)

Males and females:

1 Radial fork relatively deep (Fig. 14), R_4 and R_5 only moderately diverging, R_4 moderately sinuous and diverging strongly from apical section of R_{2+3}; median mesonotal vitta dark chocolate brown, not divided in midline by a pale stripe ..... **sericea** Westwood
– Radial fork short (Figs 15–18), R_4 and R_5 strongly diverging, R_4 nearly parallel with forwardly-flexed apical part of R_{2+3}; median mesonotal vitta divided longitudinally by a narrow, pale, midline stripe which may be indistinct apically 2

2 Spur present on fore tibia; second radial vein forked, apparently five radial veins present (Figs 17–18), sometimes apparent vein R_3 incomplete, or with secondary branches or stump veins. [Strongly patterned species, wing markings dark; Namaqualand] ..... **namaquaensis** (Stuckenberg)
– Spur usually absent on fore tibia (rarely present in *hessei*); second radial vein not forked, only the four normal radial veins present. [R_{2+3} strongly angled apically.] 3

3 Long, slender terminal segment 10 of antennal style preceded by two small segments (8 and 9) which are almost of equal length, segment 9 usually slightly longer (as in Fig. 3) ..... **hessei** (Stuckenberg)
– Segments 8 and 9 of antenna small and markedly unequal, segment 9 about twice as long as broad, and almost twice as long as segment 8 (Fig. 4) ..... **appendiculata** (Bezzi)

Leptynoma (Leptynoma) sericea Westwood

Fig. 14

Leptynoma sericea Westwood 1876: 517, pl.vi, fig. 7.
Lampromyia argentata Bigot 1885*a*: 68, Bigot 1885*b*; Stuckenberg 1960: 236 (synonymy).
Lampromyia sericea, Osten-Sacken 1883; Bezzi 1926; Engel 1929*a*, 1929*b*; Stuckenberg 1960.

This is the most frequently encountered species of the subgenus, being relatively widespread in the south-western Cape, and known as far east as the Oudtshoorn district and as far north as the Ceres district. It occurs on the Cape Peninsula and in the old town of Stellenbosch, and was found by 19th century collectors. It has been taken over a wide altitudinal range (from coastal localities to 3500 ft, *c.* 1100 m), and has the greatest phenological range in the subgenus, the flies occurring in all the months from October to March. The immature stages and aspects of their biology were described by Engel (1929*b*).

New records:

1♀ : Kleinmond Nature Res./ 34°20'S 19°00'E/ 15 Febr.1994/ HG Robertson (SAMC). 2♂, same locality – 31.x.1988/ coll. BR Stuckenberg/ hillside macchia (NMSA).
1♂: Stellenbosch/ 16 Dec.1974/ VB Whitehead (SAMC).
2♂: R.[Rivier] Zonder End/ Oudebosch 1500ft// KH Barnard/ Nov–Dec 1928 (SAMC).
1♂: French Hoek/ C.P.[Cape Prov.]// KH Barnard/ Dec 1932 (SAMC).
1♀ : So.Africa: SW Cape, 7 km/ S [south] Swellendam 3420Ab/ Bontebok National Pk [Park]/ March 1979 L.Braack/ Malaise Trap, nr. river (NMSA).
1♀ : So.Africa: Cape Prov/ Op die Berg 3319AB/ 21.xi.1986 J. Londt/ 1070 m Sandy area/ short grass and shrubs (NMSA).
1♀ : So.Africa Cape Prov/ 34 km N [north] Op die Berg/ 3219CC 21.xi.1986/ Londt & Quickelberge/ sandy area/ grass (NMSA).

Leptynoma (Leptynoma) appendiculata (Bezzi), **comb. n.**

Figs 4, 15

Lampromyia appendiculata Bezzi 1926: 301; Engel 1929*a*: 172; Stuckenberg 1960: 238.

A seldom-collected species; known originally only from the male holotype collected on the Matroosberg range in the Ceres district. It is now known to occur in a relatively confined corner of the south-western Cape, including the Cape Peninsula; this is within the range of *sericea*, but it has not been found at precisely the same localities. Collecting sites range from coastal dunes to montane heights at 4000 ft (*c.* 1200 m); found in October to December.

New records:

4♂: Gt Winterhoek Mts/ Tulbagh C.P.// KH Barnard/ 4000 ft, Nov.1932 (SAMC).
1♂: Sth Africa: Cape Prov/ Kommetjie 13.xii.1988/ Hill overlooking town/ 34°08'S; 18°19'E/ JGH Londt Macchia/ sandy ground & rocks (NMSA).
1♂: Arniston Coastal Dunes/ Bredasdorp District/ Cape Province/ 22–23 October 1964/ B&P Stuckenberg (NMSA).

Leptynoma (Leptynoma) hessei (Stuckenberg), **comb. n.**

Figs 11, 16

Lampromyia hessei Stuckenberg 1960: 233.

