

A revision of the genus *Goniurellia* Hendel (Diptera: Tephritidae)

by

A. FREIDBERG

Department of Zoology, Tel Aviv University, Tel Aviv, Israel

Goniurellia Hendel (1927) is redescribed and its affinities with *Trypanea* Schrank (1795) and *Dectodesis* Munro (1975) are discussed. Of the six species originally placed by Hendel in *Goniurellia*, only *G. tridens* (Hendel) is retained and redescribed. Six new species are described: *G. ceylonensis*, *G. longicauda*, *G. mantoi*, *G. omisa*, *G. persignata* and *G. spinifera*. *Trypanea lacertata* Becker is transferred to *Goniurellia* and compared with *G. tridens*. *Trypanea pentadactyla* Senior White is synonymized with *G. tridens*. A key to the species of *Goniurellia* is given.

INTRODUCTION

Hendel (1927) proposed *Goniurellia* as a subgenus of *Trypanea* Schrank (1795) (= *Trypanea*). Hendel's subgenus originally included the following five taxa: *T. (G.) augur* (Frauenfeld) (type-species of subgenus), *T. (G.) augur tridens* (Hendel), *T. (G.) ensina* Hendel, *T. (G.) cosmia* (Schiner), and *T. (G.) insularum* (Becker). In 1931 Hendel added a new species, *T. (G.) rostrata*. Munro (1955, 1957) treated *Goniurellia* as a distinct genus and provided (1957) detailed characterizations of *Goniurellia*, *Trypanea* and a new genus, *Dectodesis*.

Species concepts in *Goniurellia* have undergone considerable change since Hendel. Steyskal & El Bialy (1967) considered *T. ensina* and *T. rostrata* to be junior synonyms of *Trypanea* (= *Trypanea*) *kingi* Bezzi. Kugler & Freidberg (1975) and Freidberg & Kugler (1977) synonymized all three names (*T. ensina*, *T. rostrata* and *T. kingi*) with *Trypeta augur* Frauenfeld. Freidberg & Kugler (1977) also showed that Hendel (1927) misidentified *T. (G.) augur* when he designated it as the type-species of *Goniurellia*, and they suggested that *T. augur* of Frauenfeld be placed in *Dectodesis* Munro. Accordingly, Freidberg & Kugler (1977) raised *tridens* from subspecific to specific rank and requested that the International Commission on Zoological Nomenclature designate it as the type-species of *Goniurellia*.

During the present study specimens of *T. cosmia* and *T. insularum*, including male genitalia, have been checked. The two species are not congeneric with *T. tridens* and should be retained (at least temporarily) in *Trypanea*. As a consequence, the number of valid species of *Goniurellia* is reduced to one, namely, *G. tridens*. However, specimens from the Mediterranean region, Asia and Africa (which key to *T. (G.) augur sensu* Hendel (1927) *nec* Frauenfeld (1857)) were found by me to belong to at least six hitherto undescribed species of *Goniurellia*.

In the present paper *Goniurellia* is redescribed and compared with two closely related genera, *Dectodesis* and *Trypanea*. *G. tridens* is redescribed, and six new species (*G. ceylonensis*, *G. longicauda*, *G. mantoi*, *G. omisa*, *G. persignata* and *G. spinifera*) are described.

The material used in this study is deposited in the entomological collection of the Department of Zoology, Tel Aviv University, Israel (TAV) and in the institutions listed below. The following institutions and the respective curators are thanked for loan of specimens:

- AMNH American Museum of Natural History, New York (Dr P. W. Wygodzinski)
- BM British Museum (Natural History), London (Mr B. H. Cogan)
- CM University Zoologisk Museum, Copenhagen (Dr L. Lynborg)
- GNC Canadian National Collection, Ottawa (Dr J. F. McAlpine)
- HQB Zoologisches Museum der Humboldt Universität zu Berlin (Dr Schumann)
- IPP Institute for Plant Production, Praha (Dr J. Dürbeck)
- MM Museo Civico Storia Naturale, Milano (Dr G. Leonardo)
- MNHF Muséum National d'Histoire Naturelle, Paris (Dr L. Matile)
- PPI Plant Protection Research Institute, Pretoria (Dr H. K. Munro)
- SM Staatliches Museum für Naturkunde in Stuttgart, Ludwigsburg (Dr B. Heimg)
- USNM National Museum of Natural History, Washington (Dr R. H. Foote)
- WM Naturhistorisches Museum Wien (Dr R. Lichtenberg)

GONIURELLIA Hendel, 1927

Goniurellia Hendel, 1927: 198 (as subgenus of *Trypanea* Schrank). Munro 1957: 4; Freidberg & Kugler 1977: 208.

