

# On the encyrtid parasites (Hymenoptera: Chalcidoidea) associated with psyllids (Hemiptera: Psylloidea) in southern Africa

by

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A key is given to the genera of Encyrtidae associated with psyllids in southern Africa. A generic diagnosis is provided for the genus *Psyllaephagus*, a key to twenty species of this genus from southern Africa is given, and the following eighteen species are described as new: *albicrus*, *argutus*, *arytainae*, *bicolor*, *callaimus*, *capeneri*, *chianganus*, *cincticrus*, *dispar*, *furvus*, *lucaris*, *oleae*, *ornatus*, *parvus*, *rhusae*, *secus*, *vastus* and *viridis*. A diagnosis and a key to the southern African species are given for *Trechnites*; *morulus*, *versicolor* and *angolensis* are described as new, and *manaliensis* is recorded from Africa for the first time. Two species of *Aphidencyrtus* are dealt with: *cassatus* Annecke, and *similis*, which is described as new. An apparently new species, of which the genus could not be determined, and *Cheiloneurus cyanonotus* are recorded as hyperparasites of the citrus psylla.

The southern African encyrtids associated with psyllids that are dealt with here have accumulated in the National Collection of Insects at the Plant Protection Research Institute in Pretoria over the past fifteen years or more. Much of the material was reared from known hosts collected by Mr A. L. Capener, formerly of this Institute, during his studies on South African Psyllidae from 1964 to 1974. Hardly any systematic work has been done on these parasites in southern Africa – or elsewhere in Africa – and this accounts for the large number of new species that are here described. In addition to the new species, this paper deals with all encyrtids previously recorded as parasites or hyperparasites of psyllids in southern Africa (Table 1).

Holotypes and paratypes of the new species described here are in the National Collection of Insects, Pretoria; paratypes will be deposited on exchange in the British Museum (Natural History), London (BMNH), where indicated in the text.

## Key to the genera of Encyrtidae associated with psyllids in southern Africa

### FEMALES

- 1 Apex of scutellum with a semi-erect tuft of coarse bristles; fore wing strongly and more or less entirely infuscated (body partly brilliant metallic; antenna with scape expanded ventrally, the funicle six-segmented, the club three-segmented; hyperparasites)..... **Cheiloneurus**

- Scutellum without a tuft of bristles; fore wing usually hyaline, rarely with an infuscated patch below the venation ..... 2
- 2 Antennal funicle five-segmented; mesoscutum with complete or incomplete parapsidal sulci (head and body metallic green to blue, or black with a strong metallic lustre in certain parts; antennal scape long, cylindrical; club one or three-segmented; fore wing with marginal vein absent; primary parasites) ..... **Trechnites**
- Antennal funicle six-segmented; mesoscutum without parapsidal sulci ..... 3
- 3 Head and body entirely pale yellow, without a metallic lustre (hyperparasite) ..... Gen. et sp. ign.
- Head and body metallic in colour, or black with a metallic lustre on certain parts ..... 4
- 4 Marginal vein of fore wing punctiform or short (figs 6, 11, 22), plainly shorter than stigmal vein (primary parasites) ..... **Psyllaephagus**
- Marginal vein relatively long, about as long as, or longer than, marginal vein (fig. 4) ..... 5
- 5 Legs with coxae, femora and tibiae boldly marked with black; antennal club plainly longer than the distal three funicle segments together; hyperparasites ..... **Aphidencyrthus**
- Legs pale, except for hind femur which is largely blackish brown; antennal club about as long as the distal three funicle segments together; primary parasite ..... **Psyllaephagus** (= *P. pulvinatus*)

TABLE 1. Psyllid host records of southern African Encyrtidae (names of hyperparasites marked with an asterisk).

PSYLLID HOST	PARASITE
<i>Agonoscena crotolariae</i>	<i>Psyllaephagus argutus</i>
<i>Agonoscena</i> sp.	<i>P. argutus</i>
	<i>P. albicus</i>
<i>Arytaina mopanei</i>	<i>P. arylainae</i>
<i>Ciriacremum capense</i>	<i>Trechnites versicolor</i>
<i>Diaphorina albomaculata</i>	<i>P. ornatus</i>
<i>Diaphorina carissae</i>	<i>P. ornatus</i>
<i>Diaphorina loranthi</i>	<i>P. viridis</i>
<i>Diaphorina natalensis</i>	<i>P. ornatus</i>
<i>Diaphorina ?punctulata</i>	<i>P. ornatus</i>
	<i>P. viridis</i>
<i>Diaphorina solani</i>	<i>P. ornatus</i>
<i>Diaphorina tenebrosa</i>	<i>P. cincticus</i>
<i>Diaphorina</i> sp.	<i>P. cincticus</i>
	<i>P. harrisoni</i>
	<i>P. ornatus</i>
	<i>P. vastus</i>
	<i>P. viridis</i>
<i>Euphalerus marginalis</i>	<i>Aphidencyrthus similis</i> *
<i>Euphyllura longiciliata</i>	<i>P. oleae</i>
	<i>Trechnites manaliensis</i>
<i>Paurocephala</i> sp.	<i>P. parvus</i>
<i>Pseudophacopteron pretoriensis</i>	<i>P. capeneri</i>
<i>Psylla</i> sp.	<i>P. chianganus</i>
<i>Trichohermes insleyae</i>	<i>P. callainus</i>
<i>Trioza erytreae</i>	<i>Aphidencyrthus cassatus</i> *
	<i>Cheiloneurus cyanonotus</i> *
	<i>P. pulvinatus</i>
	Encyrtidae gen. et sp. ign.*

*PSYLLAEPHAGUS* Ashmead, 1900

This cosmopolitan genus, the species of which are primary parasites in the nymphs of psyllids, was hitherto known in Africa from four species, two of which occur in southern Africa. An additional eighteen species are here described as new. These species closely resemble many of their extra-African congeners known to me, but are distinguished by a combination of characters, of which host preference, body colour and maculation of the legs are perhaps the most important.

Tryapitsyn (1967) provides a key to the females of 27 species of Palaearctic *Psyllaephagus*, and the same author (Tryapitsyn 1971) and Graham (1969) deal with the synonymy of the genus.

In the more than fifty series on which this study is based, body colour and leg maculation were found to vary little intraspecifically and were valuable and reliable aids in the initial arrangement of the large amount of material. On the other hand, antennal shape (i.e. the dimensions of the funicle segments), which is usually a useful and stable character in species separation, was found to vary to a greater or lesser extent in some species. This variation was present between series of the same species, between specimens of the same series, and even between the two antennae of one specimen, to such an extent that it was sometimes difficult or impossible to provide a detailed description that would fit all the examined specimens of a given species. Describing colour was also a problem in some cases. Specimens of the same species, depending on whether they are dry, in alcohol, or dried after having been in alcohol, appear to reflect light differently, displaying different metallic colours when examined under a stereomicroscope in the light of two 6 V incandescent lamps. For this reason, only dried specimens were examined for colour, and, in a few cases where these were not available, alcohol specimens were first dried and mounted on cards before their colour was described. It should be noted that different colours may be observed even in dry material of highly metallic-coloured species if different light sources are used.

The southern African species of *Psyllaephagus* are characterized as follows.

**FEMALE.** Small to moderate-sized encyrtids. Length usually about 1.25–2 mm. Colour: head and thorax usually brilliant metallic green to bluish, partly with a reflection of other colours in certain plays of light; in a few species the head and body are predominantly blackish with a moderately strong metallic lustre; tegulae in most species characteristically whitish proximally, dark distally; legs pale, usually with some segments boldly marked with blackish; wings entirely hyaline except in *P. dispar*, which has a large infuscated patch below the apex of the fore wing venation.

Head, in dorsal view (occiput perpendicular), with frontovertex approximately horizontal from fronto-occipital margin to anterior ocellus, from where it slopes strongly forwards to an imperceptible union with face; anterior margin of head, in this position, usually gently convex to straight, becoming a little concave if the head is tilted slightly backwards; fronto-occipital margin rounded to acutely angled; frontovertex never narrow, usually about one-half to two-fifths head width at median ocellus; ocelli in a right or obtuse-angled triangle, the lateral pair separated from each other by about 3.5–4.5 times (except in *P. lucaris*), and from the eye margins by less than, their own greatest diameter; head, in frontal view, about 1.3–1.4 times as long as wide; toruli with upper limits more or less level with lower eye margins, removed from the mouth margin by more than one-half, and separated from each other by more than, their own greatest diameter; scrobes always well developed, usually impressed on face

as two relatively deep converging furrows, their upper limits sometimes confluent, forming an inverted V-shaped impression on the face; scrobes separated, at least basally, by a well-developed interscrobal prominence. Antenna eleven-segmented; scape usually subcylindrical, usually plainly more than three times as long as broad, rarely broadly and laminately expanded ventrally; funicle six-segmented, often varying in shape intraspecifically; club three-segmented, rounded, or slightly truncate apically, often longer than the distal three funicle segments together; all club segments with rhinaria. Mandible with two teeth and a large more or less straight dorsal truncation; maxillary palpi each with four segments, the labial each with three. Frontoververtex and face with fine to fairly coarse cellulate-reticulate sculpture, the integument with or without fine punctations, the latter usually giving rise to fine setae; eyes never densely pubescent.

Thorax with mesoscutum wider than long, the scutellum more or less as long as wide; mesoscutum without parapsidal sulci; thoracic dorsum ranging from rather flat to moderately convex in profile, the axillae usually slightly elevated; mesonotum with sculpture of mesoscutum and scutellum sometimes different. Fore wing about 2.5 times as long as wide; marginal vein punctiform or relatively short (except *P. pulvinatus*), the postmarginal vein shorter than stigmal; marginal fringe developed, except in *P. ornatus*. Legs not especially modified.

Abdomen usually longer than, or sometimes shorter than, thorax; cercal plates placed more or less halfway between base and apex of gaster; ovipositor usually not protruding strongly at gastral apex, the gonostyli varying in shape.

MALE. Colour: brilliant metallic like the female, but almost always green; maculation of the legs usually as in the female, sometimes with additional infuscations on the hind tibia.

Structurally much as in the female except as follows: frontoververtex relatively broader (1:1.8-2.0) in relation to head width; toruli higher on face, their lower limits at, or a little above, lower eye margins; scrobes impressed on face as two relatively shallow, short, broad, slightly converging furrows. The antenna, like the other characters mentioned above, is similar in all but two of the species described here, differing intraspecifically mainly in the dimensions of the funicle segments; scape short, about twice as long as broad; pedicel small, cylindrical, shorter than basal funicle segment; funicle six-segmented, the segments not flattened, often subequal in size and at least the basal four or five each longer than wide; club not segmented, more or less as long as the distal two funicle segments together, about as wide as funicle segment VI, parallel-sided, narrowly rounded apically; flagellum clothed with long setae as in fig. 7. In *P. arytainae* and *P. dispar*, the antenna is quite different, as described for these species below.

#### Key to the southern African species of *Psyllaephagus*

##### FEMALES

- |  |                  |
|--|------------------|
| 1 Fore wing entirely hyaline .....   | 2                |
| — Fore wing with a large, distinct, but palely infuscated patch below apex of venation (fig. 71) .....   | <b>dispar</b>    |
| 2 Antennal scape strongly expanded ventrally, about twice as long as its greatest width (fig. 76) .....  | <b>arytainae</b> |
| — Antennal scape at most a little expanded ventrally, three to six times as long as broad (figs 1, 13, 23) .....   | 3                |
| 3 Head and body entirely blackish-brown to black, usually without a metallic lustre, the scutellum at most with a faint greenish tinge in plays of light ..... | 4                |

- Head and body usually brilliant metallic green to blue, or black with a moderate to strong metallic lustre on certain parts ..... 5
- 4 Fore leg with coxa blackish-brown, the femur with dark suffusions ..... **harrisoni**
- Fore leg with coxa and femur entirely pale ..... **pulvinatus**
- 5 Hind tibia entirely pale, usually sordid white or yellowish white ..... 10
- Hind tibia darkly marked ..... 6
- 6 Hind tibia with a short blackish band near its basal end, the remainder of the segment pale (fig. 80) ..... **viridis**
- Hind tibia with at least basal half or so darkly suffused ..... 7
- 7 Fore femur entirely yellowish white to yellow ..... **furvus**
- Fore femur darkly infuscated, only the basal and distal ends of the segment pale ..... 8
- 8 Head and body brilliant metallic blue-green, the face with a purplish tinge in plays of light; legs, apart from the blackish parts, yellowish-white ..... **cincticrus**
- Head and body generally black with a bronze or greenish lustre on certain parts; legs, apart from the blackish areas, sordid white to brown ..... 9
- 9 Antennal funicle with all segments each wider than long, the club as long as the distal four funicle segments together (fig. 62) ..... **vastus**
- At least basal four or five funicle segments longer than wide, the club as long as the distal three funicle segments together (fig. 65) ..... **lucaris**
- 10 Marginal fringe of fore wing absent along distal wing margin ..... **ornatus**
- Marginal fringe of fore wing relatively well developed ..... 11
- 11 Mesonotum bicolorous, the mesoscutum green, the axillae and scutellum dark purple ..... 12
- Mesonotum more or less unicolorous ..... 13
- 12 Fore coxa and hind femur entirely pale ..... **chianganus**
- Fore coxa and hind femur largely blackish ..... **bicolor**
- 13 Legs entirely pale except for hind coxa, which is infuscated ..... **albicus**
- Hind femur and at least middle and hind coxae darkly infuscated ..... 14
- 14 Fore and middle femora largely blackish ..... **secus**
- Fore and middle femora pale, yellowish-white to sordid white ..... 15
- 15 Head entirely metallic green, the face without a bluish or purplish lustre on certain parts ..... **parvus**
- Face partly or entirely tinged with blue or purple ..... 16
- 16 Gonostyli long and slender (fig. 29), protruding strongly at apex of gaster ..... **callainus**
- Gonostyli relatively short (figs 14, 19, 17, 24), protruding at most slightly apically ..... 17
- 17 Antenna long and slender, the scape about six times as long as broad, the funicle segments all longer than broad (fig. 23) ..... **rhusae**
- Antenna with scape plainly less than six times as long as broad, the funicle with at least some segments wider than long ..... 18
- 18 Fore coxa pale, at most slightly infuscated basally, the middle and hind coxae brown to blackish-brown ..... **argutus**
- All coxae darkly infuscated ..... 19
- 19 Small species, about 1 mm long; antennal flagellum yellowish, with a faint orange tinge in some specimens; ovipositor shorter than middle tibia, the gonostyli short and broad (fig. 14) ..... **capeneri**
- Larger species, 1.5–2 mm long; antennal flagellum sordid white to brown; ovipositor longer than middle tibia, the gonostyli elongate, slender (fig. 17) ..... **oleae**

*Psyllaephagus harrisoni* (Robinson), figs 1–3

**Coccidoxenus harrisoni** Robinson, 1960a: 371–4.

**Psyllaephagus harrisoni** (Robinson): Annecke & Insley 1971: 23, 39.

Annecke & Insley (1971) transferred this species from *Coccidoxenus* Crawford (now known as *Trichomasthus* Thomson) to *Psyllaephagus* and listed some characters

which place *harrisoni* in the latter genus rather than in *Trichomasthus*. I agree with their placement, although *harrisoni* differs somewhat from the usual *Psyllaephagus habitus* in the head and body, which are predominantly blackish-brown, with only a very faint metallic lustre on certain parts; and in the relatively long marginal vein of the fore wing.

Robinson's (1960a) description of *harrisoni* does not need to be supplemented, and this species is separated from its southern African congeners in the foregoing key and by figs 1-3.

Annecke & Insley (1971) did not give details of the topotypical and other material of *harrisoni* studied by them. This material, together with additional specimens collected since, is listed below. The type-series and all those mentioned below were reared from undetermined species of *Diaphorina*.

**MATERIAL EXAMINED. SOUTH AFRICA:** Rustenburg, Tvl. xii.1968, on *Heeria salicina* (2 ♀, T 2872); Elandshoek, Tvl. xi.1968, on *Clerodendron myricoides* (10 ♀ 4 ♂, T 2871); both series det. D. P. Annecke; Pietersburg, Tvl., 1964, A. L. Capener, on *Ozoroa reticulata* (16 ♀ 8 ♂, T 2084); Roodeplaat (nr Pretoria), Tvl., ii.1964, on *Solanum* sp. (6 ♂, T 1740); Gulu Mouth (nr East London), C.P., iii-iv.1965 (60 ♀, T 1948); Pienaarspoort (nr Pretoria), on *Rhus* sp. (2 ♀ 2 ♂, T 1737); all the above-mentioned material collected by A. L. Capener, and reared from *Diaphorina* sp.