This species has a wide range in the interior parts of the winter-rainfall area, extending eastwards to the Karoo National Park, and northwards to the Garies and Springbok regions of Namaqualand. The flies have been collected in the months of September to January.

New records:

1♀ : Sth Africa: Cape Prov/ Karoo National Park/ 15km N [north] Beaufort West/ 12.xi.1986 3222AB/ Londt & Quickelberge/ Dry Acacia Woodland (NMSA).
2♀ : Sevenweekspoort/ Laingsburg Dist/ West. Cape Prov/ 19–22 Sept 1959/ B&P Stuckenberg (NMSA).
2♂: South Africa: W. Cape/ 42 kms NE Garies 700 m/ nr. Wolfhok 3018AC/ 15-x-1977 RM Miller/ Malaise Trap (NMSA).
1♂: South Africa: W. Cape/ 16.5 km NE Clanwilliam/ Rheebokvley Picnic/ Area. 4-x-1977 350 m/ RM Miller 3218BB (NMSA).
1♂: South Africa: Cape/ Springbok/ 15.ix.1982 J. Manning (NMSA).

Leptynoma (Leptynoma) namaquaensis (Stuckenberg), **comb. n.**

Figs 3, 17, 18

Lampromyia namaquaensis Stuckenberg 1960: 228.

This remarkable species was known for many years only from the unique male holotype collected at an unspecified locality on the Knersvlakte in southern Namaqualand. A special search was made for it in September 1994, near Van Rhynsdorp at the southern end of the Knersvlakte. This is a biologically remarkable area of low altitude and relief, with a subdued topography of rounded hills often covered with white stones, interspersed with extensive flat areas; there is a highly specialised flora with many endemic succulents and low woody shrubs. After making unsuccessful searches along dry river banks, I found the species during the late afternoon, resting on leafless bushes growing along a small, dry streambed ascending a shallow valley between low, shrub-covered hills. During my walk up the streambed, I collected one specimen; on the downward return journey, as the shadows lengthened and the air began to cool, a further six were found on the same bare bushes I had searched earlier. Evidently they had just arrived out of the surrounding vegetation to overnight in the relatively sheltered dry watercourse.

The old specimen recorded below from 'Een Riet' is of uncertain provenance. A locality (a mountain?) with that name has been found only in the *Reader's Digest Atlas of Southern Africa* (p. 115), to the west of a small settlement called Kamassies. If the specimen comes from there, the record suggests that this species occurs widely in Namaqualand.

New records:

1 damaged specimen, sex indeterminate: Bushmanld [-land]/ Een Riet [? approx.

30°01'S, 18°12'E]// Lightfoot// Oct 1911 (SAMC).
6♂: Knersvlakte/ 44 kms n [north] Van Rhynsdorp/ W.Cape Province/ 15/9/94 BR Stuckenberg// In dry streambed/ on west side of road (NMSA).

Subgenus **Perianthomyia nov.**

Etymology: perianthes (G.) 'with flowers all around' + *myia* (G.) a fly; feminine; thus, a fly in the midst of flowers, referring to the spectacular blooming of the Cape Floral Kingdom and Namaqualand in spring and early summer.

Type species: *Lampromyia maculata* Stuckenberg 1960.

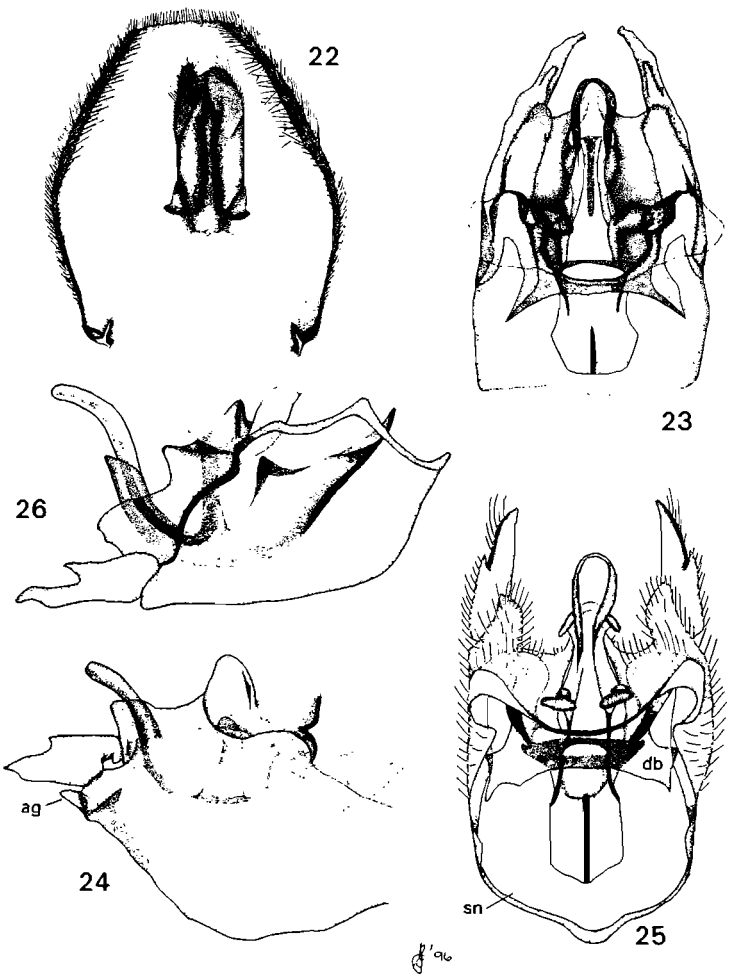
Defined in the key to genera and subgenera given above. This subgenus is well characterised by the apomorphic condition of R_{2+3}, the form of the antenna, and the mesonotal pattern. Additional subgeneric characters are as follows: Hypopygium relatively large, conspicuous, upwardly flexed relative to longitudinal axis of abdomen, this posture associated with a reduction of tergite 8 and increased intersegmental membrane between pregenital sternites; epandrium large, extending beyond gonostyles, with two dark, well-sclerotised, irregularly shaped bodies of unknown function on ventral surface, these visible externally as two dark spots; proctiger tubular, elongate, attached at base; gonostyles slender, almost straight, posteriorly directed, with conspicuous pointed angle on dorsal margin where width is abruptly reduced; apical guides slender, almost straight, converging, apically pointed; dorsal bridge strongly arcuate over posterior margin, produced on each side into a rounded flange which protrudes above dorsal edge of synsternite; aedeagus protruding dorsally above synsternite, lateral extensions situated at about midlength where deepest ventral part of curvature of aedeagal tube is attained.