Type-species: *Trypeta augur* Frauenfeld, by original designation, misidentification. Replacement type-species: *Urdia augur* Frauenfeld *var. tridens* Hendel (= *Goniurellia tridens* (Hendel)), by subsequent designation (pendent) (Freidberg & Kugler 1977: 208).

Head (figs 2, 3). Rectangular, slightly higher than long; frons flat, about long as wide; frontal stripe bare or with few hairs anteriorly; face flat, rarely with moderately large carina, epistome slightly to moderately projecting; gena at most 1 as wide as 3rd segment of antenna, parafacial narrower; antenna distinctly shorter than face; 3rd segment rounded or with a small dorso-apical point, about 1.5-2 times longer than wide, arista microscopically pubescent; proboscis capitate, short, rarely spatulate; palpus elongate; 2 upper, 3 lower orbital bristles; anterior lower and posterior upper orbitals short, white, the rest yellow or brown; ocellars about as long as the lower orbitals; all occipital bristles lanceolate and white.

Thorax. Densely pollinose. Chaetotaxy as follows: 1 humeral, 1 presutural, notopleurals, the posterior short and white, 1 dorsocentral slightly behind transpresutural, 1 prescutellar, 1 anterior and 2 posterior supra-alars, 1 mesopleural, 1 prepleural, whitish, 1 sternopleural, 1 basal scutellar.

Wing (figs 4-9). Stigma 2.5-3 times longer than wide; 4th longitudinal vein bare; an elongate, rayed, subapical, brown or black spot, sometimes broken, contains a darker area ('bullae') on the apical section of 3rd vein and a rounded or oval light spot in 1st posterior cell; apical fork present; upper squama about as long as lower

Abdomen. Densely pollinose, occasionally subshiny; male genitalia: 9th tergum (figs 10-14) oval or subrectangular; aedeagus (figs 15-19) with sclerotization restricted to the basal part and with very long vesica, which is 10-18 times longer than wide, 5-12 times longer than the sclerotized part; phallosome usually several times longer than the sclerotized part of the aedeagus, in one species about as long; female oviscape at dorsal side about as long as combined length of last 2-3 terga, shiny, pubescent; pubescence white and coarse along basal 0,5-0,75 of oviscape, yellowish or brownish at apex; aculeus (figs 20-25): basal half more or less parallel sided, apical half gradually tapering; apex simple.

Remarks

Species of *Goniurellia* closely resemble those of *Dectodesis* Munro and *Trupanea* Schrank but differ from those of both genera by the greatly lengthened vesica of the aedeagus. In males of *Dectodesis* and *Trupanea* the vesica is at most 4 times longer than wide, whereas in males of *Goniurellia* the vesica is 10-18 times longer than wide. Other similarities and differences between *Goniurellia* and either of the other two genera are as follows.

Goniurellia and *Dectodesis* have similar wing patterns and chaetotaxy. However, in *Dectodesis* the proboscis is geniculate, having the labella about as long as the mouth opening, the lower squama linear (only in *D. augur* is it broader), the 9th tergum rounded and the vesica often bears a hairy 'tail'; in *Goniurellia* the proboscis is usually capitate, the labella being much shorter (only in *G. omissa* is the proboscis spatulate), the lower squama at least as wide as the upper, the 9th tergum oval to rectangular and the vesica lacks a 'tail'. The wide, brown, median, thoracic stripe, which is usually very conspicuous in *Dectodesis*, is completely absent in *Goniurellia*.