*Psyllaephagus pulvinatus* (Waterston), fig. 4

**Encyrtus pulvinatus** Waterston, 1922: 47-9.

**Aphidencyrtus pulvinatus** (Waterston): Robinson 1960b: 491-2.

**Aphidencyrtus coccidicola** Gahan, 1932: 221-2; Robinson 1960b: 491.

**Psyllaephagus pulvinatus** (Waterston): Annecke & Cilliers 1963: 189-90.

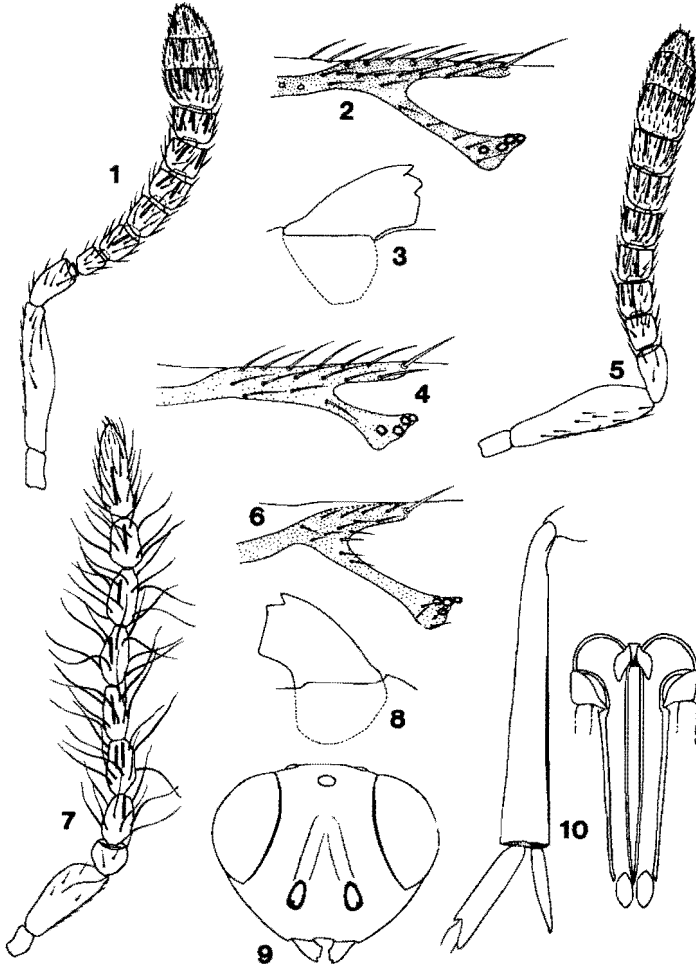
The identity of this rather well known parasite of the citrus psylla, in Africa has been dealt with by Robinson (1960b) and Annecke & Cilliers (1963), and McDaniel & Moran (1972) reported on its biology. Waterston's (1922) description and illustrations of *P. pulvinatus* are accurate, as is his description of *coccidicola*, and need not be amplified.

Like *P. harrisoni*, *P. pulvinatus* differs somewhat from the typical *Psyllaephagus habitus*, especially in the colour of the head and body, which is only faintly metallic, and in the well-developed marginal vein of the fore wing (fig. 4), which is longer than the stigmal vein. The latter character readily separates *pulvinatus* from other species of *Psyllaephagus*.

**MATERIAL EXAMINED. ERITREA:** 'Faghena, eastern slopes, 29.iv.1946, Dr G. Jannone, T 34, parasite of *Spanioze erytrae*' (now known as *Trioza erytrae*), 2 ♀ 1 ♂; **KENYA:** 'Kiambu, 8.x.1929, R. H. le Pelley, ex *Trioza merwei*' (now known as *T. erytrae*) 1 ♂, det. Ch. Ferrière; both series mentioned in Robinson (1960b); **ZIMBABWE:** Hippo Valley, xii.1978, S. Kamburov, ex psyllids on citrus (5 ♀ 4 ♂, T 5483). **ANGOLA:** Gangassol, L. Amorim, i.1971 ex *T. erytrae* on citrus (5 ♀ T 4881). **SOUTH AFRICA:** St Michaels-on-Sea, Ntl, xi.1974, B. Smallwood, ex *T. erytrae* on citrus (many ♀ ♂, T 4920, det. D. P. Annecke); Port Elizabeth, C.P., ii.1966, K. Elliot, ex citrus psylla on lemon (5 ♀ 3 ♂, T 2109); Nelspruit, Tvl, material as detailed in Annecke & Cilliers (1963).

*Psyllaephagus ornatus* spec. nov., figs 5-10, 80

This species is represented by nine series, all reared from species of *Diaphorina*. *P. ornatus* is readily distinguished by the absence of a marginal fringe on the fore wing of the female, and by the peculiar shape of the gonostyli.



Figs 1-10. *Psyllaephagus* spp. 1-3. *P. harrisoni* (Robinson), female (T 2871-1). 1. Antenna. 2. Fore wing venation. 3. Mandible. 4. *P. pulvinatus* (Waterston), female, fore wing venation (T 620-2). 5-10. *P. ornatus* spec. nov., paratypes. 5. Antenna (♀ T 3162-1). 6. Fore wing venation (♀ T 3442-1). 7. Antenna (♂ 3162-2). 8. Mandible (♀ T 3162-1). 9. Head, anterior view (♀ T 3162-1). 10. Ovipositor and middle tibia, drawn to the same scale (♀ T 3442-1).

**FEMALE.** Length: ranging from 1 to 2 mm. Colour: head and thoracic dorsum dark metallic green to blue-green, the sides of face between antennal sockets and inner eye margins bluish purple; thoracic dorsum tinged with bronze in plays of light; sides of thorax, and abdomen, brownish black to black with a faint metallic green or bronze lustre; tegulae yellowish white basally, blackish distally; antenna with radicle, scape and pedicel largely brownish black, the latter two segments fading to sordid white at their distal ends; remainder of antenna sordid white to brown; legs mostly pale yellow except all coxae and hind femur, which are largely brownish black with a faint metallic tinge, the maculation as in fig. 8o.

Head, in dorsal view (occiput perpendicular), with anterior margin gently concave medially, bulging at the eyes; junction of frontovertex and occiput subacute; head somewhat more than twice as wide as frontovertex at median ocellus (2,2-2,4:1); ocelli in an obtuse-angled triangle; head, in frontal view (fig. 9) with upper limits of toruli about level with lower eye margins; scrobes impressed on face as an inverted V, deep, their lateral margins subacutely angled; interscrobial prominence gently convex, extending from toruli upwards to scrobial confluence. Antenna (fig. 5) with scape more or less than four times (3,5-4,2:1) as long as its greatest width; funicle segments I-V each subquadrate or quadrate, I usually a little smaller than II-V which are subequal in size; VI wider than long; funicle segments I-VI, or II-VI; with rhinaria; club about as long as the distal three funicle segments together; mandible as in fig. 8; frontovertex and face with slightly raised fairly coarse sculpture, the frontovertex finely, evenly, and moderately densely punctate.

Thorax moderately convex from side to side and anteroposteriorly; sculpture of mesonotum slightly finer than on head, the cells on mesoscutum small, more or less round, those on scutellum mostly somewhat elongate and longitudinally oriented; scutellum with about 40 setae. Basal half of fore wing with one or two rows of setae extending along submarginal vein, otherwise fairly densely setose from a level about halfway along submarginal vein to speculum, the latter complete except for a few setae at caudal margin; venation as in fig. 6; marginal cilia very short and sparse along cephalic wing margin, absent along distal and caudal margins. Middle leg with tibial spur a little shorter than basal tarsal segment.

Abdomen slightly shorter than thorax in cleared slide-mounts; ovipositor (fig. 10) about one-half as long as gaster as seen through the derm in most specimens, a little shorter than middle tibia (1:1,1-1,3); ovipositor about 7,5-8,2 times as long as gonostyli, the latter small, appearing almost rudder-shaped, protruding by about one-half their length at gastral apex.

**MALE.** Colour: differing from that of the female as follows: the metallic green on the head and thorax appearing a little more brilliant in most specimens, the frontovertex and face with a bronze tinge in certain parts, not bluish or purplish; antenna entirely yellowish except the pedicel, which is largely dark brown on its dorsal and lateral surfaces; flagellum clothed with dark setae. Antenna as in fig. 7.

**MATERIAL EXAMINED.** ♀ Holotype, 162 ♀ 48 ♂ paratypes with the following data: SOUTH AFRICA: Assen, Tvl, ix.1969, H. P. Insley, ex *Diaphorina albomaculata* Capener on *Ozoroa paniculosa* (holotype, 18 ♀ 13 ♂, T 3162); Magaliesburg, Tvl, iv.1970, H. P. Insley, ex *Diaphorina natalensis* (Petty) on *Rhus* sp. (144 ♀ 35 ♂, T 3442). 2 ♀ 2 ♂ paratypes in BMNH.



The following series, some of which differ from the type material as indicated below, are not included in the types.

SOUTH AFRICA: Pienaarspoort (nr Pretoria), Tvl, ii.1964, A. L. Capener, ex *Diaphorina natalensis* on *Rhus* sp. (66 ♀ 57 ♂, T 1738); Roodeplaat (nr Pretoria), ii.1964, A. L. Capener, ex *D. solani* Capener on *Solanum* sp. (39 ♀ 27 ♂, T 1739); Pretoria, xi.1965, M. J. Mynhardt, ex *D. natalensis* on *Rhus* sp. (17 ♀ 7 ♂, T 2104); Van Stadens Pass, C. P., iii.1970, H. P. Insley, ex *D. carissae* (Petty) on *Carissa bispinosa* (5 ♀, T 3369). The slide-mounted and dried specimens of these series do not differ significantly from those of the type-series.

SOUTH AFRICA: Buffelspoort, Tvl., xii.1966, A. L. Capener, ex *D. carissae* on *Carissa bispinosa* (2 ♀ 5 ♂, T 2373). This series comprises only dried and alcohol material which do not appear to differ from the types.

SOUTH AFRICA: Roodeplaat (nr Pretoria), Tvl, ii.1964, A. L. Capener, ex *D. natalensis* on *Rhus pyroides* (8 ♀ 6 ♂, T 1734); Pietersburg, Tvl, 1964, A. L. Capener, ex *Diaphorina* sp. on *Ozoroa reticulata* (9 ♀ 5 ♂, T 2085). In both these series there are slide-mounted females in which the antennal scape is slightly less than five times as long as broad.

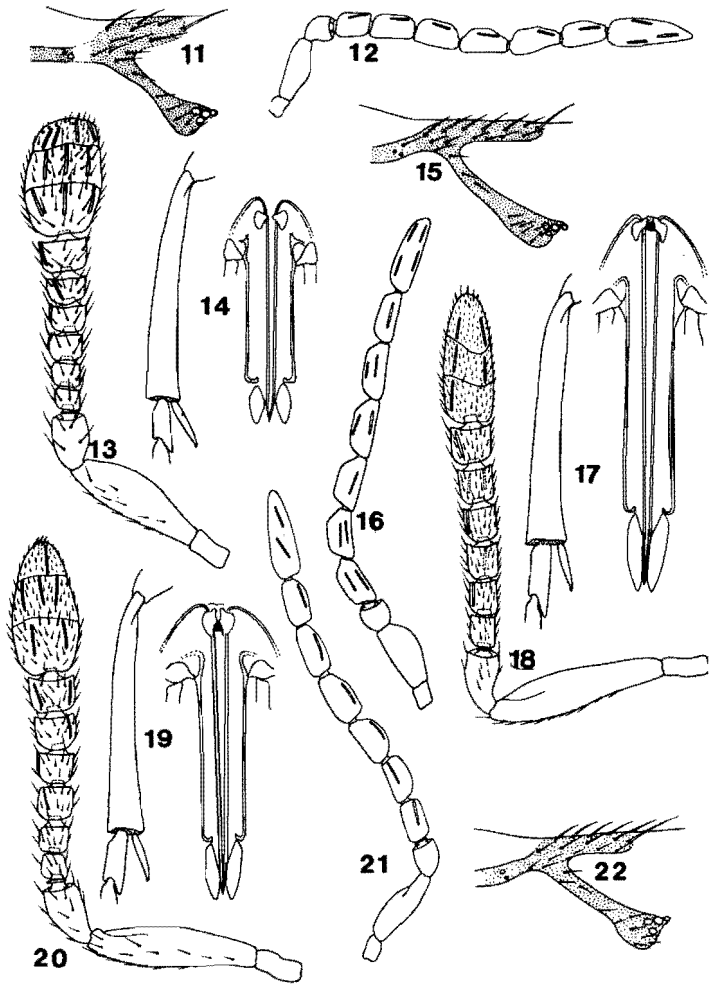
*Psyllaephagus capeneri* spec. nov., fig 11-14, 80

This new species resembles *P. ornatus* in general colour, in the maculation of the legs, and in the short and broad gonostyli, but is distinguished from that species by, *inter alia*, the smaller size, shape and colour of the antennae and by the presence of a well-developed marginal fringe on the fore wing of the female. *P. capeneri* is described from four series, all reared from species of *Pseudophacopteron* and collected at Pretoria, Transvaal.

This species is named for Mr A. L. Capener, formerly of the Plant Protection Research Institute, Pretoria, who collected the type material as well as a great deal of the other material on which this study is based.

FEMALE. Small species. Length about 1 mm. Colour: head and thoracic dorsum dark metallic green, the face with a bluish green to blue tinge and two conspicuous purple markings at junction of frontovertex and face, one each between outer margin of scrobe and inner eye margin; sides of thorax, and abdomen, brownish black to black, with a fairly strong metallic green tinge; tegulae whitish basally, dusky distally; basal half or so of scape, and dorsal surface of pedicel, unevenly suffused with brown to blackish brown, the remainder of antenna yellowish, washed with pale orange in most specimens; legs whitish, semi-translucent except for all coxae and hind femur, which are largely blackish brown, the maculation as in fig. 80.

Head, in dorsal view (occiput perpendicular), with anterior margin gently convex; fronto-occipital margin subacute; head about twice as wide as frontovertex at median ocellus (2.0-2.1:1); head in frontal view with scrobes relatively weakly impressed on face, converging, but not confluent dorsally, their lateral margins rounded; interscrobial prominence only slightly elevated, extending about halfway along length of scrobes. Antenna (fig. 13) relatively short, the scape about three to four times as long as broad; funicle segments in most specimens all wider than long, or with basal one or two segments quadrate; segments I-II subequal in size, usually a little smaller than each of III-V, which are subequal; segment VI usually plainly wider than the preceding segments; club large, broad, broadly rounded or slightly truncate apically, as



Figs 11-22. *Psyllaephagus* ssp. 11-14. *P. capeneri* spec. nov., paratypes. 11. Fore wing venation (♀ T 2006-1). 12. Antenna (♂ T 3973-5). 13. Antenna (♀ T 2006-1). 14. Ovipositor and middle tibia, drawn to the same scale (♀ T 4368-2). 15-18. *P. oleae* spec. nov., paratypes. 15. Fore wing venation (♀ T 1744-1). 16. Antenna (♂ T 1744-2). 17. Ovipositor and middle tibia, drawn to the same scale (♀ T 1744-1). 18. Antenna (♀ T 1735-1). 19-22. *P. argutus* spec. nov., paratypes. 19. Ovipositor and middle tibia, drawn to the same scale (♀ T 1851-2). 20. Antenna (♀ T 1851-1). 21. Antenna (♂ T 3511-4). 22. Fore wing venation (♀ T 1851-1).

long as the distal three-and-a-half funicle segments together; funicle segments II–VI or III–VI with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head very slightly raised, the frontovertex finely, somewhat unevenly, and moderately densely, punctate.

Thorax gently rounded from side to side; mesonotal sculpture much as on head, and similar on mesoscutum and scutellum, the cells mostly more or less round, except at sides of scutellum where they are elongate and longitudinally oriented; scutellum with about 30–40 setae. Fore wing with venation as in fig. 11; basal half of fore-wing disc sparsely and unevenly setose to speculum, the latter complete; marginal fringe well developed, the cilia along distal wing margin about one-half as long as setae on submarginal vein. Middle tibial spur a trifle shorter than adjacent tarsal segment.

Abdomen shorter than thorax, the gaster broad and short, broadly rounded apically; ovipositor (fig. 14) more than one-half length of gaster as seen through the derm, a little shorter than middle tibia (1:1,1–1,3), about 5,0–5,5 times as long as gonostyli, the latter broad, relatively short, shorter than middle tibial spur (about 1–1,3), protruding a little at gastral apex.

**MALE.** Colour: head metallic green to bluish green except for the posterior area of frontovertex from the level of the lateral ocelli to junction with occiput, which is copperish; thoracic dorsum a mixture of metallic green and copper; antenna with scape yellow; pedicel largely blackish brown, the remainder of antenna a little paler; legs as in female except hind tibia, which is largely blackish brown. Antenna as in fig. 12, the setation similar to that found in *P. ornatus*.

**MATERIAL EXAMINED.** ♀ Holotype, 96 ♀ 3 ♂ paratypes with the following data: SOUTH AFRICA: Pretoria, Tvl. x.1965, A. L. Capener, ex *Pseudophacopteron pretoriensis* Capener on *Ekebergia capensis* (12 ♀ 1 ♂, T 2006); same data, except accession number (20 ♀, T 2007); same data except: x.1971, on *Harpephyllum caffrum* (holotype, 58 ♀ 2 ♂, T 3973); same data except: ix.1972, ex *Pseudophacopteron* sp. (6 ♀, T 4368). 4 ♀ paratypes in BMNH.

### *Psyllaephagus oleae* spec. nov., figs 15–18, 80

*P. oleae* is here recorded from three series from the Transvaal, reared from *Euphyllura longiciliata* Silvestri on olives, and a single series from Angola, the host of which is not known. This new species resembles a number of other species dealt with here, but is separated by a combination of structural characters described below.

**FEMALE.** Length: about 1,5–2 mm. Colour: head and thoracic dorsum usually brilliant metallic blue-green, rarely green; upper part of face between lateral margins of scrobes and inner eye margins with a purplish tinge; tegulae largely pale yellow, the distal ends darkly suffused; lateral parts of thorax, and abdomen with a strong metallic green lustre; antenna with radicle, scape and pedicel mostly brownish black to black except the distal ends of the latter two segments, which are sordid white; flagellum sordid white to brown, in some specimens with uneven darker suffusions; legs yellowish white to pale yellow except all coxae and hind femur, which are largely brownish black, the maculation as in fig. 80; coxae with a metallic green tinge in plays of light.