The two included species are widely separated geographically but closely related. Differences in their adult phenology probably reflect rainfall seasons: *maculata* in the Koup Karoo is spring emergent (September–October), whereas *phantasma* was found in southern Namibia in late summer (April).

Key to species of subgenus *Perianthomyia* nov.

1 Yellowish-brown species; antenna darkened apically; swollen apical section of hind tibia and of hind femur moderately contrasting darker brown; on mesonotum (Fig. 20), in addition to 6 dark brown spots, is a pair of paler brown spots anteriorly, one spot on each side of dark paramedian vitta; ♂ abdomen more densely silvery pruinose dorsally, this absent over swelling on posterior half of tergite 2 [Koup Karoo, south-western Cape].....**maculata** (Stuckenberg)

– Very pale yellowish species; antenna almost unicolorous; hind tibia and femur with strongly contrasting very dark brown apical sections; mesonotum lacking such anterior spots; ♂ abdomen more thinly silvery pruinose dorsally, this present over swelling on posterior half of tergite 2 [Southern Namibia]..... **phantasma** sp. n.



Figs 22–26. 22–24. *Leptynoma (Perianthomyia) maculata* (Stuckenberg): 22. Epandrium in ventral view. 23. Hypopygium in dorsal view. 24. Hypopygium in lateral view. 25–26. *Leptynoma (Perianthomyia) phantasma* sp. n. 25. Hypopygium in dorsal view. 26. Hypopygium in lateral view.

Leptynoma (Perianthomyia) maculata (Stuckenberg), **comb. n.**

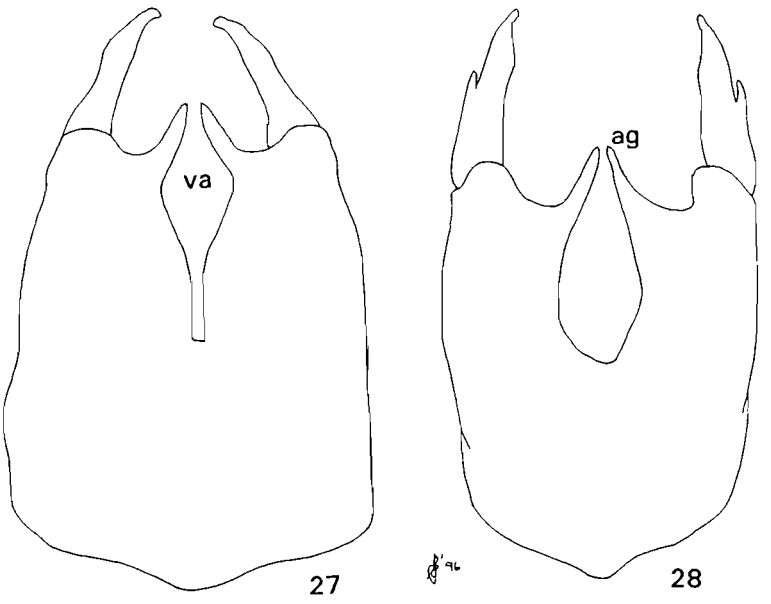
Figs 2, 19, 20, 22–24, 27

Lampromyia maculata Stuckenberg 1960: 239.