Goniurellia is similar to *Trupanea* Schrank in chaetotaxy, in body vestiture, in having a short proboscis and in having a subapical rayed spot in the wing. It differs from the latter in having two dark lower orbital bristles and a third, anterior, white one, not three or more concolorous bristles. It also differs in the subapical spot of the wing, which is almost always elongate, broadly united to the stigma and terminates in an apical fork, whereas in *Trupanea* it is usually short and rounded (sometimes much reduced), only seldom united broadly to the stigma and with, or without, an apical fork. In *Goniurellia* the 9th tergum of the male is oval to subrectangular, and the base of the aedeagus is variously sclerotized; in *Trupanea* the 9th tergum is shorter and broader, more egg-shaped, and the aedeagus has a strong spine of a type not found in *Goniurellia* (*G. spinifera* spec. nov. has a somewhat similar spine, but differs in all other respects).

Distribution

The insect material checked during this study originated from an area whose borders are the Canary Islands in the west, eastern India and Ceylon in the east, France and Transcaucasian U.S.S.R. in the north and South Africa in the south (fig. 1). However, records in the literature, which probably refer to species of *Goniurellia*, extend the range of the genus in the northeast to the Gobi Desert of China (Becker 1907, as *Urellia augur*). In addition to the locality records in the literature that I was unable to confirm, I have examined a few specimens, all in poor condition, that were not determined to species. Some of them represent localities that further expand the known distribution of the genus. The Near East or East Africa is probably the centre of diversity of *Goniurellia*, as evident from the occurrence there of 5 out of the 8 known species.

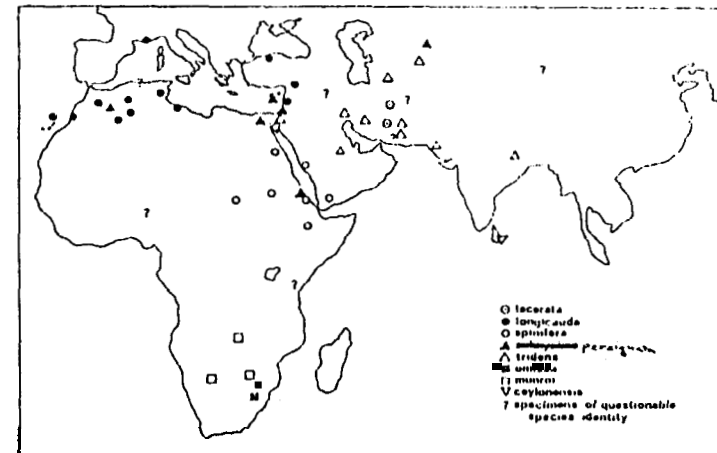


Fig. 1. Distribution of *Goniurellia* species.

Key to species of *Goniurellia*

- 1 Wing pattern compact; subapical spot broadly connected to stigma; stigma extensively brown; brown ray in discal cell, behind anterior crossvein, short, not reaching 5th longitudinal vein *lacerata* (Beck)
- Wing pattern distinctly reticulate; subapical spot broken, narrowly connected to stigma; stigma hyaline or yellowish; brown ray in discal cell, behind anterior crossvein, long, usually reaching 5th longitudinal vein. (Iran) *longicauda* (Beck)
- 2 Ninth tergum of male subrectangular, with very broad surstyli (fig. 14), prenisetae of each side united; phallosome extremely short, about as long as the aedeagal sclerotization; female ovipositor very short, aculeus 3,5 times longer than wide; wing: connection of the 'bulla' to the costa narrower than half width of 'bulla' (fig. 9); discal cell with only 1 ray in addition to ray on posterior crossvein. (Near East and East Africa) *spinifera* spec. n.
- Ninth tergum oval, surstyli narrow, a pair of prenisetae at each side; phallosome much longer; aculeus usually longer; wing: connection of the 'bulla' to the costa usually broader than half width of 'bulla'; in discal cell 1-2 rays *tridens* (Hemsl.)
- 3 Proboscis spatulate, labella about 1,5 times longer than antenna (fig. 3); in discal cell only one ray in addition to ray on posterior crossvein (fig. 7). (South Africa) *omissa* spec. n.
- Proboscis capitate, labella at most as long as antenna *munro* (Beck)
- 4 First posterior cell usually with 1-3 hyaline dots in addition to oval spot (fig. 4); distance between crossveins usually 1,5-2,0 times longer than anterior crossvein; in discal cell almost always 2 rays in addition to ray on posterior crossvein, middle one about half length of posterior crossvein. (West and Central Asia) *vesiculosa* (Beck)
- First posterior cell with the oval spot only; distance between crossveins usually 1,0-1,5 times longer than anterior crossvein; middle ray in discal cell shorter than half length of posterior crossvein or lacking *subapicalis perazani* (Beck)
- 5 Marginal cell with the large hyaline indentation only, which does not cross second vein; pattern dark brown to black *vesiculosa* (Beck)