Head, in dorsal view (occiput perpendicular) with anterior margin very gently convex, almost straight; fronto-occipital margin abruptly rounded; head about 2,5 times as wide as frontovertex at median ocellus; head, in frontal view, with upper

limits of toruli level with lower eye margins; scrobes with lateral margins subacute, converging strongly, but not confluent dorsally; interscrobial prominence broad, gently convex, extending about three-fourths length of scrobes, the upper interscrobial area with a large but inconspicuous median fovea. Antenna (fig. 18) variable: scape about four times as long as broad (3,8-4,2:1); all funicle segments subequal in length, I-II, or I-III, each a little longer than wide, the remaining segments each quadrate except for VI, which is a little wider than long; club about as long as the distal three-and-a-half funicle segments together; funicle segments II-VI with rhinaria; in one slide-mounted specimen, the scape is 3,2 times as long as wide, funicle segments I-V are each longer than wide, VI is quadrate, and the club is as long as the distal three funicle segments together. Mandible much as in *P. ornatus*. Head rather coarsely sculptured, the cells small, their margins thickened and raised; frontovertex densely punctate.

Thorax with mesoscutum gently convex from side to side, the scutellum appearing almost disc-like; mesonotal sculpture much as on head, similar on mesoscutum and scutellum, the cells small, more or less round; scutellum with about 30-40 setae. Basal half of fore-wing disc finely setose from wing base to speculum, the latter interrupted in its caudal one-third or so by a row of fine setae, the caudal extreme with another row of fine setae; venation as in fig. 15; marginal cilia along distal wing margin about one-third as long as longest setae on submarginal vein. Middle leg with tibial spur shorter than basal tarsal segment.

Abdomen a little longer than thorax; ovipositor (fig. 17) about two-thirds length of gaster as seen through the derm in cleared slide-mounts, about 1,3-1,4 times as long as middle tibia; gonostyli slender, protruding by about one-half their length at gastral apex, about one-fifth length of ovipositor, about 1,4 times as long as middle tibial spur.

**MALE.** Colour: head and thorax largely metallic green to blue-green, the scutellum with a faint bronze tinge in some specimens, the face without a bluish or purplish lustre on certain parts as in female; antenna with radicle blackish, the scape yellow; pedicel (except for pale distal end) and flagellum blackish brown; legs as in female except hind tibia, which is suffused with blackish brown along its outer and lateral margins. Antenna as in fig. 16, the setation much as in *P. ornatus*.

In one of the type-series (T 1735), two female and one male slide-mounted specimens were found which differ from the remaining type-specimens in the sculpture of the mesonotum, which is finer, with larger cells, and in the base of the fore-wing disc, which is devoid of setae. These three specimens are not included in the type-material. They may represent a different species, but a final conclusion as to their identity will have to be held over until additional series are collected.

**MATERIAL EXAMINED.** ♀ Holotype, 34 ♀ 24 ♂ paratypes with the following data: SOUTH AFRICA: Roodeplaat (nr Pretoria), Tvl. ii.1964, A. L. Capener, ex *Euphyllura longiciliata* Silvestri on *Olea africana* (♀ holotype, 28 ♀ 21 ♂, T 1735); same data, except: v.1964, on *Olea europaea* (4 ♀ 3 ♂, T 1744). 2 ♀ 2 ♂ paratypes in BMNH.

The following series are not included in the types.

SOUTH AFRICA: Broederstroom, Tvl., v.1969, H. P. Insley, ex *Euphyllura longiciliata* on *Olea africana* (11 ♀ 9 ♂, T 3046). ANGOLA: Chianga, x.1971, A. van Harten, ex undetermined psyllids on *Faurea discolor* (8 ♀, T 4230). Like the type material, the female funicle varies in shape in the latter series; in some specimens

segments I–V are longer than wide, and in others segments I–IV are longer than wide, V is quadrate, and VI is slightly wider than long; in the two slide-mounted specimens, segments I–VI have rhinaria.

***Psyllaephagus argutus* spec. nov., figs 19–22, 80**

Three of the four type-series on which this new species is based were reared from species of *Agonoscena* on *Rhus*, and the fourth, of which the host is unknown, emerged from a sample containing scale insects, also collected on *Rhus*.

**FEMALE.** Length: about 1.0–1.25 mm. Colour: head and thoracic dorsum metallic green, the face from above toruli to junction with frontovertex with a strong purple lustre, the surface with an additional bluish tinge on certain parts in some specimens; tegulae mostly sordid white except for their distal ends, which appear blackish; sides of thorax, and abdomen, brownish black to black with a relatively weak metallic tinge; antenna with radicle, scape and pedicel largely brown to blackish brown, fading somewhat at their distal ends; flagellum a little paler than the preceding segments, sordid white to pale brown; fore coxa usually pale, in some specimens with brownish suffusions basally; middle coxa brown to blackish brown, fading to sordid white distally; hind coxa blackish brown; legs otherwise yellowish white to sordid white, except hind femur which is boldly marked with blackish brown, the maculation as in fig. 80.

Head, in dorsal view (occiput perpendicular), with anterior margin slightly concave medially, bulging gently at the eyes; fronto-occipital margin subacute or abruptly rounded; head about twice as wide as frontovertex at median ocellus (2.0–2.2:1); ocelli in a slightly obtuse-angled triangle; head, in frontal view, with upper limits of toruli level with lower eye margins; scrobes moderately deep, converging, but not confluent dorsally, their lateral margins subacute; interscrobial prominence gently convex, broad basally, extending about half the length of scrobes, the upper interscrobial area almost flat. Antenna (fig. 20) variable: scape more or less than four times as long as broad (3.7–4.4:1); funicle with basal two segments each quadrate or a trifle wider than long, subequal in size, smaller than each of the preceding funicle segments; segments III–VI each wider than long, increasing usually gradually and slightly in width towards the club; III and IV in some specimens quadrate, or IV sometimes narrower than III; club large, plainly broader than distal funicle segment, as long as the distal three-and-a-half to four funicle segments together, the septum dividing the distal two club segments sometimes incomplete on one surface; funicle segments III–VI with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head somewhat raised, the frontovertex with fine, scattered punctations.

Thoracic dorsum gently convex from side to side; mesonotal sculpture much as on head, the cells large, mostly more or less round, similar on mesoscutum and scutellum; scutellum with about 25–30 setae. Fore-wing disc setose from near base to speculum, the latter complete except for a few setae at its caudal extreme; venation as in fig. 22; marginal cilia along distal wing margin about one-half as long as longest setae on submarginal vein. Middle leg with tibial spur a little shorter than basal tarsal segment.

Abdomen a little longer than thorax; ovipositor (fig. 19), as seen through the derm, more or less than two-thirds as long as gaster, a little longer than middle tibia

(about 1,2:1), 5,0–5,5 times as long as gonostyli, the latter about as long as middle tibial spur, protruding by about one-half their length at gastral apex.

**MALE.** The male is known from two slide-mounted specimens; in these, the antenna is pale except the pedicel, which is largely brown, and the legs are as in the female save for the hind tibia, which is darkly suffused. Antenna as in fig. 21, the setation much as in *P. ornatus*.

**MATERIAL EXAMINED.** ♀ Holotype, 77 ♀ 2 ♂ paratypes with the following data: SOUTH AFRICA: Hennops River, Tvl, x.1964, M. J. Mynhardt, ex *Agonoscena* sp. on *Rhus* sp. (holotype, 24 ♀, T 1851); Somerset West, C.P., ii.1969, H. P. Insley, ex *Agonoscena crotolariae* (Petty) on *Rhus angustifolia* (9 ♀, T 2959); Jeffreys Bay, C.P., iii.1970, H. P. Insley, ex *Agonoscena* sp. on *Rhus schlechteri* (11 ♀, T 3370); Plettenberg Bay, C.P., iii.1970, H. P. Insley, with scale insects on *Rhus* sp. (33 ♀, T 3511). 4 ♀ paratypes in BMNH.

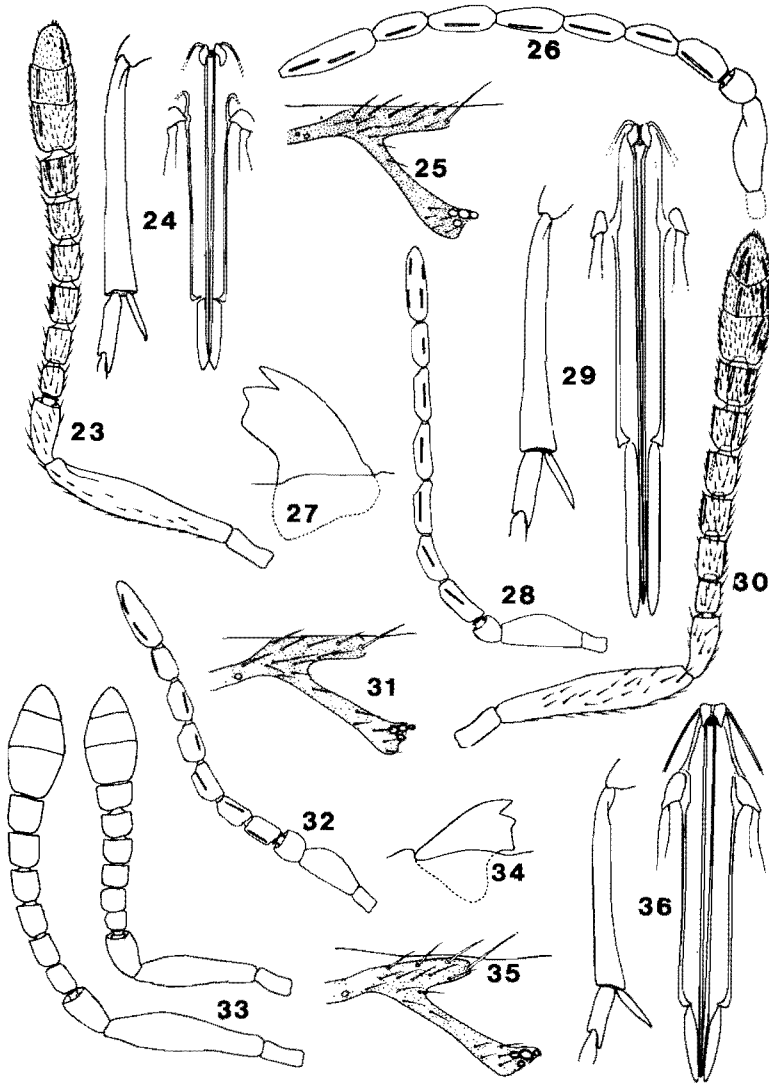
***Psyllaephagus rhusae* spec. nov., figs 23–26, 80**

This new species is fairly similar to a number of other species dealt with here which have the legs similarly marked, but differs in the female in the characters of the antenna, ovipositor and thoracic sculpture. *P. rhusae* is described from a single series reared from an undetermined psyllid.

**FEMALE.** Length: about 1,25–1,5 mm. Colour: head and thoracic dorsum dark metallic green, the face from toruli to junction with frontovertex with a strong, dark purple lustre; basal half or so of tegulae yellow, the distal half blackish; sides of thorax, and abdomen, brownish black to black, with a weak to moderately strong metallic tinge; antennal radicle, scape and pedicel largely brownish black, the latter two segments fading to sordid white at their distal ends; flagellum sordid white to brown, the basal two or three funicle segments usually darker than the remaining flagellar segments; legs pale yellow except all coxae and hind femur, which are largely brownish black, the maculation as in fig. 80.

Head, in dorsal view (occiput perpendicular), with front margin very gently concave medially; fronto-occipital margin subacute; head about 2,5 times as wide as frontovertex at median ocellus; ocelli in an obtuse-angled triangle; head, in frontal view, with upper limits of toruli a trifle below lower eye margins; scrobes relatively shallow, their lateral margins not acute, converging, but not quite confluent dorsally; interscrobial prominence broad, extending to near upper limits of scrobes. Antenna (fig. 23) long and slender; scape about six times as long as broad; funicle with segments I–V each longer than broad, I a little smaller than II–V, which are subequal in size; segment VI quadrate or slightly longer than wide; club about as long as the distal three funicle segments together; funicle segments III–VI with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head relatively fine, the frontovertex finely and sparsely punctate.

Thorax appearing rather flat, only gently convex from side to side; mesonotal sculpture much as on head, the cells mostly more or less round, shaped similarly on mesoscutum and scutellum; scutellum with about 40–45 setae. Basal half of fore-wing disc evenly and finely setose from near wing base to speculum, the latter complete except the odd fine seta at caudal extreme; venation as in fig. 25; cilia along distal wing



Figs 23–36. *Psyllaephyagus* spp. 23–26. *P. rhusae* spec. nov., paratypes. 23. Antenna (♀ T 3623-1). 24. Ovipositor and middle tibia, drawn to the same scale (♀ T 3623-2). 25. Fore wing venation (♀ T 3623-2). 26. Antenna (♂ T 3623-6). 27–31. *P. callainus* spec. nov., paratypes. 27. Mandible (♀ T 3930-2). 28. Antenna (♂ T 3930-4). 29. Ovipositor and middle tibia, drawn to the same scale (♀ T 3164-1). 30. Antenna (♀ T 3164-2). 31. Fore wing venation (♀ T 3164-1). 32–36. *P. parvus* spec. nov., paratypes. 32. Antenna (♂ T 1733-5). 33. Antennae of two females (left T 1733-4, right T 1733-3) showing variation. 34. Mandible (♀ T 1733-2). 35. Fore wing venation (♀ T 1733-1). 36. Ovipositor and middle tibia, drawn to the same scale (♀ T 1733-3).

margin about one-half as long as longest setae on submarginal vein. Middle tibial spur shorter than adjacent tarsal segment.

Abdomen longer than thorax; ovipositor, as seen through the derm (fig. 24), about one-half as long as gaster, about 1,2 times as long as middle tibia, not quite five times as long as gonostyli, the latter about as long as, or a little longer than, middle tibial spur.

**MALE.** Colour: head metallic green, the hind margin of frontovertex tinged with purple in most specimens; antenna pale yellow, except the dorsal and lateral parts of pedicel which are largely blackish brown; flagellum clothed with dark setae; mesoscutum a slightly darker green than head, suffused with a bronze lustre; scutellum and axillae largely purplish; tegulae and legs much as in female except hind tibia, which is darkly suffused along the lateral and dorsal surfaces. Antenna as in fig. 26, the setation much as in *P. ornatus*.

**MATERIAL EXAMINED.** ♀ Holotype, 37 ♀ 27 ♂ paratypes with the following data: SOUTH AFRICA: Harrismith, O.F.S., viii.1970, H. P. Insley, ex undetermined psyllids on *Rhus pyroides* (T 3623). 2 ♀ 2 ♂ paratypes in BMNH.

***Psyllaephagus callainus* spec. nov., figs 27–31, 80**

This new species is readily separated from other species dealt with here that have the legs similarly marked, by its blue-green colour and by the ovipositor, which protrudes relatively strongly at apex of gaster. *P. callainus* is described from five series, of which three were reared from the nymphs of *Trichohermes insleyae* Capener on *Ziziphus mucronata*; a fourth series was reared from an undetermined psyllid on the same host plant; in all probability the host is also *T. insleyae*; the host of the fifth series is not known.

**FEMALE.** Length: about 1,5–2,25 mm. Colour: head and thoracic dorsum brilliant metallic blue-green, the face above toruli with a strong bluish purple tinge; tegulae white basally, otherwise blackish; sides of thorax, and abdomen, black with a green lustre; antenna with radicle, scape and pedicel largely black, only the distal ends of the latter two segments a little paler; flagellum blackish-brown; legs pale yellow except all coxae and hind femur, which are largely blackish-brown to black with a faint metallic tinge, the maculation as in fig. 80.

Head, in dorsal view (occiput perpendicular), with anterior margin approximately straight; fronto-occipital margin abruptly rounded; head about 2,3–2,5 times as wide as frontovertex at median ocellus; ocelli in a slightly obtuse-angled triangle; head, in frontal view, with upper limits of toruli level with lower eye margins; scrobes relatively shallow and broad, their lateral margins rounded; interscrobial prominence gently convex, not extending to near upper limits of scrobes. Antenna variable: scape 4,0–4,8 times as long as broad; funicle usually with segments I–V each longer than broad, VI quadrate (fig. 30), or segments generally more compact, I quadrate, II–V each subquadrate, and VI a little wider than long; club slender, as long as the distal three funicle segments together; funicle segments II–VI with rhinaria. Mandible as in fig. 27. Sculpture of head fairly coarse, the cells small, their margins slightly thickened; frontovertex densely punctate.

Thorax gently rounded from side to side; sculpture of mesonotum much as on



head, similar on mesoscutum and scutellum; scutellum with about 35-40 setae. Fore-wing venation as in fig. 31, the setation of the wing disc much as in *P. ornatus*; marginal cilia along distal wing margin about one-half as long as setae on submarginal vein. Middle tibial spur plainly shorter than adjacent tarsal segment.

Abdomen plainly longer than thorax, the gaster slender; ovipositor, as seen through the derm (fig. 29) extending to near base of gaster in most specimens and protruding strongly apically; ovipositor about twice as long as middle tibia, three times as long as gonostyli, the latter unusually long, slender, about 2.5-3.0 times as long as middle tibial spur, protruding by more than half their length at gastral apex.

MALE. Colour: head, body and legs much as in female except face, which is without a bluish or purplish lustre; antenna with radicle brownish, the scape yellow except a small infuscated mark in the middle of the outer surface; pedicel largely blackish-brown on its dorsal and ventral surface; remainder of antenna concolorous with scape, or a little darker, clothed with dark setae. Antenna as in fig. 28, the setation much as in *P. ornatus*.