Known originally on the female holotype (SAMC) from the Merweville region, Beaufort West district. The following old specimen was subsequently identified:

New record:

1♂: Gouph [Die Koup, 32°25'S, 21°43'E]/ Laingsburg/ Dist// Mus Staff/ Sept 1931 [indistinct, possibly 1937] (SAMC).



Figs 27–28. Synsternite in ventral view. 27. *Leptynoma (Perianthomyia) maculata* (Stuckenberg). 28. *Leptynoma (Perianthomyia) phantasma* sp. n.

Proboscis length: ♂ 3.4, ♀ 3.3 times mesonotal length; in male reaching back almost to apex of hind femora when these are posteriorly extended.

♂. *Mesonotum* testaceous beneath pruinescence; 2 narrow blackish paramedian vittae present, separated by ash-grey pruinose midline stripe which narrows apically and has a densely punctate appearance under high magnification because of abundant sockets of small, fine, semi-recumbent setae; lateral to dark stripes are zones of shining ashy-grey pruinescence which has a fugitive brown tinge; fore and middle legs dull yellowish-brown, hind legs similar but smoky brown apically on femora and tibiae; tibial spurs 1.2.2. *Wing* unpatterned, most veins dull yellowish, costa, subcosta and R_1 paler; ♂ membrane slightly yellowish-brown, with faint pale streaks in middle region of most cells; cell m_3 closed with short stalk; ♀ membrane greyish-hyaline, evidently immature. *Abdomen* pale yellowish-brown with reddish tinge; tergites 2–5 with irregular brownish lateral marks, tergites 6–7 similar but marks confined narrowly to lateral margins; epandrium testaceus; tergite 2 with rounded swelling over posterior half; silvery pruinescence covering all tergites except swollen posterior half of tergite 2, this pruinescence fugitive and not much apparent in dorsal or postero-dorsal view; epandrium apruinose. *Hypopygium* capable of considerable upward flexure due to presence of wide membrane between basal margin of synsternite and apical margin of sternite 8, and due to modification of tergite 8 which is reduced, strongly narrowed medially, and withdrawn under posterior margin of tergite 7. Proctiger less elongate than in *phantasma*, but relatively larger, about half length of epandrium. Apical margin of epandrium without notch. Synsternite deep in lateral view, its upper margin at about midlength with a protruding rounded lobe

which continues into dorsal bridge, and with a blunt angular projection posteriorly above insertion of gonostyle; aedeagus projecting a little above synsternite margins; ventral aperture subovate, extended basally into a slit-like extension.

Body length 13.2 mm, wing 10.2 mm.

Leptynoma (Perianthomyia) phantasma sp. n.

Figs 21, 25, 26, 28

Etymology: phantasma (G.) = apparition, phantom; in reference to the incorporeal appearance of these strange flies, arising from their pallid waxy-yellow colouring overlain with fugitive silvery pruinescence.

This new species is diagnosed in the key above; it is also distinguished from *maculata* by the following genitalic features (Figs 21–26): synsternite in lateral view of different form, aedeagus protruding more, epandrium much more elongate and with apical notch, proctiger differently proportioned and smaller relative to size of epandrium.

Holotype ♂, 1 ♂ paratype: SW AFRICA NAMIBIA/ Uguchab River nr/ Aurusberg, 27°32'S/ 16°11'E 22.iv.1988; holotype coll. UM Uys, paratype coll. CD Eardley. Holotype in SANC, paratype donated to NMSA (Type no. 2191). Although the specimens were collected at the same locality on the same date, they differ markedly in size; the holotype is larger and more robust, with a relatively shorter proboscis; the paratype is more slender and gracile, with a very long proboscis. Dr Eardley kindly sent me a colour slide of the type locality, which is close to the coastal plain of the Namib Desert; it shows arid, barren, rocky hills separated by sandy areas supporting a sparse vegetation of woody shrubs.

♂ (both specimens)

Head: Frons and face silvery-grey pruinose; frons about as long as wide, slightly widening dorsally, wider than ocellar tubercle which is dark brown overlain with greyish pruinescence; antennae pale yellowish-brown, slender terminal stylus segment darker; palp yellowish-brown, proboscis dark brown. Proboscis of holotype 2.9 times mesonotal length, 4.5 times in paratype. *Mesonotum* with 2 narrow, dark brown paramedian vittae that coalesce anteriorly and do not extend to scutellar margin, fading out between posterior pair of dark brown spots; between these vittae is a silvery-grey pruinose midline stripe, similar pruinescence occurring thinly over remainder of mesonotum; 3 conspicuous pairs of shiny brown spots, middle and hind pairs dark, anterior pair reddish-brown. Pleura and coxae unicolorous pale waxy yellowish; hind legs similar but dark brown over swollen apical parts of femora and tibiae; tibial spurs 1.2.2; hind tarsi light amber-brown. *Wing* stalk one-fifth of total wing length; membrane greyish-hyaline, brownish infusion in cells c, sc and r_1, also but more weakly along other veins, pale streaks faintly evident in radial and median cells; costa, subcosta and R_1 yellowish-brown, other veins dark brown; cell m_3 closed with a long stalk in paratype, short stalk in holotype. *Abdomen* slender, widening only slightly posteriorly, pale waxy-yellow, with irregular, narrow, dark brown markings on lateral margins of tergites 2–5; all tergites thinly filmed with silvery pruinescence which is fugitive, shining strongly in some positions. *Hypopygium*