- Marginal cell with a similar hyaline indentation in addition to the large one, which usually crosses second vein; pattern lighter 7
- 6 Stigma dark to bend of subcosta (fig. 8); oviscape dorsally longer than combined length of last 2 terga. (West Asia, North and East Africa) *persignata* spec. nov.
- Basal part of stigma pale yellow; oviscape shorter than combined length of last 2 terga. (Sri Lanka) *ceylonensis* spec. nov.
- 7 Basal 0.25 stigma hyaline or very pale yellow (fig. 6); in discal cell only one brown ray III addition to rry on posterior crossvein. (Rhodesia, South Africa and South West Africa) *inunroi* spec. nov.
- Stigma brown to bend of subcosta (fig. 5); in discal cell a shorter, middle ray is also present. (Mediterranean) *longicauda* spec. nov.

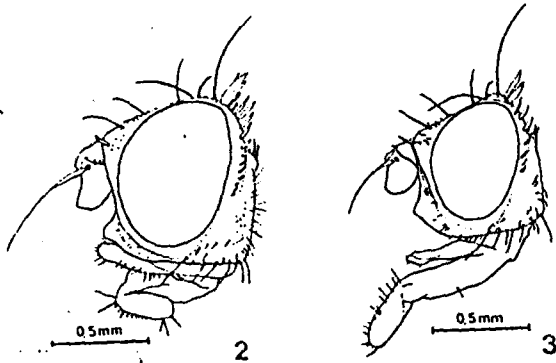
Goniurellia tridens (Hendel), figs 2, 4, 10, 15, 20

- Urella augur* (Frauenfeld) var. *tridens* Hendel, 1910: 106.
- Trypanea pentadactyla* Senior White, 1904: 164, n. sp. nov.
- Trypanea* (*Goniurellia*) *augur tridens* Hardy, 1968: 127.
- Trypanea* (*Goniurellia*) *augur tridens* Diribek & Diribekova, 1971: 171.
- Goniurellia tridens* Freidberg & Kugler, 1977: 209.

Length 3.5–4.5 mm; wing 3.6–4.1 mm; oviscape (ventral aspect) 1.0–1.1 mm.

Head (fig. a). Whitish yellow; antenna yellow, a V pattern on occiput and terminal part of arista black; orbits, ocellar triangle, a weak median stripe on frons, face and occiput with white pollinosity; ratio of head length to height to width 6.8:7.0:10.0; frontal stripe bare, rarely with 1–2 hairs near lunule; face flat, lacking distinct carina, epistome slightly projecting; proboscis capitate, labella at most as long as antenna.

Thorax. Dorsum of thorax, scutellum and plicura black (apex of scutellum sometimes yellow), with dense greyish white pollinosity and whitish to yellowish pubescence; pollinosity and pubescence on humerus and broadly on notopleural area yellowish; dark dorsocentral and median lines barely visible. Legs yellow to rufous yellow.