MATERIAL EXAMINED. ♀ Holotype, 37 ♀ 40 ♂ paratypes with the following data: SOUTH AFRICA: Hartebeespoort Dam, Tvl., ix.1969, H. P. Insley, ex *Trichoermes insleyae* Capener on *Ziziphus mucronata* (7 ♀ 2 ♂, T 3164); Rustenburg, Tvl., ix.1971, A. L. Capener, same data (5 ♀ 6 ♂, T 3914); Pretoria, Tvl., ix.1971, H. P. Insley, same data (holotype, 17 ♀ 28 ♂, T 3930); Piensaarspoort (nr Pretoria), ix.1971, H. P. Insley, ex undetermined psyllid on *Z. mucronata* (8 ♀ 4 ♂, T 3958). 2 ♀ 2 ♂ paratypes in BMNH.

The following series is not included in the type-material: SOUTH AFRICA: East London, C.P., i.1968, C. J. Cilliers, with *Filippia chilianthi* Brain (2 ♀, T 2572).

### *Psyllaepagus parvus* spec. nov., figs 32-36, 80

*P. parvus* is readily separated in the female from related African species that have the legs similarly marked by the colour of the head, which is entirely metallic green, the face lacking a bluish or purplish lustre.

FEMALE. Length: 1.25-1.5 mm. Colour: head and thoracic dorsum entirely metallic green except mouth margin, which is sometimes faintly tinged with bronze; basal half or so of tegulae yellowish-white, the distal half blackish-brown; radicle, scape and pedicel brownish-black except base of scape, which is a little paler, and distal one-third or so of scape and distal end of pedicel, which are sordid white; remainder of antenna brownish with irregular darker suffusions; sides of thorax brownish-black, the abdomen black, these parts with weak to moderately strong metallic tinge in plays of light; legs yellowish-white except all coxae and hind femur, which are largely blackish-brown, the maculation as in fig. 80.

Head, in dorsal view (occiput perpendicular), with anterior margin very gently rounded, almost straight; fronto-occipital margin subacute; relative head width variable, 2.0-2.5 times as wide as frontovertex at median ocellus; ocelli in an obtuse-angled triangle; head, in frontal view, with upper limits of toruli a little above lower eye margins; scrobes converging, but not quite confluent dorsally, their lateral margins rounded; interscrobial prominence extending to near upper scrobial limit, gently convex. Antenna variable: in the four slide-mounted specimens of the same

series (T 1733), the dimensions of the funicle are different in all the specimens; in one specimen all the funicle segments are wider than long, and in the other specimens segments I–V are either quadrate or longer than wide; the club varies from as long as funicle segments III–VI together to IV–VI together, and the scape from 3,7 to 4,0 times as long as broad; some of the variation is shown in fig. 33. Mandible as in fig. 34. Sculpture of head relatively fine, the cells small, the frontovertex densely punctate.

Thorax rather flat and broad; mesonotal sculpture slightly finer than on head, similar on mesoscutum and scutellum; scutellum with about 35–40 setae; in the slide-mounted specimen, which has the funicle segments all wider than long (see above), the mesoscutum is a little less densely setose than in other specimens and the scutellum has 20 setae. Basal half of fore wing finely setose from near wing base to speculum, the latter complete save the odd fine seta at caudal extreme; venation as in fig. 35; cilia along distal wing margin about one-half as long as longest setae on submarginal vein. Middle tibial spur a little shorter than adjacent tarsal segment.

Abdomen longer than thorax; ovipositor long, about two-thirds length of gaster as seen through the derm in most specimens, about 1,7–1,9 times as long as middle tibia; ovipositor (fig. 36) about 4,7–5,5 times as long as gonostyli, the latter slender, about 1,4–1,7 times as long as middle tibial spur.

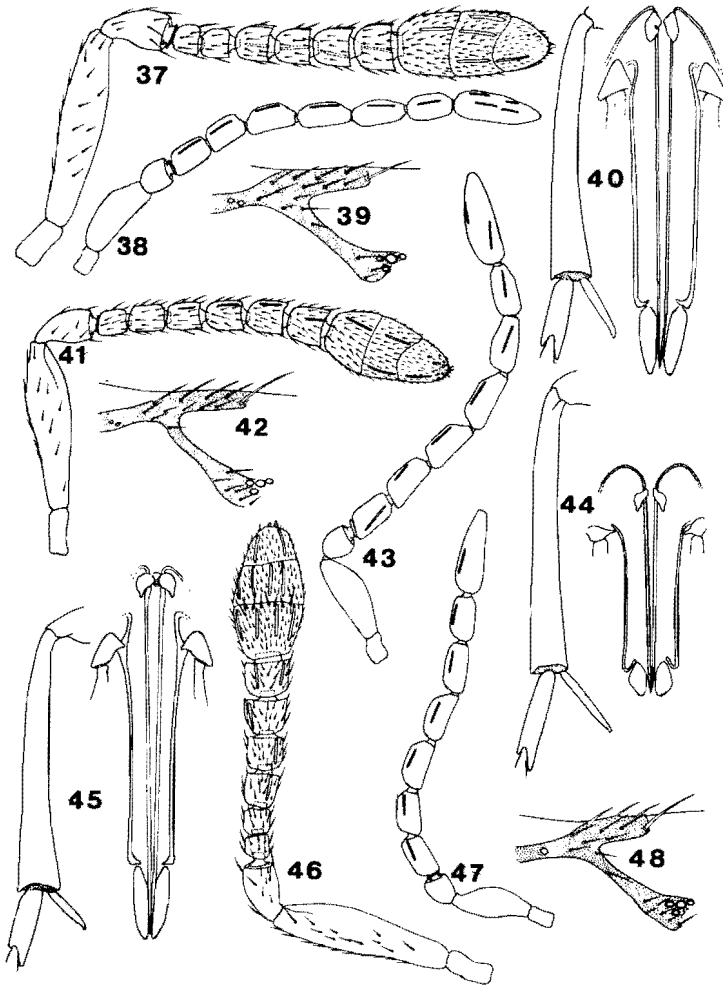
**MALE.** Colour: head brilliant metallic green; thorax a mixture of dark metallic green and bronze, appearing less brilliant than on head; antenna pale yellow except dorsal and lateral surfaces of pedicel, which are largely blackish-brown; otherwise much as in female except the outer and lateral surfaces of hind tibia which are largely darkly suffused. Antenna as in fig. 32, the setation much as in *P. ornatus*.

**MATERIAL EXAMINED.** ♀ Holotype, 9 ♀ 8 ♂ paratypes with the following data: SOUTH AFRICA: Rooodeplaas (nr Pretoria), Tvl., ii.1964, A. L. Capener, ex *Paurocephala* sp. on *Scolopia zeyheri* (T 1733).

***Psyllaephagus bicolor*** spec. nov., figs 37–40, 80

This species resembles *P. chianganus*, described below, in the bicolorous mesonotum, but differs from that species in leg colour (see fig. 80), and in a number of structural characters. The type-series of *P. bicolor* was reared from an undetermined species of psyllid.

**FEMALE.** Length: about 1,75 mm. Colour: head with face from antennal sockets to junction with frontovertex dark purple, the lower part of face from toruli to mouth margin, genae, and frontovertex, dark metallic green to blue-green; tegulae whitish basally, the remainder brown; mesoscutum concolorous with frontovertex, with a faint to moderately strong purple sheen in plays of light; axillae and scutellum dark purple, the posterolateral margin of scutellum tinged with metallic green; sides of thorax, and abdomen, black with a green tinge; antenna with radicle, scape and pedicel, dark blackish-brown to black except distal one-fourth or so of scape and distal end of pedicel, which are sordid white; flagellum sordid white to brown, the basal two funicle segments appearing a little darker than remainder of flagellum in some specimens; legs pale yellow except all coxae and hind femur, which are largely blackish-brown to black, the maculation as in fig. 80.



Figs 37-48. *Psyllaephagus* spp. 37-40. *P. bicolor* spec. nov., paratypes. 37. Antenna (♀ T 2023-1). 38. Antenna (♂ T 2023-2). 39. Fore wing venation (♀ T 2023-1). 40. Ovipositor and middle tibia, drawn to the same scale (♀ T 2023-1). 41-44. *P. chianganus* spec. nov., paratypes. 41. Antenna (♀ T 4231-1). 42. Fore wing venation (♀ T 4231-1). 43. Antenna (♂ T 4231-2). 44. Ovipositor and middle tibia, drawn to the same scale (♀ T 4231-1). 45-48. *P. viridis* spec. nov., paratypes. 45. Ovipositor and middle tibia, drawn to the same scale (♀ T 2000-1). 46. Antenna (♀ T 2000-1). 47. Antenna (♂ T 2000-2). 48. Fore wing venation (♀ T 2000-1).

Head, in dorsal view (occiput perpendicular), with anterior margin approximately straight or very gently concave medially; fronto-occipital margin almost acute; head about 2,5 times as wide as frontovertex at median ocellus; ocelli in a right or slightly obtuse-angled triangle; head, in frontal view, with upper limits of toruli about level with lower eye margins; scrobes deep, impressed on face as an inverted V; interscrobial prominence extending to near upper scrobial limits. Antenna (fig. 37) with scape about 4,5-4,8 times as long as broad; funicle segments I-V each subquadrate or quadrate, the basal two segments a little smaller than each of III-V; funicle VI wider than long; club about as long as funicle segments III-VI together; funicle segments III-VI with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head moderately coarse, the frontovertex densely and finely punctate.

Thorax moderately convex from side to side; mesonotal sculpture finer than on head, the cells not raised, much the same on mesoscutum and scutellum except those along sides of scutellum, which are somewhat elongate and longitudinally oriented; scutellum with about 40 setae. Basal part of fore wing finely setose, the setae evenly spaced from a level about halfway along submarginal vein to speculum, the latter complete save for a single row of fine setae at its caudal extreme; cilia along distal wing margin about one-half as long as setae on submarginal vein; venation as in fig. 39. Middle tibial spur shorter than adjacent tarsal segment.

Abdomen plainly longer than thorax in cleared slide-mounts; ovipositor, as seen through the derm, about one-half length of gaster, about 1,4 times as long as middle tibia, about five times as long as gonostyli, the latter about as long as middle tibial spur.

**MALE.** Colour: head brilliant metallic green without a purple lustre in parts; antennal radicle and scape pale yellow; pedicel largely brownish on its dorsal and lateral surface; remainder of antenna very slightly darker than scape; thorax bicolorous as in female; abdomen and legs much as in female. Antenna as in Fig. 38, the setation much as in *P. ornatus*.

**MATERIAL EXAMINED.** ♀ Holotype, 17 ♀ 7 ♂ paratypes with the following data: SOUTH AFRICA: Pretoria, Tvl, ix.1965, M. J. Mynhardt, ex nymphs of undetermined psyllid on *Acacia* sp. (T 2023). 2 ♀ paratypes in BMNH.

The following two series are not included in the types: SOUTH AFRICA: Magoebaskloof, Tvl, xi.1963, D. P. Annecke, with *Saissetia somereni* (Newstead) and *Parasassetia nigra* (Nietner) on *Syzygium cordatum* (2 ♀ 1 ♂, T 1604). In the slide-mounted female, funicle segments II-VI have rhinaria and the club is as long as the distal three-and-a-half funicle segments; the ovipositor is somewhat longer in relation to the gonostyli, and shorter to the middle tibia, than in the types. SOUTH AFRICA: Pienaarspoort (nr Pretoria), Tvl, xi.1963, C. J. Cilliers, with *Waxiella mimosae* (Signoret) on *Acacia karroo* (12 ♀ 9 ♂, T 1578). This series includes specimens which do not differ significantly from the types; however, it also includes female specimens which, apart from antennal shape, clearly differ from the type-specimens in that the fore coxa is white, not blackish, and in the middle coxa which is only palely infuscated. The latter specimens possibly represent a different species, perhaps especially because no intraspecific variation in leg maculation was found amongst the large amount of material on which this study is based. Sufficient additional reared material is, however,

needed before any final conclusion can be made about the identity of these specimens, and they have not been provided for in the foregoing key to the species of *Psyllaephagus* from southern Africa.

***Psyllaephagus chianganus* spec. nov., figs 41–44, 80**

This new species is readily recognized in both sexes by the bicolorous mesonotum and by the legs, which are white except the dark middle and hind coxae. *P. chianganus* is described from two series from Angola, the one reared from a species of *Psylla*, the other from an undetermined psyllid; a single female from Zimbabwe is also recorded.

**FEMALE.** Length: about 1,25–1,5 mm. Colour: head with frontovertex, face below toruli, and genae, a mixture of black and metallic green; face above toruli to junction with frontovertex with a strong blue and purple lustre; pronotum and mesoscutum concolorous with frontovertex with an additional rather faint bronze tinge in most specimens; axillae and scutellum dark purple, the posterior rim of the latter tinged with metallic green; tegulae white basally, blackish brown distally; antenna with radicle, basal two third or so of scape, and pedicel largely (except extreme distal end), brownish black to black, the remainder of antenna sordid white; legs white to yellowish white, except the middle and hind coxa which are blackish with a metallic green tinge, the maculation as in fig. 80.

Head, in dorsal view (occiput perpendicular), with anterior margin very gently convex, almost straight; fronto-occipital margin acute; head about 2,5 times as wide as frontovertex at median ocellus; ocelli in a right-angled triangle; head, in frontal view, with upper limits of toruli level with lower eye margins; scrobes with lateral margins abruptly rounded or subacute, converging, but not confluent dorsally; interscrobal prominence broad, short. Antenna (fig. 41) with scape about 3,7 times as long as broad; funicle with segments I–V each a little longer than wide, VI quadrate or a trifle wider than long; club a little longer than the distal three funicle segments together; funicle segments II–VI with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head fairly coarse, the cells small, their margins thickened and slightly raised; frontovertex finely and unevenly punctate.

Scutellum gently convex; sculpture of mesoscutum and scutellum different: the cells on mesoscutum much as on head, more or less round; those on scutellum notably larger, mostly somewhat elongate and longitudinally oriented, their margins not thickened; scutellum with about 18–20 setae. Basal half of fore wing finely setose from a level about halfway along submarginal vein to speculum, the latter complete; venation as in fig. 42. Marginal cilia along distal wing margin about one-half to one-third as long as longest setae on submarginal vein. Middle tibial spur about as long as adjacent tarsal segment.

Abdomen a little longer than thorax; ovipositor (fig. 44), as seen through the derm, about one-half gastral length, shorter than middle tibia (about 4:6), about 5,7 times as long as gonostyli, the latter about one-half length of middle tibial spur, protruding slightly at gastral apex.

**MALE.** Colour: much as in female, except as follows: head brilliant metallic green, the face lacking a blue or purple lustre, the frontovertex and mesoscutum with a reddish tinge in certain lights; antennal scape pale yellow, the pedicel largely blackish

brown on its dorsal and lateral surfaces; flagellum a little darker than scape. Antenna structurally as in fig. 43, the setation much as in *P. ornatus*.

**MATERIAL EXAMINED.** ♀ Holotype, 24 ♀ 17 ♂ paratypes with the following data: ANGOLA: Chianga, 25.x.1971, A. van Harten, ex *Psylla* sp. on *Albizia antunesiana* (♀ holotype, 18 ♀ 11 ♂, T 4232); same data except: 12.x.1971, ex undetermined psyllid on *Faurea discolor* (6 ♀ 6 ♂, T 4231). 2 ♀ 2 ♂ paratypes in BMNH.

The following specimen is not included in the types. ZIMBABWE: Makumbi Mission, 1974, A. Watsham, by sweeping.

***Psyllaephagus viridis* spec. nov., figs 45-48, 80**

This new species is readily separated from its southern African congeners by the narrow dark band on the hind femur. *P. viridis* is recorded from three series, all reared from *Diaphorina*.

**FEMALE.** Length: about 1,75 mm. Colour: head usually dark metallic green, the face from toruli to junction with frontovertex tinged with a mixture of blue and purple; in some specimens the head is more blue-green and in others the frontovertex has a weak golden lustre in plays of light; thoracic dorsum dark metallic green with a golden tinge in most specimens; tegulae whitish basally, otherwise blackish brown; sides of thorax, and abdomen, black with a moderate to strong metallic green lustre; antenna with radicle, scape and pedicel largely blackish, the latter two segments fading to sordid white distally; flagellum sordid white to pale brown with irregular darker suffusions in some specimens; legs pale yellow or sordid white except all coxae and hind femur, which are largely blackish with a greenish tinge, and hind tibia, which has a narrow blackish band near its basal end, the maculation as in fig. 80.

Head, in dorsal view (occiput perpendicular), with anterior margin approximately straight; fronto-occipital margin abruptly rounded; head 2,3-2,5 times as wide as frontovertex at median ocellus; head, in frontal view, with upper limits of toruli level with lower eye margins; lateral margins of scrobes subacute; interscrobial prominence extending to near upper scrobial limits. Antenna (fig. 46) with scape about 3,8-4,5 times as long as broad; funicle variable: segments I-II subequal, subquadrate, usually a little smaller than III-V which are subequal, each quadrate or a trifle wider than long; segment VI wider than long; club as long as the distal three-and-a-half funicle segments together; funicle segments II-VI or III-VI with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head with cells small, their margins thickened; frontovertex densely punctate.

Thorax gently convex from side to side; mesonotal sculpture finer than on head, similar on mesoscutum and scutellum except for cells along sides and apex of scutellum, which are somewhat elongate and longitudinally oriented; scutellum with 30-40 setae. Basal part of fore wing densely setose from about halfway along submarginal vein to speculum, the latter complete; venation as in fig. 48; marginal cilia along distal wing margin about half as long as setae on submarginal vein. Middle tibial spur plainly shorter than adjacent tarsal segment.