amber-brown, capable of upward flexure due to presence of wide membrane between basal margin of synsternite and apical margin of sternite 8; tergite 8 modified, narrowed medially by strong concavity of anterior margin and lesser concavity of posterior margin, so withdrawn under tergite 7 that basal margin of epandrium lies against posterior margin of tergite 7. Epandrium elongate, strongly arched transversely, clearly longer than broad, with 2 shallow depressed areas on dorsum at about midlength giving a pinched appearance, and a distinct apical notch. Proctiger relatively shorter, about one-third of epandrial length. Synsternite appearing flattened ventrally in lateral view; ventral aperture large, an extensive semi-membranous area medially adjacent to aperture; gonostylus in lateral view like that of *maculata*, but angle on upper margin more acutely pointed; aedeagus like that of *maculata* but longer and extending dorsally further out of synsternite; dark bodies on inner epandrial surface as in Fig. 21.

Body length: holotype 14.8 mm, paratype 11.0 mm; wing length: holotype 11.2 mm, paratype 9.0 mm.

Genus *Lampromyia* Macquart

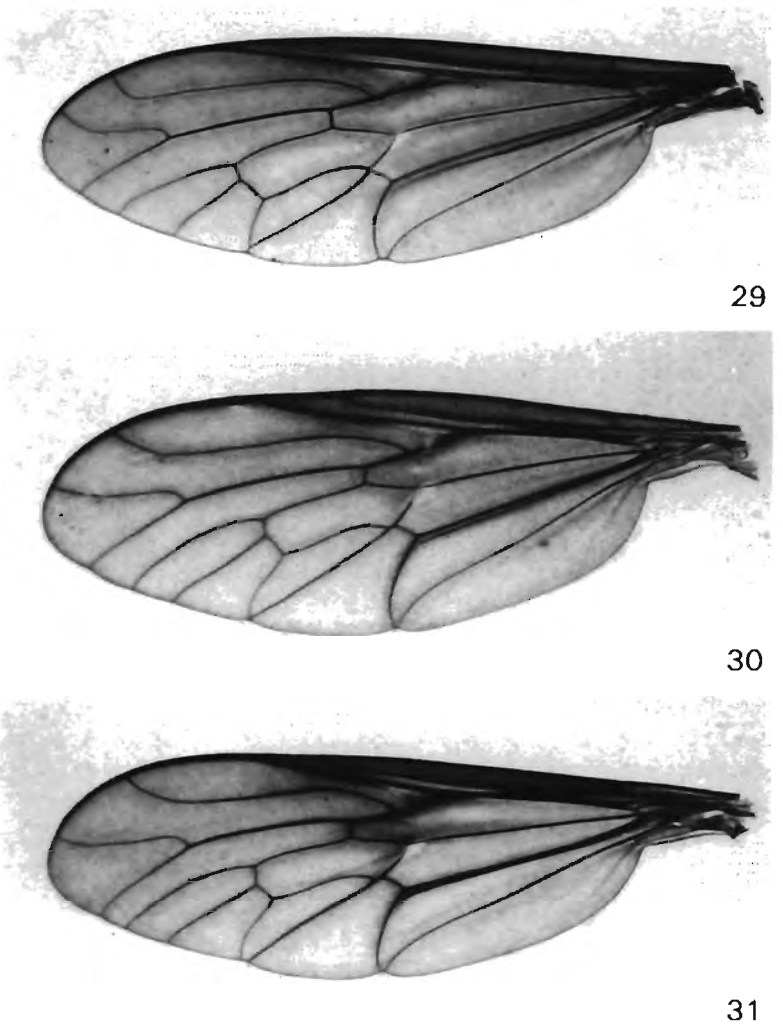
Lampromyia Macquart 1835: 660. Type species: *Lampromyia pallida* Macquart 1835, by monotypy.

This genus now has a more limited scope as a consequence of the cladistic analysis presented above. Its monophyly is demonstrated by the apomorphy of reduction of the pseudotracheae to a single bifid one in each labellum. In this restricted sense, *Lampromyia* has its main centre of diversity in the south-western Palaearctic Region (Canary Islands, north-western Africa, Iberian Peninsula), with a geographically remote offshoot of three species in South Africa and Zimbabwe. These three species – *pilosula*, *flavida* and *rebecca* – form a monophyletic clade unique to this region. Their monophyly is revealed by an apomorphic form of the dorsal bridge, found only in these species; the dorsal bridge is extended posteriorly in a projecting median lobe (Fig. 33; Stuckenberg 1960, Fig. 11). The species are obviously related as follows: *pilosula* + (*flavida* + *rebecca*).