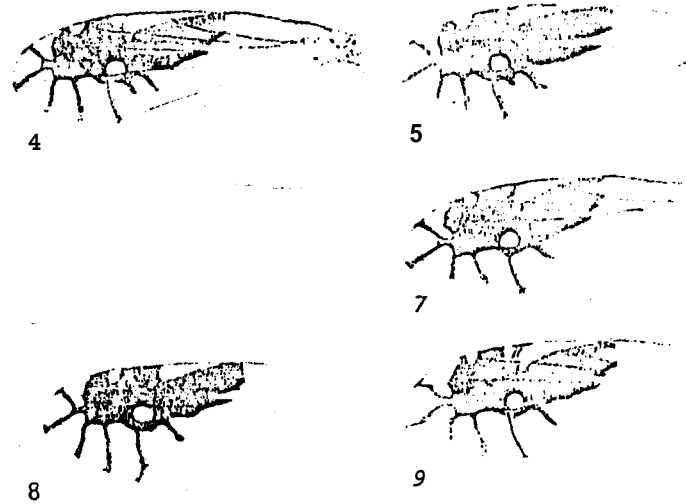


Figs 2–3. Heads of *Goniurellia* species in profile. 2. *G. tridens* (Hendel). 3. *G. omissa* spec. nov.

Wing (fig. 4). With brown pattern extending from bend of subcosta; large hyaline indentation in marginal cell intrudes distinctly into submarginal cell; small triangular indentation in the same cell relatively large, usually reaches 2nd vein; connection of 'bulka' to costa usually narrower than half the width of 'bulka'; oblique proximal border of pattern mainly straight, slightly indented on 3rd vein; first posterior cell usually with 1–3 hyaline dots, in addition to larger, oval, hyaline spot, rarely lacking; discal cell with two brown rays in addition to one on posterior crossvein; middle ray finger-like, about half length of posterior crossvein, rarely lacking; distance between crossveins 1.53–2.15 ($n = 7$) times longer than anterior crossvein; square white; halter yellow.

Abdomen. Terga black, usually with narrow yellow posterior margins; anterior terga more or less yellow laterally; pollinosity and pubescence as on thorax, 1–2 pollinosity more sparse; male genitalia: 9th tergum oval (fig. 10), surstyli moderate broad; each of the twisted rods bears two distinctly separate preusisetae; phallosome elongate; aedeagus (fig. 15): sclerotized part with two (sometimes three) closely associated spines; vesica about 6 times longer than sclerotized part; female oviscape rufous yellow, with white pubescence on basal half or more, shorter dorsally than combined length of last three terga, ventral aspect 0.27 length of a wing; aculeus as fig. 20.

Host. Unknown.



Figs 4–9. Wings of *Goniurellia* species. 4. *G. tridens* (Hendel). 5. *G. longicauda* spec. nov. 6. *G. inunroi* spec. nov. 7. *G. omissa* spec. nov. 8. *G. persignata* spec. nov. 9. *G. spinifrons* spec. nov.

MATERIAL EXAMINED. Lectotype ♀. **TURKMENIA:** Ober Murgab, Reiter, 1894, also labelled 'angur var. tridens dei F. Hendel' (type ♀, *Tephritis angur tridens* Hendel, selected by D. E. Hardy 1961). The lectotype is deposited in WM. Other specimens examined: **TURKMENIA:** Ober Murgab, iv.1887, Reiter 1894 (2 ♂); Ashabad, 1888, Mik (2 ♂, WM); **Bucharia** Repetek, Oldenberg (1 ♀, IPP). **Uzbekistan:** Namangan, 30.vii.1959, Oman, ex *Heliotropium europaeum* (1 ♀, USNM). **IRAN:** E. Iran, Taftan, Gushch, 21.iv.1973 (Lic. no. 171, Exp. Nat. Mus. Praha) (2 ♀); 55 km S. Hadjabad, 2000 m, 10.v.1973 (Loc. no. 171, Exp. Nat. Mus. Praha) (2 ♂, IPP); Khuzistan, 18 km NE Shadegan, Jarrahi Ufergebiet, 28.iii-6.iv.1956, Richter & Selhäuffele (1 ♂); Belutschistan, Iranshar, 800 m, 1-10.iv.1954, Kiciier & Selhäuffele (1 ♂, SM). **PAKISTAN:** Karachi, Oyster Isl., B.xi.1959, R. I. Sailer (1 ♀, USNM). **INDIA:** Banhar, 13.iii.1921, also labelled 'Type', 'Ta 43' and 'Ceylon, R. Senior White, B.M. 1924-100' (1 ♂); ilic specimen, which in bad condition (abdomen dissected and in microvial attached to ilic pin) is deposited in BM as the holotype and only known specimen of *Trypanea pentadactyla* Senior White. **SAUDI ARABIA:** Riyadh Umg., 17.iv.1975, W. Büttiker (1 ♂) Arada, 30.x.1975, W. Büttiker (1 ♀); (1 ♂, BM); Harod, 20-21.iii.1978, Linnavuori (2 ♂, 2 ♀); 50 km N Urayirah, 12.iv.1978, Linnavuori (2 ♂, 3 ♀); **Ayn-An-Nu'ayriyah**, 27-28.iv.1978, Linnavuori (8 ♂, 4 ♀, TU). **ISRAEL:** Avdat, 11.iv.1970, A. F. (my initials) (1 ♂, 2 ♀); Nahal Ze'elim, 10.v.1958, O. Theodor (1 ♂); Jotveta, 11.iv.1972, A. F. (1 ♀); Wadi Maaleh, 1.v.1954, O. Theodor (1 ♂, TU).