Abdomen longer than thorax; ovipositor (fig. 45), as seen through the derm, usually more than one-half as long as gaster, 1,2-1,4 times length of middle tibia, 5,0-5,4 times as long as gonostyli, the latter a trifle longer than middle tibial spur.

**MALE.** Colour: head brilliant metallic green, lacking a purplish lustre; body much as in female; antenna yellowish white except pedicel, which is suffused with brown on its dorsal and lateral surfaces; legs as in female, except hind femur which is largely blackish brown, fading to sordid white at its basal and distal ends. Antenna as in fig. 47, setation as in *P. ornatus*.

**MATERIAL EXAMINED.** ♀ Holotype, 48 ♀ 15 ♂ paratypes with the following data: SOUTH AFRICA: Pretoria, Tvl., x.1965, M. J. Mynhardt, ex nymphs of *Diaphorina* sp. on *Tapinanthus natalitius* subsp. *zeyheri* (holotype, 29 ♀ 15 ♂, T.2000); Hekpoort, Tvl., iv.1972, H. P. Insley, ex *Diaphorina ?punctulata* (Petthey) on *Lopholaena coriifolia* (29 ♀, T.4296). 2 ♀ 2 ♂ paratypes in BMNH.

The following series is not included in the type-material: SOUTH AFRICA: Roodeplaat Dam (nr. Pretoria), ix.1971, H. P. Insley, ex *Diaphorina loranthi* Capener on *Tapinanthus* sp. (5 ♀, T.3929).

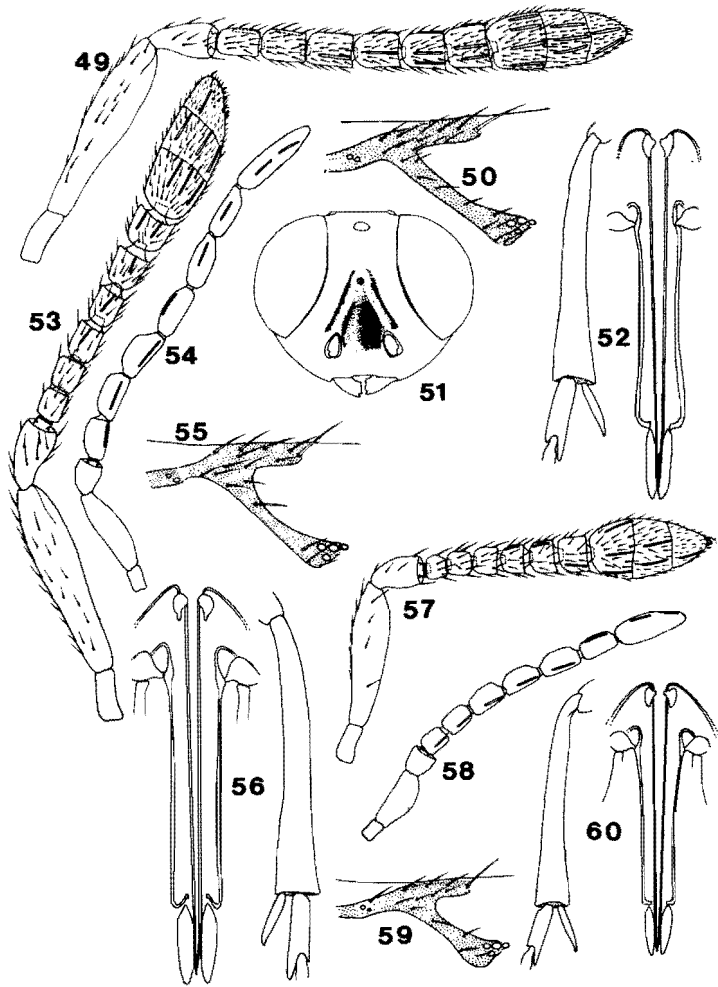
***Psyllaephagus secus* spec. nov., figs 49–52, 80**

*P. secus* is here described from the female only, which is distinguished by the maculation of the legs and by the presence of a distinct fovea at the upper limits of the antennal scrobes. The host of this species is not known.

**FEMALE.** Length: about 1.75–2 mm. Colour: head largely purplish with a metallic blue tinge in certain parts, the posterior part of frontovertex blue-green with a faint purplish lustre in some specimens; thoracic dorsum dark metallic green or blue-green; tegulae entirely blackish brown to black, not partly pale as in most of the other species described here; sides of thorax, and abdomen, brownish black to black; antenna with radicle, scape and pedicel brownish black to black except distal ends of the latter two segments, which are a little paler; remainder of antenna brown to blackish brown; legs with all coxae and femora largely brownish black, the trochanters, tibiae and tarsi pale, sordid white to testaceous, the maculation as in fig. 80.

Head, in dorsal view (occiput perpendicular), with anterior margin very gently convex; fronto-occipital margin subacute; head about three times as wide as frontovertex at median ocellus; ocelli in a right-angled triangle; head, in frontal view, with upper limits of toruli a trifle above lower eye margins; scrobes deeply impressed on face, their lateral margins subacute, converging strongly; scrobes separated basally by a broad interscrobial prominence which extends to near upper scrobial limits, the upper interscrobial area flat, containing a distinct fairly large median fovea, illustrated in fig. 51. Antenna (fig. 49) slender, the scape about 4.3 times as long as broad; funicle segments I–IV longer than wide, V quadrate and VI a little wider than long; club as long as the distal three funicle segments together; all funicle segments with rhinaria. Mandible much as in *P. ornatus*. Head rather coarsely sculptured; frontovertex densely and evenly punctate, the punctations relatively large.

Thorax with mesoscutum gently convex from side to side, the scutellum rather flat, appearing almost plate-like; mesonotal sculpture coarse, much as on head, similar on mesoscutum and scutellum, the cells small, their margins thickened; scutellum with 60–70 setae. Fore-wing disc more or less evenly setose from base to speculum, the latter complete save for a single row of fine setae at caudal extreme; venation as in fig. 50; cilia along distal wing margin about one-third length of longest setae on submarginal vein. Middle tibial spur shorter than adjacent tarsal segment.



Figs 49-60. *Psyllaephagus* spp. 49-52. *P. secus* spec. nov., paratype. 49. Antenna (♀ T 3947-1). 50. Fore wing venation (♀ T 3947-1). 51. Head, anterior view (♀ T 3947-1). 52. Ovipositor and middle tibia, drawn to the same scale (♀ T 3947-1). 53-56. *P. furvus* spec. nov., paratypes. 53. Antenna (♀ T 5676-1). 54. Antenna (♂ T 5676-2). 55. Fore wing venation (♀ T 5676-1). 56. Ovipositor and middle tibia, drawn to the same scale (♀ T 5676-1). 57-60. *P. albicus* spec. nov., paratypes. 57. Antenna (♀ T 1871-1). 58. Antenna (♂ T 1871-2). 59. Fore wing venation (♀ T 1871-1). 60. Ovipositor and middle tibia, drawn to the same scale (♀ T 1871-1).



Abdomen slightly longer than thorax; ovipositor long, about as long as gaster as seen through the derm, about 1,5 times as long as middle tibia (fig. 52), five times as long as gonostyli, the latter 1,3 times as long as middle tibial spur, protruding by about two-thirds their length at gastral apex.

**MATERIAL EXAMINED.** ♀ Holotype, 4 ♀ paratypes with the following data: SOUTH AFRICA: St Lucia Lake, Ntl, viii.1971, H. P. Insley, ex undetermined psyllids on *Ficus natalensis* (T 3947).

***Psyllaephagus furvus* spec. nov., figs 53–56, 80**

The dark metallic colour of the body and maculation of the legs, described below, separate this species from others dealt with here. *P. furvus* is described from a single short series, the host of which is not known.

**FEMALE.** Length: about 1,75 mm. Colour: head, thorax and abdomen a mixture of black and dark metallic green, the lower part of face at antennal sockets with a bluish tinge, and the upper part of face to junction with frontovertex with a dark purple tinge in plays of light; tegulae blackish except their extreme bases, which are pale; antenna with radicle, scape and pedicel largely black, the latter two segments fading slightly at their extreme distal ends; flagellum a little paler than scape, mostly brownish black; all coxae black; fore and middle legs yellow, except a small infuscated patch on outer surface near basal end of middle tibia; hind leg with femur largely black, the tibia mostly black in its basal half, the distal half, and tarsus, yellowish, the maculation as in fig. 80.

Head, in dorsal view, with anterior margin approximately straight, appearing concave if head tilted slightly backward; fronto-occipital margin acute; head about 2,6 times as wide as frontovertex at median ocellus; ocelli in a right-angled triangle; head, in frontal view, with upper limits of toruli level with lower eye margins; scrobes deep, their lateral margins subacute, converging strongly. Antenna (fig. 53) with scape about five times as long as broad; funicle segments I–V each longer than wide or quadrate, VI a little wider than long; club about as long as the distal three and a half funicle segments together, somewhat obliquely truncate apically; funicle segments III–VI with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head not coarse, the cells only very slightly raised, the frontovertex with a few sparsely scattered punctations, hardly visible against the dark coloration of the integument.

Thorax gently convex from side to side; mesonotal sculpture much as on head, the cells hardly tilted, their margins thin, much the same on mesoscutum and scutellum; scutellum with about 20 setae. Basal half of fore-wing disc evenly setose from about halfway along submarginal vein to speculum, the latter complete save for a few fine setae at caudal extreme, venation as in fig. 55; marginal cilia along distal wing margin about one-third length of longest setae on submarginal vein. Middle tibial spur plainly shorter than adjacent tarsal segment.

Abdomen plainly longer than thorax; ovipositor (fig. 56), as seen through the derm, about one-half gastral length, about 1,4 times as long as middle tibia, a little less than five times as long as gonostyli; gonostyli about 1,5 times as long as middle tibial spur, protruding by about half their length at gastral apex.

**MALE.** Colour: head a mixture of metallic green and black, lacking the purplish tinge as in female; mesoscutum much as on head, but with a little less green, appearing somewhat duller; scutellum almost steel blue; antenna mostly white to sordid white except as follows: scape with an elongated dark patch on outer surface near distal end; pedicel entirely black; flagellum with irregular darker suffusions on dorsal surface; legs marked as in female except outer surface of fore tibia, which is margined with blackish brown, and the dark marking on middle tibia, which is much more extensive.

**MATERIAL EXAMINED.** ♀ Holotype, 1 ♀ 2 ♂ paratypes with the following data: SOUTH AFRICA: Saldanha Bay, C.P., x.1978, S. Nesar, with *Saissetia* sp. on *Lycium cinerium* (T 5676).

***Psyllaephagus albicrus* spec. nov., figs 57-60, 80**

This new species is distinguished by the legs, which are entirely pale except the dark hind coxa. *P. albicrus* is known from a single short series, reared from a species of *Agonoscena* in the Transvaal.

**FEMALE.** Length: about 1,25-1,5 mm. Colour: head metallic green, the face from above antennal sockets to junction with frontovertex washed with bluish purple, the mouth margin with a golden tinge in plays of light; thoracic dorsum metallic green; tegulae pale basally, brownish distally; sides of thorax brownish black, the abdomen black, the parts with a strong metallic lustre; antenna with radicle blackish; remainder of antenna sordid white except scape, which has a darker, uneven, elongate infuscation near its distal end, and pedicel, which is largely darkly suffused; legs white to sordid white except hind coxa, which is blackish brown, as in fig. 80.

Head, in dorsal view, with anterior margin gently convex; fronto-occipital margin acute; head about 2,3-2,5 times as wide as frontovertex at median ocellus; ocelli in about a right-angled triangle; head, in frontal view, with upper limits of toruli slightly above lower eye margins; scrobes relatively shallow, their lateral margins rounded, not confluent dorsally, the interscrobial prominence extending to near upper limits of scrobes. Antenna (fig. 57) with scape about four times (3,8-4,1:1) as long as broad; funicle segments I-IV each quadrate or a little wider than long, V and VI each plainly wider than long; club as long as the distal four funicle segments together; funicle segments III-VI with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head fairly coarse, the integument without punctations.

Thorax relatively strongly convex from side to side and anteroposteriorly; mesonotal sculpture a little finer than on head, the cells large, more or less similar on mesoscutum and scutellum; scutellum with about 25-30 setae. Basal half of fore-wing disc densely setose from about halfway along submarginal vein to speculum, the latter complete; venation as in fig. 59, cilia along distal wing margin about one-half length of setae on submarginal vein. Middle tibial spur about as long as adjacent tarsal segment.

Abdomen slightly longer than thorax; ovipositor (fig. 60), as seen through the derm, extending to near base of gaster, about 1,3 times length of middle tibia, 5,5-6,1 times as long as gonostyli, the latter slightly shorter than middle tibial spur, protruding slightly at gastral apex.

MALE. Colour: head with face brilliant metallic green, the genae and frontovertex cupreous; thoracic dorsum almost concolorous with frontovertex, with irregular greenish suffusions; sides of thorax, and abdomen, with a faint metallic tinge; antenna with scape white, the pedicel largely blackish on its dorsal and lateral surfaces, the flagellum sordid white, clothed with dark setae; legs as in female except middle coxa, which is somewhat darkened, and hind tibia, which is suffused with blackish brown along its dorsolateral surfaces. Antenna as in fig. 58, the setation much as in *P. ornatus*.

MATERIAL EXAMINED. ♀ Holotype, 5 ♀ 9 ♂ paratypes with the following data: SOUTH AFRICA: Hennops River, Tvl, x.1964, M. J. Mynhardt, ex *Agonoscena* sp. on *Rhus* sp. (T 1871).

***Psyllaephus vastus* spec. nov., figs 61–63, 81**

The predominantly black colour of the body with a relatively weak metallic lustre and the legs, which are all boldly marked with black, distinguish this new species. *P. vastus* is here described from two series: one from South West Africa/Namibia, the other from Porto Alexandra further north, along the coastal desert of Angola. Both the series were reared from psyllids on *Zygophyllum simplex*. The male of *P. vastus* is not known.

FEMALE. Length: about 1.25 mm. Colour: head black, the face and genae with a weak to moderately strong dark green, bluish or purple lustre, the frontovertex in some specimens with a weak purple or bronze tinge; thoracic dorsum black with a weak to moderately strong bronze tinge, the surface in some specimens washed with a faint greenish lustre; sides of thorax, and abdomen, black, shiny, with a faint metallic tinge; tegulae largely blackish, slightly paler basally; antenna with radicle, scape and pedicel mostly black except distal ends of the latter two segments, which are a little paler; flagellum a little paler than scape in most specimens, but also concolorous with scape in some specimens; legs generally black except the joints of the segments, tarsi, and parts of fore and middle tibiae, which are sordid white to pale brown, the maculation as in fig. 81.

Head, in dorsal view (occiput perpendicular), with anterior margin approximately straight; head a little more than twice width of frontovertex at median ocellus (about 2.2:1); ocelli in a right or obtuse-angled triangle; fronto-occipital margin acute; head in frontal view, with upper limits of toruli a little below lower eye margins; scrobes deep, their lateral margins subacute, not quite confluent dorsally; interscrobial prominence gently convex, extending to near upper limits of scrobes. Antenna (fig. 62) with scape about 5.0–5.5 times as long as broad; funicle usually with all segments wider than long, increasing gradually in width towards the club; one or more of the basal four funicle segments quadrate in some specimens; club about as long as the distal four funicle segments together; funicle segments I–VI or II–VI with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head rather fine, the frontovertex without punctations.

Thorax appearing rather flat, only gently convex from side to side; sculpture of mesoscutum and scutellum similar, much as on head, the cells large; scutellum with 20–25 setae. Fore-wing disc evenly setose from near wing base to speculum, the latter usually complete, in some specimens with a few fine setae at caudal extreme; venation

as in fig. 63; marginal cilia along distal wing margin about one-fourth length of longest setae on submarginal vein. Middle leg with tibial spur shorter than basal tarsal segment.

Abdomen shorter than thorax; ovipositor (fig. 61) long, as long as, or a little longer than, gaster as seen through the derm, about 1,3–1,4 times as long as middle tibia; ovipositor about 5,5–6,5 times as long as gonostyli, the latter about as long as middle tibial spur, protruding by about half their length at apex of gaster.

MATERIAL EXAMINED. ♀ Holotype, 21 ♀ paratypes with the following data: SOUTH WEST AFRICA/NAMIBIA: Gobabeb Research Station, Namib desert, ix.1979, R. A. Wharton, ex undetermined psyllids on *Zygophyllum simplex* (holotype, 12 ♀, T 5957). ANGOLA: Porto Alexandra, vii.1973, A. van Harten, ex *Diaphorina* sp. on *Zygophyllum simplex* (9 ♀, T 4802). 3 ♀ paratypes in BMNH.