Key to species of the *pilosula* group

1 Very dark species with brownish wings; mesonotum usually bicoloured, with three dark vittae, amber-yellow laterally and over humeral calli (not in Lesotho material), also an amber-yellow area centrally in pleura; antenna (Fig. 5) segmented 1, 2, 3–5, 6, 7, 8, 9, 10; proboscis relatively shorter, about 2.5 times length of mesonotum (3.2 times in Lesotho specimen); ♂ abdomen blackish or dark brownish-black, with prominent bands of ash-grey pruinescence basally on tergites 2–6 and over all of tergites 7–8; ♀ abdomen blackish over tergites 1–3, dark brownish over other tergites, all tergites basally with greyish pruinescence [Eastern parts of southern highveld in Cape Province, Orange Free State, Lesotho, western Natal] ..... **pilosula** Engel

– Brownish species; mesonotum almost uniformly brown, without dark vittae; greyish pruinescence absent on abdomen; antenna (Figs 5, 6, 7) with fewer free segments, compound third segment large; proboscis very elongate, 3.3–4.5 times length of mesonotum; wing greyish-hyaline with brownish infuscation which is stronger in costal, subcostal and basal cells [Zimbabwe] 2



Figs 29–31. Wings. 29. *Lampromyia pilosula* Engel. 30. *Lampromyia flavida* Engel & Cuthbertson. 31. *Lampromyia rebecca* sp. n.

2 Larger species; antenna (Fig. 7) dark brown; dark triangular marks on upper occiput coalesce with dark median stripe from ocellar tubercle to occipital foramen; frons entirely greyish pruinose with shifting brownish tinge; wing (Fig. 30) with brown veins, greyish-hyaline with strong brown tinge in costal, subcostal and basal cells, weakly brown-tinged basally in adjacent cells; ♂ with abundant, erect, long, dark hairs on abdomen, hind femora, coxae and occiput [Eastern Highlands near Mutare] ..... **flavida** Engel & Cuthbertson

– Smaller species; antennae blackish; occiput in dorsal view has dark subtriangular marks behind upper eye margins separated from dark median stripe between ocellar tubercle and foramen; frons with fugitive pruinose pattern, in dorsal view with a dark median mark; wing (Fig. 31) greyish-hyaline with blackish-brown

veins; sooty-brown infuscation in costal and subcostal cells, around radial sector, and apically in first basal cell; ♂ with numerous erect hairs on abdomen, hind femora and coxae, but these relatively shorter, thinner and less conspicuous [Harare district] ..... **rebecca** sp. n.

Lampromyia pilosula Engel

Figs 5, 29

Lampromyia pilosula Engel 1929*a*:172; Engel & Cuthbertson 1937: 1; Stuckenberg 1960: 241.

Described on three males collected at Aliwal North by Dr H. Brauns. Engel stated that the holotype was retained in his collection. The other two specimens, which have paratype status, are now in the Natal Museum, having been donated along with other Diptera from the Brauns collection, by the Transvaal Museum. Specimens from Bokong in Lesotho, and from Bergville in Natal, were recorded by Stuckenberg (1960).

The few specimens available show regional differences. Those from Lesotho differ as follows: the warm amber-yellow colouring laterally on the mesonotum and centrally in the pleura is largely absent or faintly developed; the proboscis is relatively longer, in the male about 3.2 times mesonotal length, about 2.6 times in the female. Specimens from Aliwal North and Clarens have the mesonotum strongly bicolorous (as described in the key), an amber-yellow area in the middle of the pleura, and the proboscis (males only) about 2.5 times mesonotal length. The male from Clarens is noticeably robust; it differs in having the hind femora densely pilose on all sides, and not just on the upper and inner surfaces as described for this species in my earlier key (Stuckenberg 1960).

New record:

1♂: SOUTH AFRICA, OFS/ Adullam Farm near/ Clarens. 28°34'S/ 28°28'E 15-18.i./ 1986 C.D. Eardley (SANC).

Lampromyia flavida Engel & Cuthbertson

Figs 7, 10, 30

Lampromyia pilosula Engel, variety *flavida* Engel & Cuthbertson 1937: 2; Stuckenberg 1960: 243 (status revised).

The type locality of *flavida* was given as the farm 'Cloudlands' on the Vumba Mountains at about 5000 ft (c. 1500 m), near Umtali (now Mutare) in the Eastern Highlands of Zimbabwe. The original series was reared from larvae collected from under rock ledges; some observations of larval habits were recorded. No other material is known. The proboscis is especially elongate in some specimens (Fig. 1): a male has it 4.5 times the mesonotal length, and in two females it is 3.3 and 3.4 times respectively.