Distribution. U.S.S.R. (Turkmenia, Uzbekistan), Pakistan, India, Iran, Saudi Arabia, Israel.

Gonurellia ceylonensis spec. nov.

Differs from *G. tridens* in ilic following:

Length 3.4-3.9 mm; wing 2.9-3.5 mm; oviscapae (ventral aspect) 0.6 mm.

Head. Length-height-width ratio 6.0:7.2:10.0.

Wing. Basal 0.25-0.33 of stigma pale yellow; larger hyaline indentation iii marginal cell intrudes slightly or not at all into submarginal cell; smaller indentation in marginal cell lacking or very small; connection of 'bulla' to costa as broad as or broader than half width of 'bulla'; proximal border of ilic blackish subapical spot deeply indented along 3rd vein; first posterior cell with 0.5 the rounded hyaline spot; middle ray of discal cell present or absent, when present, less than half length of posterior crossvein; distance between crossveins 1.20-1.82 (n = 2) times longer than anterior crossvein.

Abdomen. Dorsal side of oviscapae slightly shorter than combined length of last two terga, ventral side 0.19 times length of wing.

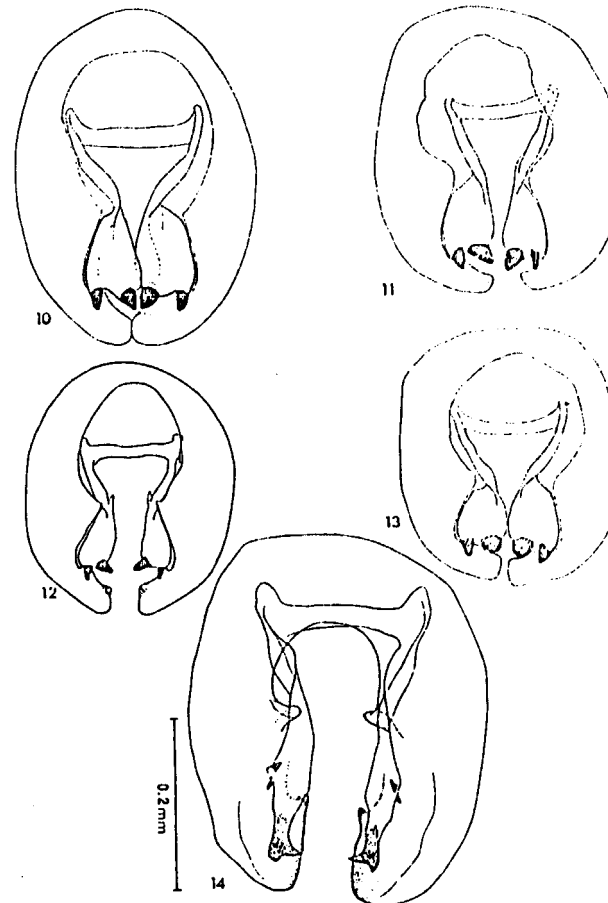
Male. Unknown.

Host. Unknown.

MATERIAL EXAMINED. Holotype ♀ and paratype ♀. **CEYLON:** Tea Estate, nr. Nuwara Eliya, 18.ix.1963, M. Speight (Univ. Lond. Ceylon Expedn.), deposited in BM.