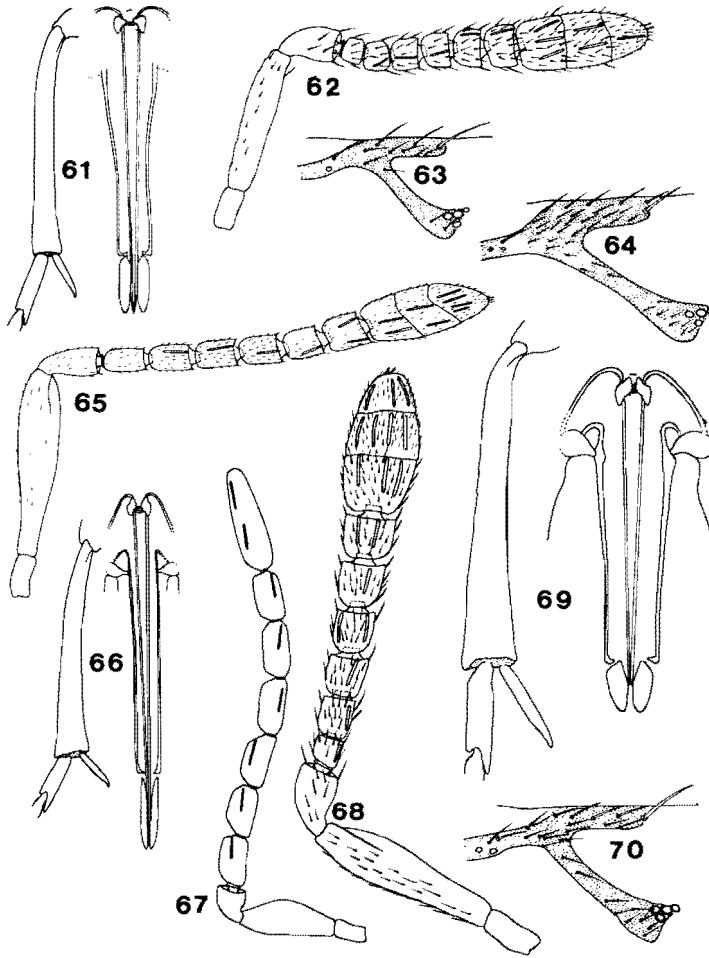
***Psyllaephagus lucaris* spec. nov., figs 64–66, 81**

This new species is recognized in the female by its slender antennae, dark body colour, and legs, which are brownish with most segments marked with blackish. *P. lucaris*, the male of which is not known, was described from a series of females reared from an undetermined psyllid taken at George, Cape Province.

♀. Length: about 2 mm. Colour: head black, the face above toruli, and frontovertex, with a fairly weak purplish lustre; lower part of face, genae and temples with a dull bluish green tinge; thoracic dorsum a mixture of black and very dull metallic green or blue-green, with a faint purplish or golden tinge in some specimens; tegulae largely brownish black, fading somewhat basally; sides of thorax, and abdomen, brownish black with a rather strong metallic green or golden tinge in plays of light; antenna with radicle a little paler than scape and pedicel, the latter two segments black, fading slightly at their distal ends; flagellum a little paler than scape and pedicel, mostly blackish brown; fore leg with coxa black, the femur and tibia largely brownish black, fading to brown at their basal and distal ends, the tarsus pale brown; middle leg with coxa brownish black, the remainder of leg pale brown except an irregular shaped darker patch near basal end of tibia; hind leg with coxa and femur largely brownish black to black, the basal half or so of tibia brownish black, fading to pale brown in its distal half, the tarsus pale brown to brown; leg maculation as in fig. 81.

Head, in dorsal view, with anterior margin gently convex, fronto-occipital margin rounded; head about 2,3–2,5 times as wide as frontovertex at median ocellus; ocelli in an obtuse-angled triangle, the lateral pair separated from each other by about 7,0–7,5 times their own diameter; head, in frontal view, with upper limits of toruli a little below lower eye margins; scrobes short, their lateral margins subacute, converging but clearly not confluent dorsally; interscrobial prominence rather flat, extending to near upper limits of scrobes, the latter area with a weakly developed median fovea. Antenna (fig. 65) slender, more or less five times as long as broad (about 4,6–5,3:1); funicle with segments I–V each longer than wide, VI quadrate or a trifle longer than wide; club as long as funicle segments III–VI together; funicle segments II–VI or III–VI with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head fairly coarse, the cells small, the frontovertex densely punctate.

Thorax rather flat, the scutellum appearing disc-like; mesonotal sculpture a



Figs 61-70. *Psyllaephagus* spp. 61-63. *P. vastus* spec. nov., female paratypes. 61. Ovipositor and middle tibia, drawn to the same scale (T 4802-2). 62. Antenna (T 5957-1). 63. Fore wing venation (T 4802-2). 64-66. *P. lucaris* spec. nov., female paratype (T 2129-1). 64. Fore wing venation. 65. Antenna. 66. Ovipositor and middle tibia, drawn to the same scale. 67-70. *P. cincticus* spec. nov., paratypes. 67. Antenna (♂ T 2087-2). 68. Antenna (♀ T 2086-1). 69. Ovipositor and middle tibia, drawn to the same scale (♀ T 2086-1). 70. Fore wing venation (♀ T 2086-1).

little finer than on head, similar on mesoscutum and scutellum, the cells small, more or less round; scutellum with about 60–70 setae. Basal half of fore-wing disc densely setose from wing base to speculum, the latter interrupted near its caudal end by a short row of fine setae; venation as in fig. 64; cilia along distal wing margin about one-half length of longest setae on submarginal vein. Middle tibial spur plainly shorter than basal tarsal segment.

Abdomen longer than thorax; ovipositor (fig. 66), as seen through the derm, long, extending to near base of gaster, about 1,6–1,7 times as long as middle tibia, 4,5–5,0 times as long as gonostyli; gonostyli slender, a little more than 1,5 times as long as middle tibial spur, protruding by about half their length at apex of gaster.

**MATERIAL EXAMINED.** ♀ Holotype, 6 ♀ paratypes, with the following data: SOUTH AFRICA: George District, C.P., viii.1965, D. J. Rust, ex undetermined psyllids on *Leucadendron daphnoides* (T 2129).

***Psyllaephagus cincticus* spec. nov., figs 67–70, 81**

The colour of the legs (fig. 81), which are all partly infuscated, distinguishes the female of this new species. *P. cincticus* is recorded from three series taken in the Transvaal; two were reared from species of *Diaphorina*, and the host of the third series is not known.

**FEMALE.** Length: about 1,5–2 mm. Colour: head and thorax dark metallic blue-green except face from toruli to junction with frontovertex, which is purple; basal half or so of tegulae whitish, the distal half blackish brown; abdomen with a strong metallic blue-green lustre; antenna with radicle, scape and pedicel largely brownish black, the latter two segments fading to sordid white at their distal ends; flagellum mostly dark brown; legs yellowish white except as follows: fore coxa and femur largely brownish black, the fore tibia irregularly suffused with pale brown; middle leg with coxa brownish black, the femur with a broad concolorous band, the tibia with a paler, incomplete, narrow band on its outer and lateral surface near its base; hind leg with coxa, femur and tibia largely brownish black to black; the maculation as in fig. 81.

Head, in dorsal view (occiput perpendicular), with anterior margin approximately straight, becoming gently concave medially if head tilted backwards; fronto-occipital margin acute; head about 2,3–2,5 times as wide as frontovertex; ocelli in an obtuse-angled triangle; head, in frontal view, with upper limits of toruli slightly above lower eye margins; scrobes deep, their lateral margins acute, impressed on face as an inverted V; interscrobial prominence rather strongly convex, extending to near scrobial confluence. Antenna (fig. 68) variable: scape 3,5–4,5 times as long as broad; funicle usually with basal segment quadrate, a little smaller than segments II–V, which are each a trifle longer than wide or quadrate, VI a little wider than long; club about as long as funicle segments III–VI together; funicle segments II–VI with rhinaria. Mandible as in *P. ornatus*. Sculpture of head moderately coarse, the margins of the cells somewhat thickened; frontovertex densely punctate.

Thorax appearing rather flat, the mesonotum only gently rounded from side to side; mesonotal sculpture a little finer than on head, similar on mesoscutum and scutellum; scutellum with about 30–40 setae. Basal half of fore wing very finely setose from about halfway along submarginal vein to speculum, the latter interrupted by one to three fine setae in its caudal one-third or so; venation as in fig. 70; marginal cilia

very short, sparse, those along distal wing margin about one-eighth length of longest setae on submarginal vein. Middle tibial spur about as long as adjacent tarsal segment.

Abdomen about as long as thorax; ovipositor (fig. 69), as seen through the derm, more or less than one-half length of gaster, as long as, or a little longer than (1,0-1,2:1) middle tibia, 6,0-7,0 times as long as gonostyli, the latter short, relatively broad, shorter than middle tibial spur (1:1,6-2,0).

**MALE.** Colour: head brilliant metallic green to blue-green, the face without a purple lustre as in female; thoracic dorsum dark metallic blue-green with a faint purplish lustre in plays of light; sides of thorax, and abdomen, blackish brown to black, with a greenish tinge; antenna with scape pale yellow; pedicel largely dark brown to blackish brown on its dorsal and lateral surfaces; remainder of antenna mostly pale yellow with slightly darker irregular suffusions; flagellum clothed with dark setae; legs as in female except fore and middle femora, which are not marked. Antenna structurally as in fig. 67, the setation much as in *P. ornatus*.

**MATERIAL EXAMINED.** ♀ Holotype, 12 ♀ 12 ♂ paratypes, with the following data: SOUTH AFRICA: Pietersburg, Tvl, xii.1965, A. L. Capener, ex *Diaphorina* sp. on *Ozoroa reticulata* (T 2086, T 2087). 1 ♀ 1 ♂ paratypes in BMNH.

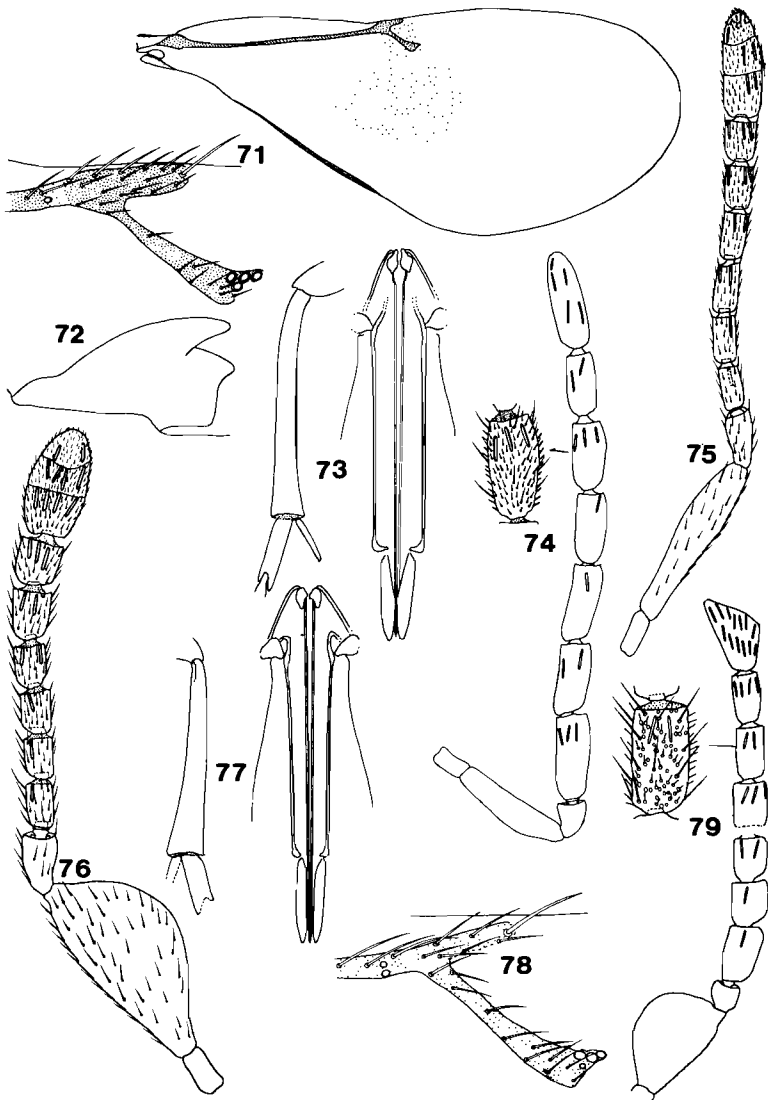
The following series are not included in the types: SOUTH AFRICA: Gravelotte, Tvl, xii.1963, A. L. Capener, ex *Diaphorina tenebrosa* Capener on *Rhus leptodictya* (2 ♀ 2 ♂, T 1729). The female slide-mounted specimen of this short series differs from the females of the type-series in the antennal funicle which has the basal three segments quadrate, the distal three each wider than long, and in the basal two funicle segments which are without rhinaria, Pienaarspoort (nr Pretoria), Tvl, ii.1962, C. J. Cilliers, with *Tecaspis* sp. on *Tapinanthus natalitius* subsp. *zeyheri* (2 ♀ T 806). These two females do not differ significantly from the type-specimens.

***Psyllaephagus dispar* spec. nov., figs 71-75, 81**

This new species is readily separated from other species dealt with here by the large infuscated patch on the fore wing in both sexes, by the maculation of the legs, and by the shape of the male antenna, described below. *P. dispar* is known from a single short series from the Cape Province.

**FEMALE.** Length: about 2 mm. Colour: head metallic green to blue-green, the face from toruli to junction with frontovertex with a strong bluish purple lustre; thorax brilliant metallic green; tegulae yellow basally, brownish black distally; abdomen black with a strong metallic lustre in plays of light; antenna with radicle, scape and pedicel black except the extreme distal ends of the latter two segments, which are a little paler, the scape with a greenish metallic tinge on its outer aspect in plays of light; flagellum slightly paler, dark brownish black; legs with all coxae black, with a strong metallic green lustre; femora largely brownish black to black with a green tinge; fore and hind tibiae each with a blackish mark near its base, the distal segment of each tarsus blackish; remainder of legs yellowish brown; the maculation as in fig. 81; fore wing with a large, distinct, but palely infuscated patch on wing disc below the apex of venation, as in fig. 71.

Head, in dorsal view (occiput perpendicular), with anterior margin more or



Figs 71-79. *Psyllaephagus* spp. 71-75. *P. dispar* spec. nov., paratypes. 71. Fore wing, showing infuscated patch, and venation enlarged (♀ T 6130-1). 72. Mandible (♀ T 6130-1). 73. Ovipositor and middle tibia, drawn to the same scale (♀ T 6130-1). 74. Antenna (♂ T 6130-2). 75. Antenna (♀ T 6130-1). 76-79. *P. arylatae* spec. nov., paratypes. 76. Antenna (♀ T 1949-1). 77. Ovipositor and middle tibia, drawn to the same scale (♀ T 1949-1). 78. Fore wing venation (♀ T 1949-1). 79. Antenna (♂ T 1949-2), the latter not a type-specimen.



less straight, very gently concave medially; fronto-occipital margin rounded; head about 2.5 times as wide as frontovertex at median ocellus; ocelli in a strongly obtuse-angled triangle; head, in frontal view, with upper limits of toruli level with lower eye margins; scrobes relatively shallow, their lateral margins rounded, converging strongly; interscrobial prominence broad, rather flat, extending about three-fourths scrobial length. Antenna (fig. 75) long, slender, the scape about four times as long as broad; funicle with all segments longer than wide; club as long as the distal two-and-a-half funicle segments together; all funicle segments with rhinaria. Mandible as in fig. 72. Sculpture of head fairly coarse, the cells somewhat raised; frontovertex densely and finely punctate, the punctations not clearly visible against the raised sculpture under low magnifications.

Thorax gently rounded from side to side and anteroposteriorly; mesonotal sculpture much as on head, the cells small, more or less round, slightly raised, similar on mesoscutum and scutellum; scutellum with about 40 setae. Fore wing densely setose from base to speculum, the latter complete; venation as in fig. 71; cilia along distal wing margin about one-third length of longest setae on submarginal vein. Middle leg with tibial spur a little shorter than basal tarsal segment.

Abdomen longer than thorax; ovipositor (fig. 73), as seen through the derm, more than one-half length of gaster, about 1.7 times as long as middle tibia, five times as long as gonostyli; gonostyli longer than middle tibial spur (about 3:2), protruding by about half their length at apex of gaster.

**MALE.** Colour: much as in female except for face, which lacks the bluish purple tinge, and fore and hind tarsi and hind tibia, which are unevenly suffused with blackish; fore wing with a large infuscated patch as in female.

The male is represented by a single card-mounted specimen, from which one antenna has been removed and mounted on a slide, and illustrated in fig. 74; it is quite different from that of the majority of the other southern African species dealt with here and resembles more closely the antenna of *P. arytainae* (described below) and that of some extra-African species, including *P. pachypsyllae* (Howard), the type-species of the genus.

**MATERIAL EXAMINED.** ♀ Holotype, 1 ♀ 1 ♂ paratypes, with the following data: SOUTH AFRICA: Stellenbosch, C.P., x.1979, S. Nesor, ex undetermined psyllid on *Myrica* sp. (T 6130).

***Psyllaepagus arytainae* spec. nov., figs 76–80**

This striking new species is structurally not closely related to any of the other southern African species dealt with here, differing most notably from them in the strongly expanded antennal scape of the female and in the structure of the male antenna. However, *P. arytainae* shares many characters with the female of the West African *P. phytolymae* Ferrière (the male of the latter is not known), including general colour and habitus and antennal shape. *P. arytainae* is described from a short series, reared from *Arytaina mopanei*, northern Transvaal.