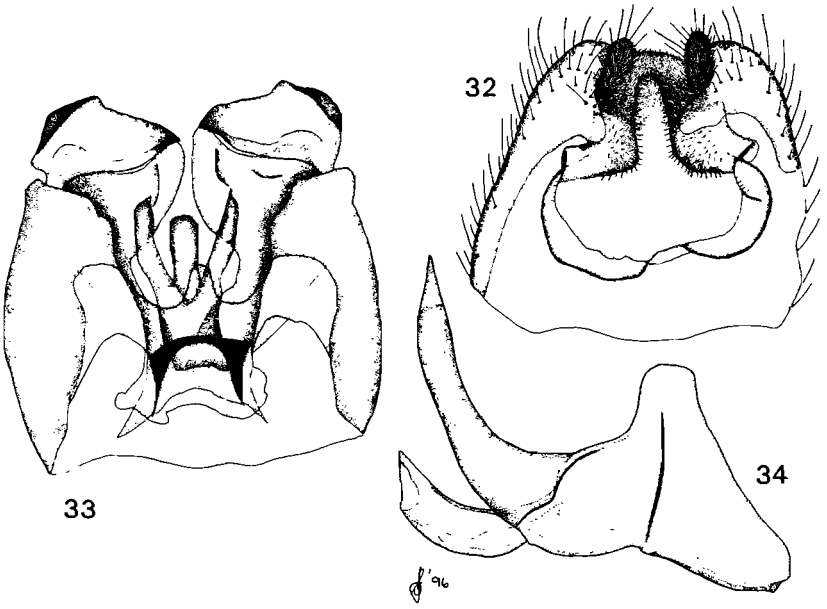
Lampromyia rebecca sp. n.

Figs 6, 31–34

Etymology: Named in honour of Rebecca Fowlds of Harare, whose interest in the

biology of wormlions enabled me to describe this species.

The material available comprises three specimens from Harare, Zimbabwe: male no.1 which I reared from a larva sent by Mrs Fowlds, and male no.2 and a female reared by Mrs Fowlds. Male no.1 is distinctly smaller than no.2; a possibility exists that it may be unnaturally small because it completed its metamorphosis in a short time through being persistently fed at a rate unlikely to occur under natural conditions. Male no.2 is larger and rather teneral. The female is the largest specimen. This variability in size is of some concern, as these specimens could conceivably be taken to represent a small geographical variety of *flavida*. The upland area around Harare extends to the Eastern Highlands, and wormlions may occur throughout the intervening terrain. It was decided that the distinguishing features given in the key warrant specific status for the Harare population.



Figs 32–34. *Lampromyia rebecca* sp. n. 32. Epandrium and proctiger in ventral view [epandrium incomplete on left side]. 33. Hypopygium in dorsal view. 34. Aedeagus in lateral view.

In addition to the diagnostic characters provided in the key, it may be possible to separate *flavida* from *rebecca* by the presence of golden hairs on the ventral surface of the hind basitarsus of *rebecca*. The material of *flavida* is too teneral and dirty for the nature of pilosity on the hind basitarsus to be determined. Examination of the holotype male antenna by stereoscopic microscope showed only the two stylus segments following the compound third segment (1, 2, 3–8, 9, 10), as in *flavida*; a slide-mounted antenna from the paratype male (Fig. 6) shows clearly a free segment 8 (thus 1, 2, 3–7, 8, 9, 10).

Holotype ♂: Zimbabwe/ Harare/ 6 km from University/ R. Cannell [Fowlds]// reared [by BRS] from/ larva collected/ in old carport/ collected 2.3.1995/ adult emerged/ 17.4.1995 (NMSA). Paratype ♂, paratype ♀ : reared from larvae collected at same

locality by Mrs R. Fowlds, emerged on about 4.5.1995. All in NMSA (Type no. 2190).

♂ Holotype

Head: Frons ashy-grey pruinose with fugitive golden tinting, about as long as broad, a little broader than ocellar tubercle, anteriorly with fugitive dark lines and a median narrow triangle (these marks best seen in dorsal view with oblique posterior lighting); ocellar tubercle shining black; face silvery-grey pruinose, with fine, pale hairs. Antenna black, segmentation 1, 2, 3–8, 9, 10. Proboscis black, elongate, about 3.8 times mesonotal length (4.0 times in paratype ♂). Occiput with shining silvery-grey pruinescence laterally; velvety blackish pruinescence occurs in a narrow midline stripe from ocellar tubercle to foramen, and in a triangular patch behind each upper eye corner, these triangular patches not merging with median stripe but separated by areas of pruinescence as on frons. *Mesonotum* light brown, with indistinct dark brown longitudinal vittae separated by narrow strips of pale golden pruinescence, midline stripe incomplete posteriorly because of a large prescutellar yellowish-brown area. Halteres smoky brown. Fore and middle legs yellowish-brown, tarsi darker; hind femur tawny, dark brown apically, with abundant dark hairs which are either recumbent or erect; hind tibia smoky brown, pale basally, tarsus pale over most of basitarsus, apically darker like tibia; hind basitarsus ventrally with appressed pale golden hairs, a cluster of similar hairs ventrally at apex of tibia; ♂ paratype has some appressed golden yellow hairs ventrally at apex, and hind basitarsus with golden hairs over entire ventral surface. *Wing* as described in key to species. *Abdomen* slender, petiolate; mostly yellowish-brown, irregular dark markings extensively over posterior parts of tergites 3–7; many dark, suberect hairs dorsally and laterally on posterior half of tergites 3–6; tergites 1 and 2 with longer hairs; tergite 7 dark haired all over. *Hypopygium:* Very similar to that of *flavida*, but available material of that species teneral and unreliable for definitive comparison.