Distribution. Sri Lanka (Ceylon).

Remarks. Because this species is based on only two known specimens, I have



Figs 10-14. Ninth tergum of *Gonurellia* species. 10. *G. tridens* (Hendel). 11. *G. longicauda* spec. nov. 12. *G. munoi* spec. nov. 13. *G. persignata* spec. nov. 14. *G. spumifera* spec. nov.

ected not to make dissections for illustrations. This species is very similar to *G. insignata* spec. nov., differing from it in the pale base of the stigma and in the shorter discal cell.

Goniurellia lacerata (Becker). comb. nov.

Trypanea lacerata Becker, 1912: 644; Hering, 1956: 86.

Trypanea lacerata Hendel, 1927: 201.

Differs from *G. tridens* in the following:

Length 2.5–3.5 mm; wing 2.8–3.2 mm; oviscap (ventral aspect) 0.75 mm.

Head. Length-height-width ratio 6.4:7.1:10.0.

Thorax. Humerus and notopleural area distinctly yellow.

Wing. Pattern lacking usual compact subapical spot; stigma completely hyaline or yellowish, its apex narrowly connected to rest of pattern; first posterior cell with irregular reticulation, with hyaline oval spot large, fused with larger costal indentation; discal cell with one ray in addition to one on posterior crossvein, this ray usually reaching 5th vein; 'bullae' small but distinct, its connection to costa very narrow; distance between crossveins 1.4 (n = 2) times longer than anterior crossvein.

Abdomen. Aedeagus: phallosome relatively short, about 5 times as long as sclerotized part; sclerotized part without distinct spines or appendages; vesica 12 times as long as sclerotized part; oviscap dorsally about as long as combined length of last two terga, ventral aspect 0.237 times length of wing. Aculeus not examined.

Host. Unknown.

MATERIAL EXAMINED. IRAN: Chorassan, Birdjant, 23.vii.–2.viii.1954, Richter and Selhäufler (1 ♂, 1 ♀, TU).

Distribution. Iran.

Goniurellia longicauda spec. nov., figs 5, 11, 16, 21

Trypanea sp. 3, Kugler & Freidberg, 1975: 68.

Differs from *G. tridens* in the following:

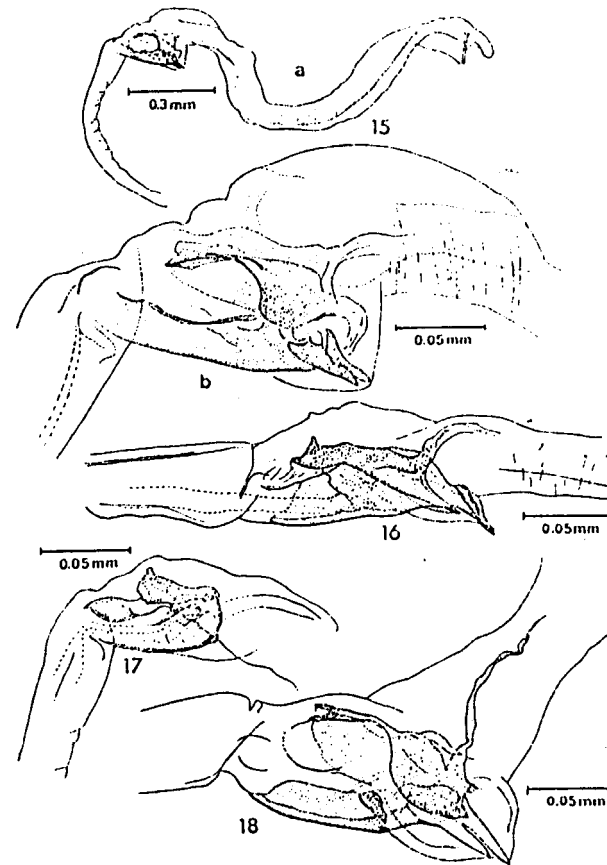
Length 2.8–4.5 mm; wing 2.8–3.7 mm; oviscap (ventral aspect) 0.8–1.2 mm.