**FEMALE.** Length: about 2.0–2.5 mm. Colour: head brilliant metallic green, the sides of face between outer margins of scrobes and inner eye margins with a brilliant blue and purplish lustre, the temples tinged with purple in plays of light; thoracic

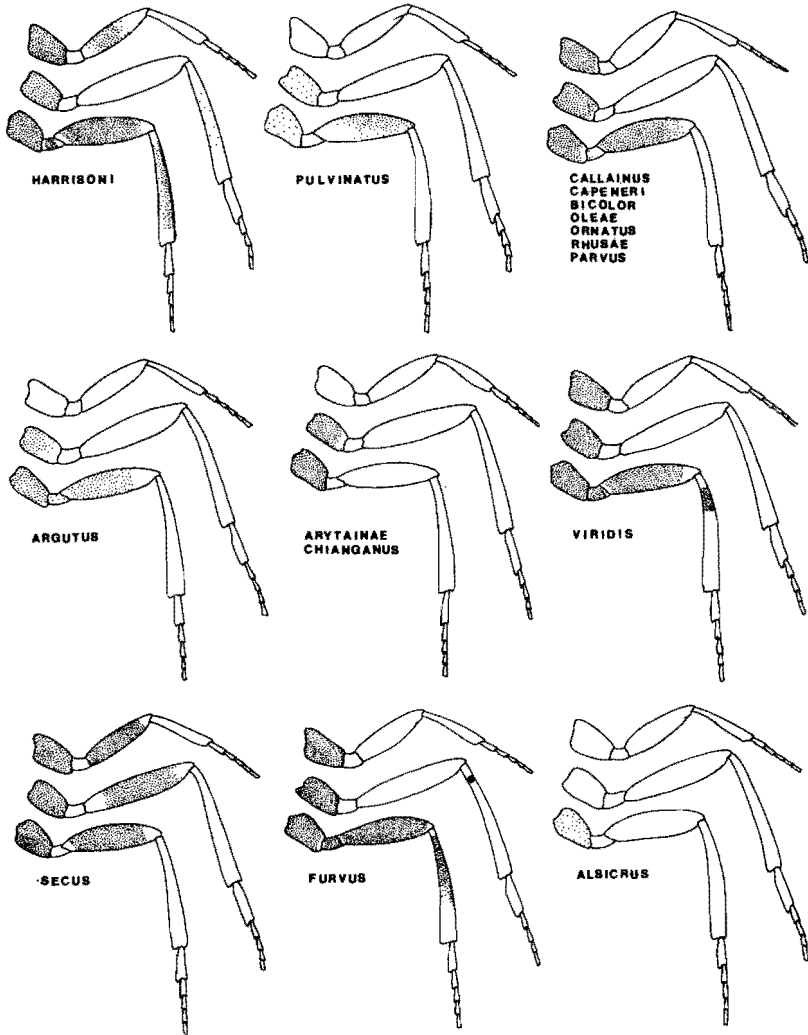


Fig. 80. *Psyllaephagus* spp., legs, schematic, showing maculation.

dorsum brilliant metallic green or blue-green; tegulae semitranslucent, entirely sordid white to yellowish white; sides of thorax, and abdomen, black, with a strong green tinge; antenna with radicle, scape and pedicel largely brownish black except the basal and distal ends of scape and distal one-half to one-fourth of pedicel, which are sordid white; flagellum sordid white to straw colour, the basal four or five funicle segments irregularly suffused with blackish brown, mostly on the basal one-half or so of each

segment; legs pale yellow except middle and hind coxae, which are largely brownish black with a greenish tinge, and tarsi, which have a pale reddish tinge; the maculation as in fig. 80.

Head, in dorsal view (occiput perpendicular), with anterior margin very gently convex; fronto-occipital margin abruptly rounded; head about 2,4–2,5 times as wide as frontoververtex at median ocellus; ocelli in an obtuse-angled triangle; head, in frontal view, with upper limits of toruli a little above lower eye margins; scrobes deep, narrow, their lateral margins subacute, converging strongly; interscrobial prominence gently convex, extending to near upper scrobal limit. Antenna (fig. 76) with scape greatly expanded ventrally, about twice as long as its greatest width; funicle segments I–V each longer than wide, VI quadrate; club a little longer than the distal two funicle segments together; all funicle segments with rhinaria. Mandible much as in *P. ornatus*. Sculpture of head coarse, the cells small, round, their margins thickened; frontoververtex moderately densely punctate, the punctations relatively large.

Thorax with mesoscutum rounded from side to side, the scutellum approximately flat, appearing almost disc-like; sculpture of mesonotum much as on head, similar on mesoscutum and scutellum; scutellum with about 60 setae. Basal part of fore-wing disc sparsely setose to speculum, the latter complete; venation as in fig. 78; marginal cilia relatively short, those along distal wing margin about one-fourth length of setae on submarginal vein.

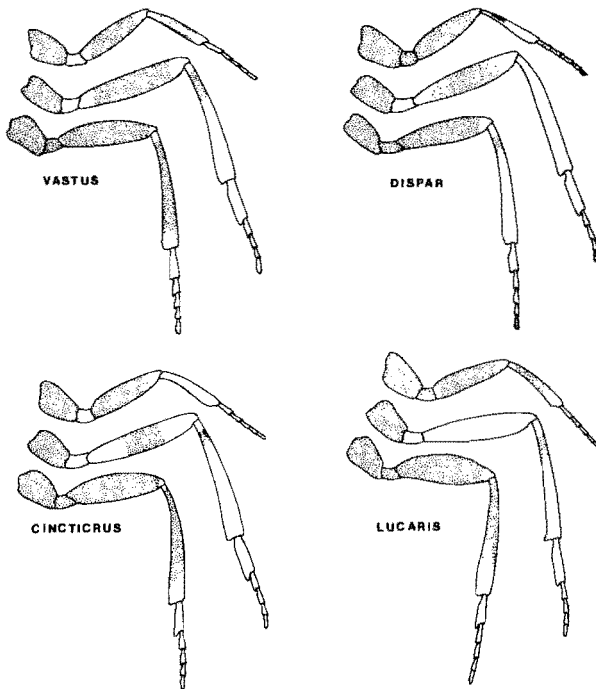


Fig. 81. *Psyllaephagus* spp., legs, schematic, showing maculation.

Abdomen longer than thorax; ovipositor (fig. 77), as seen through the derm, about 1,8 times as long as middle tibia, about 4,2 times as long as gonostyli, the latter slender, protruding by about one-half their length at apex of gaster.

**MALE.** At hand is a single slide, containing a fore and a hind wing and an antenna; a note in the accession book indicates that the remainder of the specimen, which I have been unable to trace, was mounted on a card point. This specimen is the single male of the type-series (T 1949) from which this species is described. The slide-mounted antenna of the male (fig. 79) is quite distinct, resembling more closely that of *P. dispar* (described above) and the Nearctic type-species, *P. pachyphyllae* (Howard), than the antennae of the other southern African species dealt with here.

The above-mentioned specimen, represented by the slide-mounted parts, is not included in the type-series of *P. arytainae*.

**MATERIAL EXAMINED.** ♀ Holotype, 2 ♀ paratypes, with the following data: SOUTH AFRICA: Punda Milia camp, Kruger National Park, Tvl, i.1965, A. L. Capener, ex *Arytaina mopanei* Pettey on *Colophospermum mopane* (T 1949).

#### *TRECHNITES* Thomson, 1876

This genus is known mainly from a number of psyllid-inhabiting species from the Palearctic, Nearctic, Oriental and Australian regions. Prinsloo & Annecke (1979), in their recent key to the genera of Ethiopian Encyrtidae, recorded *Trechnites* from this region for the first time from some undetermined southern African specimens; this material is here described as representing three new species and one originally recorded from India. Apart from this material, a few female specimens, representing two species from Zimbabwe, collected by sweeping, are also at hand. These specimens possibly represent a further one or two new species. But because the one species that is distinct (accession number T 6134) is represented by a single female, and because I am uncertain about the identity of the remaining specimens (T 6135), they have not been included in this study. Additional material, preferably reared, will have to be obtained to permit a detailed study of the Zimbabwean species. For synonymy of the genus *Trechnites*, Ferrière (1961) and Graham (1969) should be consulted.

The species of *Trechnites* are all associated with psyllids, and are regarded as primary parasites (Tachikawa 1978). Three of the southern African species dealt with here were reared from psyllids; the host of the fourth species is not known; it was reared from a plant sample infested with scale insects.

The genus *Trechnites*, as presently interpreted, includes species – African as well as non-African – which differ interspecifically in a number of important generic characters, including the number and shape of the antennal segments, number of segments in the labial palpi, sculpture of thorax, shape of mandibles, development of parapsidal sulci, and also in general habitus. On the basis of the material dealt with here and the specimens from Zimbabwe mentioned above the genus *Trechnites* in southern Africa is diagnosed as follows.

**FEMALE.** Small to moderate sized encyrtids. Length ranging from about 1 to 2 mm. Colour: head and thorax largely brilliant metallic green, blue-green or blue, or black with only a faint metallic tinge in certain parts, or black with the scutellum characteristically brilliant metallic green; legs entirely pale, or boldly marked; fore and hind wings hyaline.

Head, in dorsal view (occiput perpendicular), with frontovertex approximately horizontal, or sloping strongly forwards from near fronto-occipital margin to an imperceptible union with face; fronto-occipital margin acute or abruptly rounded; head about 2.5–3 times as wide as frontovertex at median ocellus; head, in frontal view, not much wider than long, appearing almost circular in outline, the eyes not bulging strongly at the sides; toruli elongate, their upper limits at or a little below lower eye margins, their lower limits close to mouth margin; scrobes impressed on face as a semicircle or triangle, separated only basally by a short broad interscrobal prominence; antenna eight- or ten-segmented; scape long, cylindrical; pedicel unusually large, longer than the basal two funicle segments together; funicle five-segmented; club one- or three-segmented, at least as long as the distal three funicle segments together, usually hardly broader than the distal funicle segment, broadly rounded apically; flagellum finely and relatively sparsely setose, the setae short. Mandible with four unequal teeth; maxillary palpi each with three segments, the labial palpi two- or three-segmented. Sculpture of head finely to coarsely cellulate-reticulate, the cells sometimes indiscernible, the scrobal area smooth, polished, without differentiated sculpture, the frontovertex with or without punctations; eyes finely pubescent.

Thorax at most gently convex, the scutellum disc-like in most species; mesoscutum plainly wider than long, the scutellum about as long as wide, tapering to an obtusely pointed apex; mesoscutum with parapsidal sulci present: in some species they are complete, present as two thin, short, indistinct lines at the anterolateral sides of the thorax; in other species they are well-developed, complete, reaching the hind margin of the mesoscutum; axillae slightly raised, meeting mesally; sculpture of mesonotum cellulate-reticulate, usually much coarser on scutellum than on mesoscutum, in which case the cells on scutellum are raised, their margins thickened; mesonotum sparsely to densely setose. Fore wing about 2.5 times as long as wide; marginal vein absent, the postmarginal punctiform or very short, the stigmal vein long, slender, much longer than postmarginal; basal part of fore-wing disc evenly setose from near wing base to speculum, the setae not much longer and stronger than those beyond speculum; speculum broad, complete except one or two rows of fine setae at caudal end; marginal fringe well developed. Legs not especially modified.

Abdomen longer than thorax; cercal plates placed a little closer to base than to apex of gaster; apical sternite large, protruding at apex of gaster; ovipositor small, much shorter than gaster as seen through the derm in cleared slide-mounted specimens; gonostyli slender, approximately parallel-sided, rounded at their apices, protruding at most slightly at gastral apex. In all the slide-mounted specimens examined, the ovipositor and associated structures are not flat, making it impossible to study these structures in detail and to measure their relative lengths; for this reason, the characters of the ovipositor have not been used in the specific descriptions below.

**MALE.** Colour as in female, differing sometimes slightly in certain parts. Structurally like the female except for sex characters and the antenna, in which the club is always one-segmented and the dimensions of the segments are a little different.

Key to the species of *Trechnites* of southern Africa

## FEMALES

- 1 Antennal club not segmented; head and body generally blackish, shiny, the face and thoracic dorsum at most with a moderately strong purplish lustre in certain parts (legs boldly marked as in fig. 85; parapsidal sulci incomplete, indistinct)..... **morulus**
- Antennal club three-segmented; colour otherwise ..... 2
- 2 Mesoscutum a mixture of black and violet, the scutellum lustrous green; legs sordid white, with blackish brown markings as in fig. 82; parapsidal sulci incomplete, indistinct ..... **manaliensis**
- Mesoscutum (except parapsides, sometimes) and scutellum largely unicolorous, lustrous green to blue; legs entirely yellowish; parapsidal sulci well developed, complete ..... 3
- 3 Antennal scape largely yellowish; mesoscutum entirely metallic green, blue-green, or blue ..... **versicolor**
- Antennal scape yellowish basally, the distal half or so strongly suffused with brownish black; mesoscutum metallic green except the parapsides, which are blackish purple ..... **angolensis**

*Trechnites manaliensis* Hayat, Alam & Agarwal, fig. 82

*Trechnites manaliensis* Hayat, Alam & Agarwal, 1975: 88-90.

This species was originally described from India, ex '*Euphyllura* sp.' (Hayat *et al.* 1975). In the copy of this paper at hand, the host of *manaliensis* is given as *Euphyllura eastopi* in Hayat's handwriting. One female and one male card-mounted paratype are available for study, on loan from the U.S. National Museum, Washington, D.C.

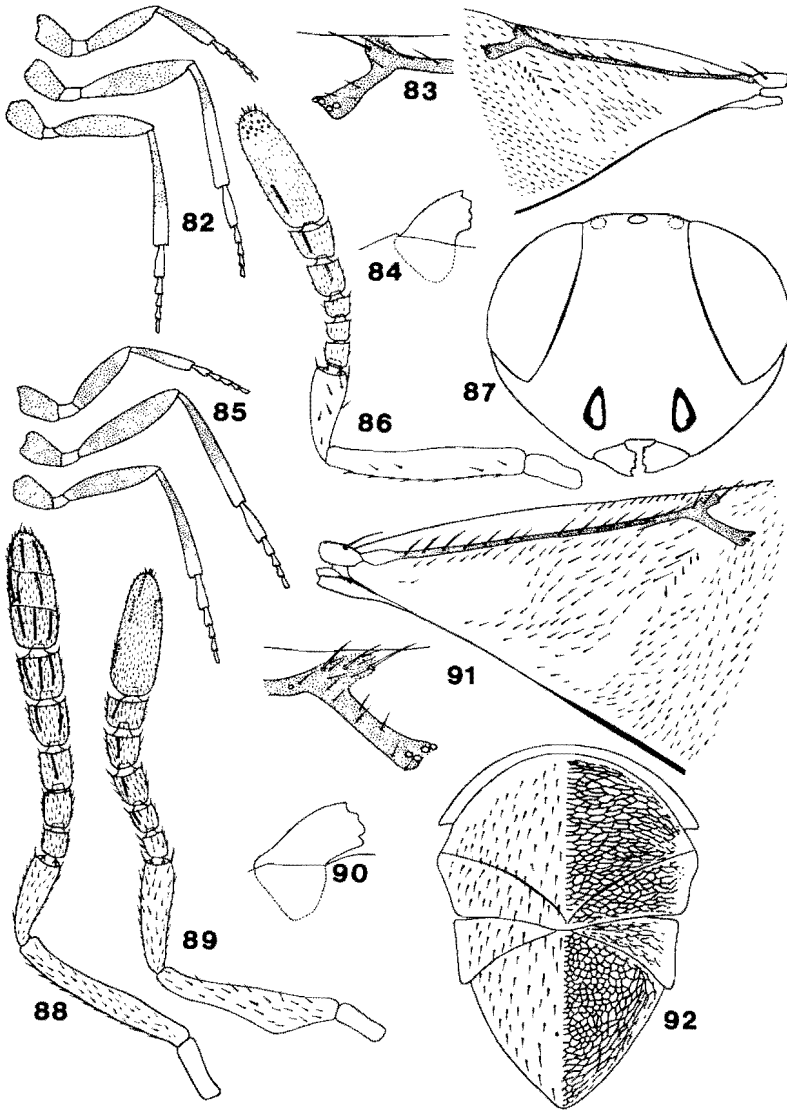
Also at hand is a short series reared from *Euphyllura longiciliata* on olive, collected in the Transvaal. This material, detailed below, fits the description of *T. manaliensis* and does not differ significantly from the card-mounted type specimens of that species which I have examined, and I regard the two lots of material as conspecific. *T. manaliensis* is separated from its southern African congeners by the characters given in the foregoing key, including the maculation of the legs, illustrated in fig. 82.

MATERIAL EXAMINED. 1 ♀ 1 ♂ paratypes (as detailed in Hayat *et al.* 1975), in U.S. National Museum, Washington, D.C.; SOUTH AFRICA: Roodeplaat (nr Pretoria), Tvl., ii.1964, A. L. Capener, ex *Euphyllura longiciliata* Silvestri on *Olea africana* (3 ♀ 1 ♂, T 1736).

*Trechnites morulus* spec. nov., figs 83-87

This new species resembles *T. aligarhensis* Hayat, Alam & Agarwal, described from Indian, and *T. insidiosus* (Crawford), known from the Nearctic and Palaearctic region, in the unsegmented antennal club. *T. morulus* differs clearly from these species in the colour of the body, in the maculation of the legs, and in a combination of structural characters, described below. The male of *T. morulus* is not known.

FEMALE. Length: about 1 mm. Colour: head and body black, somewhat shiny; face with a moderately strong dark-purple lustre, the frontovertex and thoracic dorsum



Figs 82-92. *Trechnites* spp. 82. *T. manaliensis* Hayat, Alam & Agarwal, legs, schematic, showing maculation (♀ T 1736). 83-87. *T. morulus* spec. nov., female paratypes (T 1584-1). 83. Basal half of fore wing, with venation enlarged. 84. Mandible. 85. Legs, schematic, showing maculation. 86. Antenna. 87. Head, frontal view. 88-92. *T. versicolor* spec. nov., paratypes. 88. Antenna (♀ T 3928-2). 89. Antenna (♂ T 3928-3). 90. Mandible (♀ T 3928-2). 91. Basal half of fore wing, with venation enlarged (♀ T 3928-2). 92. Mesonotum, showing sculpture and setation (♀ T 3928-2).

with a faint purple, greenish or golden tinge in plays of light; mesopleura brownish-black; antenna with radicle, scape and pedicel largely black, the latter two segments fading to sordid white in their distal one-fourth or so; basal three funicle segments mostly dark brown, the remainder of flagellum somewhat paler, sordid white to pale brown; all legs marked much the same: the coxae, femora and tibiae boldly marked with brownish-black, the ends of these segments, and tarsi, sordid white, the maculation as in fig. 85.