Body length: (holotype) 10.0 mm, wing 7.2 mm; paratype wing 9.2 mm, abdomen deformed, body length not measurable.

♀ Paratype

More mature than holotype, colouring generally reddish-brown; frons with fugitive central pattern which emerges strongly in postero-dorsal lighting, appearing as an inverted V-shape of pruinescence within a subcircular dark area; fore and middle legs coloured like pleura; hind femora testaceus, with blackish apical section, without long hairs present in ♂; hind tibia brown basally, grading to blackish apically, hind basitarsus translucent smoky brown basally, blackish-brown apically, other tarsomeres similarly blackish-brown; hairs on hind tibia dense, short, suberect, either blackish or golden, the golden hairs more flattened and especially conspicuous on dark apical section of tibia; hind basitarsus with blackish hairs above, golden hairs below. Wing as in ♂, cell m_3 open, smoky infumescence in costal and subcostal cells conspicuous. Abdomen slender, shining warm yellow-brown, a little darker on segment 8, some small, indistinct dark postmortem marks along midline of tergites 3–7.

Body length 13.3 mm, wing 10.0 mm.

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REFERENCES

BEZZI, M. 1926. South African Rhagionidae (Diptera) in the South African Museum. *Annals of the South African Museum* **23**: 297–324.

BIGOT, J. 1885*a*. Diptères nouveaux ou peu connus. *Bulletin de la Société Entomologique de France* (6) **5**: 68.

——— 1885b. Diptères nouveaux ou peu connus. *Ibid.*: 192.

ENGEL, E. O. 1929*a*. A new species of *Lampromyia* (Dipt.) from South Africa. *Annals of the Transvaal Museum* **13**: 172–174.

——— 1929*b*. Notes on two larvae of South African Diptera belonging to the families Leptidae and Asilidae. *Transactions of the Royal Society of South Africa* **18**: 147–162.

ENGEL, E. O. & CUTHBERTSON, A. 1937. On the biology of some Rhodesian Diptera together with descriptions of three species of Asilidae new to science. *Transactions of the Rhodesia Scientific Association* **35**: 147–162.

GRIFFITHS, G. C. D. 1994. Relationships among the major subgroups of Brachycera (Diptera): a critical review. *Canadian Entomologist* **126**: 861–880.

KOVALEV, V. G. 1982. Some Jurassic Diptera – rhagionids (Muscida, Rhagionidae). *Palaeontological Journal* **16**: 87–99.

——— 1987. Classification of the Diptera in the light of palaeontological data. *In:* Narchuk, E. P. , ed., *Two-winged insects: systematics, morphology and ecology*. Leningrad: Zoological Institute of USSR Academy of Sciences pp. 40–48.

KRZEMINSKI, W. 1992. Triassic and Lower Jurassic stage of Diptera Evolution. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* **65**: 39–59.

MACQUART, J. 1835. *Histoire Naturelle des Insectes. Diptères.* **2**. Paris: Roret.

NAGATOMI, A. 1977. Classification of Lower Brachycera (Diptera). *Journal of Natural History* **11**: 321–335.

OSTEN-SACKEN, C. R. 1883. Synonymica concerning exotic dipterology. No. II. *Berliner Entomologische Zeitschrift* **27**: 295–298.

STUCKENBERG, B. R. 1960. Diptera (Brachycera) Rhagionidae. *In:* Hanström, B., Brinck, P. & Rudebeck, G., eds., *South African Animal Life* **7**: 216–308. Stockholm: Swedish Natural Science Research Council.

——— 1995*a*. *Vermilynx*, a new genus for the wormlion fly *Lampromyia vansoni* Stuckenberg of the Richtersveld, southern Africa (Diptera: Vermileonidae). *African Entomology* **3** (1): 29–34.

——— 1995*b*. A taxonomic revision of *Vermipardus* Stuckenberg, 1960, with descriptions of new species and notes on the biology and biogeography of the genus (Diptera: Vermileonidae). *Annals of the Natal Museum* **36**: 215–253.

WESTWOOD, J. O. 1876. Notae dipterologicae. No.3.- Descriptions of new genera and species of the family Acroceridae. *Transactions of the Entomological Society of London* **1876**: 507–518.

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