Head, in dorsal view (occiput perpendicular), approximately straight, becoming concave medially if the head is tilted slightly backwards; frontovertex more or less horizontal; fronto-occipital margin abruptly rounded; head about 2,7–2,8 times as wide as frontovertex at median ocellus; ocelli in about a right-angled triangle, the lateral pair separated from each other by about five times, and from the eye margins by about one-half, an ocellar diameter; head, in frontal view (fig. 87), with scrobes impressed on face as a moderately deep triangle, separated only basally by a broad interscrobial prominence, their lateral margins subacute. Antenna (fig. 86) with scape about 6,25 times as long as broad; funicle segments I–III quadrate or a little wider than long, plainly shorter than each of segments IV and V; V quadrate, VI wider than long; club not segmented, a little longer than the distal four funicle segments together; funicle segments IV–V, and club, with rhinaria. Mandible as in fig. 84; maxillary palpi each with three segments, the labial palpi two-segmented. Sculpture of head fine, the integument without punctations.

Thorax with scutellum a little wider than long; parapsidal sulci incomplete, very short, hardly visible in dried specimens; sculpture of mesoscutum fine, much as on head, that of scutellum much coarser, the cells smaller than on mesoscutum, their margins greatly thickened and somewhat raised; mesoscutum fairly densely and evenly setose, the scutellum with about ten scattered setae on posterior half of the disc. Fore wing venation, and setation of basal half of wing, as in fig. 83. Middle tibial spur about as long as adjacent tarsal segment.

Abdomen plainly longer than thorax, the gaster obtusely pointed apically; gonostyli protruding slightly at apex of gaster.

**MATERIAL EXAMINED.** ♀ Holotype, 3 ♀ paratypes, with the following data: SOUTH AFRICA: Pienaarspoort (nr Pretoria), Tvl., xi.1963, C. J. Cilliers, with *Ceroplastes* sp. on *Acacia karroo* (holotype, 1 ♀, T 1584); same data, except date: vii.–ix.1962 (2 ♀ T 1040).

*Trechnites versicolor* spec. nov., figs 88–92

This new species resembles *T. angolensis*, described below, in general habitus and leg maculation, but is separated from it by the colour and shape of the antenna, and colour and sculpture of the thorax. From non-African species with a three-segmented club, *T. versicolor* is separated by a combination of characters, including those mentioned above, as well as leg colour.

**FEMALE.** Length: ranging from about 1,25 to 1,5 mm. Colour: head and thoracic dorsum, including tegulae, entirely metallic green, blue-green or blue; mesopleura brownish-black, shiny, with a polished appearance, with at most a very faint metallic tinge in some specimens; abdomen black with a faint metallic tinge in plays of light; antenna with radicle brownish-black to black; remainder of antenna mostly



yellow to brownish-yellow, the dorsum of pedicel, and funicle, unevenly suffused with brown in some specimens; all legs entirely pale yellow to yellowish-white except tarsal tips, which are blackish.

Head, in dorsal view (occiput perpendicular), with anterior margin approximately straight, becoming concave if the head is tilted a little backwards, the interscrobal prominence clearly visible in this position; fronto-occipital margin acute; frontovertex with posterior part approximately horizontal, sloping gently downwards from the level of anterior ocellus; head about 2.5–2.7 times as wide as frontovertex at median ocellus; ocelli in a slightly obtuse-angled triangle, the lateral pair separated from each other by about three times, and from the eye margins by about one-half, their own diameter; head, in frontal view, with upper limits of toruli slightly below lower eye margins; scrobes impressed on face in the approximate shape of a triangle. Antenna (fig. 88) with scape about six times as long as wide; basal funicle segment a little smaller than the remaining ones, quadrate; II–IV each longer than wide, V quadrate; club three-segmented, about as long as the distal three funicle segments together; funicle segments II–V, and all club segments, with rhinaria. Mandible as in fig. 90; maxillary and labial palpi each three-segmented. Sculpture of frontovertex coarse, the cell margins thickened, raised; frontovertex without punctations.

Thorax with scutellum about as long as wide; parapsidal sulci complete, clearly visible in dried specimens; sculpture of mesoscutum and scutellum of the same coarseness, much as on head, as in fig. 92; mesonotal setation as in fig. 92. Fore wing venation, and setation of basal half of wing, as in fig. 91. Middle tibial spur about as long as adjacent tarsal segment.

Abdomen about as long as thorax, the gaster heart-shaped; gonostyli protruding slightly at apex of gaster.

MALE. Colour as in female except for antenna, which is generally darker, the flagellum appearing dark brown. Antenna as in fig. 89, the scape characteristically humped on the dorsal surface near base, about 1.5 times as long as pedicel.

MATERIAL EXAMINED. ♀ Holotype, 9 ♀ 7 ♂ paratypes with the following data: SOUTH AFRICA: Umfolozi Game Reserve, Ntl., viii.1971, H. P. Insley, ex *Ciriacremum capense* on *Schotia brachypetalia* (T 3928). 1 ♀ 1 ♂ paratypes in BMNH.

*Trechnites angolensis* spec. nov., figs 93–96

The colour of the antennae and the sculpture of the mesonotum readily separate *T. angolensis* from *T. versicolor*, its closest southern African congener.

FEMALE. Length: about 1.5 mm. Colour: head with frontovertex and face largely metallic green, the genae washed with dark purple, the frontovertex with a thin median purplish line which extends from upper limits of scrobes to median ocellus, the purplish colour extending to cover the ocellar triangle; thoracic dorsum dark metallic green except the parapsides and axillae, which are blackish-purple; mesopleura brownish-black, smooth, polished, but without a metallic lustre; abdomen black with a weak metallic greenish lustre in plays of light; antenna with radicle black; basal half of scape pale yellow, the distal half or so unevenly suffused with brownish black; dorsal surface of pedicel (except distal end) suffused with dark brown, the remainder of antenna mostly yellowish to testaceous, the funicle with uneven darker suffusions; legs entirely pale yellow except the tarsal tips which are blackish.

Head, in dorsal view, with anterior margin approximately straight, the frontovertex horizontal; fronto-occipital margin acute; head about 3,2 times as wide as frontovertex at median ocellus; ocelli in about a right-angled triangle, the lateral pair separated from each other by about 3,5 times, and from the eye margins by about one-half, their own diameter; head, in frontal view, with toruli slightly below lower eye margins; scrobes impressed on face as a semicircle. Antenna much as in *T. versicolor*, the scape about six times as long as broad; funicle segments I-IV each a little longer than wide, V quadrate; club three-segmented, about as long as the distal three funicle segments together. Mandible as in fig. 96; maxillary palpi each with three segments, the labial palpi three-segmented. Sculpture of frontovertex rather fine, the integument with fine, shallow, scattered punctations.

Thorax with scutellum about as long as wide; parapsidal sulci complete, clearly visible in dried specimens; sculpture of mesoscutum and scutellum different: that of mesoscutum rather fine, much as on head, the scutellum coarsely cellulate-reticulate, the cells small, as in fig. 95. Basal half of fore wing with setation much as in *T. versicolor*, the venation as in fig. 94.

The characters of the mandible and palpi, and illustrations of the thoracic sculpture and wing venation, are from slide-mounted male paratypes; the female sex is represented by a single card-mounted specimen which does not display these characters in detail.

MALE. Differing slightly in colour from the female holotype as follows: antennal scape almost entirely yellowish, the distal part not darkly suffused (except the extreme distal end, which is blackish); flagellum dark brown; parapsides a mixture of green and blackish purple; extreme distal end of hind femur unevenly suffused with dark brown. Antenna structurally as in fig. 93.

MATERIAL EXAMINED. ♀ Holotype, 5 ♂ paratypes with the following data: ANGOLA: Nhârea, x.1974, A. van Harten, ex undetermined psyllid on *Isobertinia* sp. (T 4941).

### CHEILONEURUS Westwood, 1833

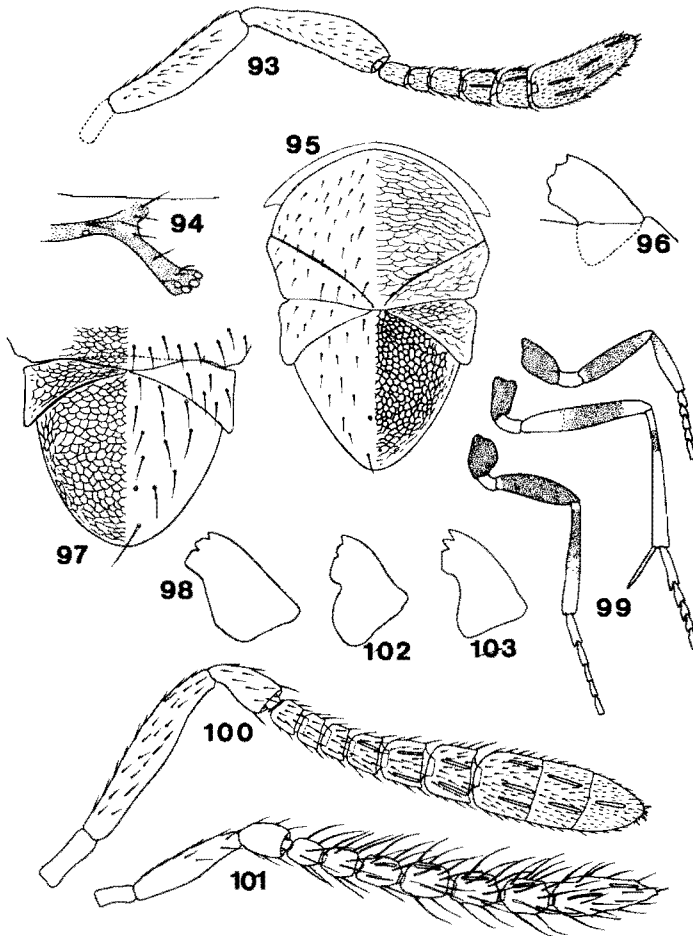
The species of this large cosmopolitan genus are always, or almost always, hyperparasites, their hosts being other chalcidoids developing in a variety of other insects, including psyllids.

A single series of *Cheiloneurus cyanonotus* Waterston, determined by D. P. Annecke and reared from the citrus psylla, *Trioza erytrae*, in Salisbury, Zimbabwe, constitutes the only record of a species of *Cheiloneurus* associated with psyllids in southern Africa. The above-mentioned material, mentioned in McDaniel & Moran (1972), is at hand.

The genus *Cheiloneurus* may be separated from other encyrtid genera associated with psyllids in southern Africa by the key at the beginning of this article.

### APHIDENCYRTUS Ashmead, 1900

Two species of this genus were hitherto known to occur in southern Africa: *A. africanus* Gahan, a widespread secondary parasite of aphids; and *A. cassatus* Annecke, a secondary parasite of psyllids. A third species, *A. similis*, reared from the psyllid



Figs 93–103. *Trechnites angolensis* and *Aphidencyrtus* spp. 93–96. *T. angolensis* spec. nov., paratype (♂ T 4941–2). 93. Antenna. 94. Fore wing venation. 95. Mesonotum, showing sculpture and setation. 96. Mandible. 97–101. *A. similis* spec. nov., paratypes. 97. Scutellum and posterior part of mesoscutum, showing sculpture and setation (♀ T 1730–2). 98. Mandible (♀ T 1730–1). 99. Legs, schematic, showing maculation (♀ T 1730). 100. Antenna (♀ T 1730–2). 101. Antenna (♂ T 1730–3). 102. *A. cassatus* Annecke, mandible (♀ T 2238–2). 103. *A. africanus* Gahan, mandible (♀ T 1010–1).

*Euphalerus marginalis* Capener in the Transvaal, is described below as new. Presumably this new species is – like its congeners – a hyperparasite.

The two southern African species of *Aphidencyrtus* associated with psyllids are separated as follows, and the genus is distinguished from other encyrtid genera dealt with here, by the key at the beginning of this article.

Scutellar sculpture like that of mesoscutum, finely cellulate-reticulate, the surface smooth and shiny under low magnification; antennal scape about five times as long as broad. . . **similis**  
 Scutellar sculpture appearing rough and mat, consisting mainly of longitudinal ridges, in contrast to the mesoscutum which is finely cellulate-reticulate, appearing smooth and shiny under low magnification; antennal scape about four times as long as wide . . . . . **cassatus**

*Aphidencyrtus cassatus* Annecke

**Aphidencyrtus cassatus** Annecke, 1969: 452; McDaniel & Moran, 1972: 304-5.

This is a common secondary parasite of the citrus psylla in southern Africa, having been recorded from South Africa, Zimbabwe and Swaziland by Annecke (1969), and being here recorded from Angola. Like *A. africanus*, *A. cassatus* is probably widespread in Africa; a series from Kenya (listed below) was also studied.

A detailed account of the biology of *A. cassatus* is given by McDaniel & Moran (1972). Its primary hosts are known to be *Psyllaephagus pulvinatus* Waterston and *Tetrastichus dryi* Waterston, the latter previously thought to be *T. radiatus* Waterston (Prinsloo 1980).

**MATERIAL EXAMINED.** Specimens from South Africa, Zimbabwe and Swaziland, listed by Annecke (1969), and the following additional material: ANGOLA: Gangassol, i.1971, L. Amorim, ex *Trioza erythrae* on citrus (♀♀ ♂♂, T 4880). SOUTH AFRICA: Grahamstown, C.P., xii.1971, W. Webb, ex psyllids on *Acacia karroo* (♀♀ ♂♂, T 4099). KENYA: Ruiru, vii.1964, T. J. Crowe, 'ID no. 2824', ex *T. erythrae* nymphs (3 ♀, det. D. P. Annecke).

*Aphidencyrtus similis* spec. nov., figs 97-101

Superficially, this species resembles *A. africanus* and *A. cassatus* closely in both sexes, and it is described with reference to the latter two species.

**FEMALE.** Length: about 1.25 mm. Colour: head and body, and markings on legs, much as in *A. africanus* and *A. cassatus*; head black, shiny, the face with a fairly strong metallic purplish tinge, the frontovertex very faintly washed with a greenish lustre in plays of light; mesoscutum a mixture of dark metallic green and black; axillae and scutellum dark purple; tegulae blackish brown; mesopleura brownish black, shiny, but without a metallic lustre; abdomen concolorous, or a little darker, with a fairly strong metallic tinge in plays of light; antenna with radicle, basal two-thirds or so of scape, and dorsal surface of pedicel (except distal end) black, the remainder of the latter two segments, and funicle, sordid white to pale brown; club somewhat darker than funicle, dark brown to blackish brown; legs whitish with blackish brown markings as in fig. 99; these markings differing a little from those of *cassatus* and *africanus* (cf. Annecke 1969: 450, figs 18, 19).

Head much the same as in the above-mentioned two species except for frontovertex, which is relatively broader, and for the ocelli, which are in a little larger obtuse-angled triangle (head about 2.3-2.4 times as wide as frontovertex, but about 2.8-3.0 times as wide as frontovertex in *cassatus* and *africanus*). Antenna (fig. 100) with scape about five times as long as broad; club as long as the distal four-and-a-half to five funicle segments together; otherwise as in fig. 100. Mandible (fig. 98) different from that of *cassatus* (fig. 102) and *africanus* (fig. 103).

Structure of thorax (except scutellar sculpture), venation and setation of fore wing, and structure of ovipositor and associated plates not significantly different from that of *africanus* and *cassatus*; scutellar sculpture (fig. 97) like that of mesoscutum, finely cellulate-reticulate, the surface smooth and shiny under low magnification, quite different from that of *cassatus*, differing from that of *africanus* in that the sculptural cells appear a little larger (cf. Annecke 1969, fig. 17).

**MALE.** Only slide-mounted specimens were available for study; in these, the maculation of the legs appears similar to that of the female except for the fore femur, which is a little more extensively infuscated. Sculpture of thorax like that of the female; antenna as in fig. 101, differing only slightly in the dimensions of the segments from that of *africanus* and *cassatus*.

**MATERIAL EXAMINED.** ♀ Holotype, 9 ♀ 3 ♂ paratypes with the following data: SOUTH AFRICA: Warmbad, Tvl, ii.1964, P. Paliatseas, ex *Euphalerus marginalis* Capener on *Burkea africana* (T 1730). 1 ♀ Paratype in BMNH.

#### Additional psyllid-inhabiting species

There are four southern African series of conspecific specimens that I am unable to place in a genus. One reared series from Zimbabwe was collected by McDaniel & Moran (1972) as a tertiary parasite of the citrus psylla, *Trioza erythraeae*. They referred to it as '*Psyllaephagus* sp.', a determination provided for them by D. P. Annecke of the Plant Protection Research Institute, Pretoria, who noted that the species appeared to be undescribed and might require a new genus. Despite the acquisition of additional material, I am undecided about this species: the body colour of the female is yellow, that of the male likewise except for the thorax, which is boldly marked with metallic green; characters of the antenna and mandible, and the general habitus of the species, do not differ significantly from the species of *Psyllaephagus* dealt with here. But the yellow non-metallic colour of the female and the hyperparasitic habit are quite different from the known African species of that genus. It seems best to leave the classification of this species in abeyance until more is known about this group of parasites in Africa. This species has been included as 'gen. et sp. ign.' in the generic key at the beginning of this article.

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