Head. Length-height-width ratio 6.7:7.1:10.0; frontal stripe with a few hairs near the lunule.

Wing (fig. 5). Larger hyaline indentation in marginal cell usually intrudes slightly into submarginal cell; connection of 'bullae' to costa at least as wide as half width of 'bullae'; proximal border of pattern with deep hyaline indentation along third vein; first posterior cell with only the rounded hyaline spot; middle ray of discal cell shorter, sometimes almost indistinct; distance between crossveins 1.25–1.65 (n = 10) times longer than anterior crossvein.

Abdomen. Sometimes almost completely yellow; male genitalia: ninth tergum as in fig. 11; aedeagus (fig. 16): the sclerotized part narrower and includes 2–3 tooth-like appendages, not arranged as in fig. 16; vesica 7.4 times longer than sclerotized part; dorsal side of female oviscap about as long as combined length of last three terga, ventral side 0.28 times length of wing; aculeus as in fig. 21.

Hosts. Flower heads of *Pallenis spinosa* (L.) Cass. and *Asteriscus graveolens* Forssk. Less. (Compositae). The Avidov & Kotter (1966) record of rearing *Trypanea* sp. from flower heads of *Carthamus tinctorius* L. may refer to this species.



Figs 15–18. Aedeagus of *Goniurellia* species. 15a. *G. tridens* (Hendel). 15b. Detail of the same. 16. *G. longicauda* spec. nov. 17. *G. omisa* spec. nov. 18. *G. insignata* spec. nov.

MATERIAL EXAMINED. Holotype ♂, allotype ♀, 3 ♂ paratypes. ISRAEL: Ein Gedi, 27.iv.1973, A.F., deposited in TU. Additional paratypes: ISRAEL: Mt. Hermon, 2 000 m, 22.vi.1973, A.F. (4 ♂); 13.viii.1973, A.F. (3 ♂, 2 ♀); 8.vii.1973, A.F. (1 ♂), 7.viii.1974, F. Nachbar (1 ♀), 27.vi.1977, D. Simon (1 ♂), 27.vi.1974, D. Furth (1 ♀); Mt. Hermon, 1 750 m, 22.vi.1973, M. Kaplan (1 ♀); Mt. Hermon, 1 650 m, 22.vi.1973, A.F. (2 ♀), 9.vi.1975, A.F. (1 ♀), 8.vii.1975, A.F. (1 ♀), 16.vii.1976, M. Kaplan (1 ♂); Mt. Hermon, 1 400 m, 8.vi.1975, A.F. (2 ♂, 1 ♀), 21.vi.1971, J. Kugler (1 ♀); Mt. Hermon, 1 300 m, 22.v.1973 (1 ♀); Majdel Chams, 4.vi.1969 (8 ♂, 3 ♀), Mt. Dov, 15.viii.1976 (2 ♂), Mt. Meron, 14.v.1974, ex *Pallenis spinosa* (5 ♂, 1 ♀), Mt. Meron, 20.v.1972 (6 ♂, 1 ♀), 3.v.1973 (1 ♂), Ramot Naftali, 8.v.1969 (1 ♂), Nahal Amud, 30.v.1972 (5 ♂, 1 ♀), all A.F.; Tarschicha, 24.vi.1954, O. Theodor (1 ♀); Carmel, 2.v.1970 (2 ♀); Zikhron Ya'akov, 20.vi.1969 (1 ♂, 3 ♀); Bet She'an, 24.v.1969 (1 ♀); Wadi Faria, 3.vi.1977 (1 ♂), all A.F.; Jerusalem, 1.vii.1931, Aharoni (1 ♀), 2.vii.1947, O. Theodor (1 ♀), 20.v.1940, O. Theodor, (1 ♀), 20.v.1950, O. Theodor (1 ♀); Holon, 28.iv.1969, S. Bleszynski (1 ♂); Kefar Shemu'el, 19.iv.1968 (4 ♂, 2 ♀), 22.iv.1968 (6 ♂, 3 ♀), 26.iv.1968 (7 ♂), all S. Bleszynski; Bet Guvrin, 5.vi.1969 (3 ♀), 23.v.1976 (1 ♀); Shalva, 27.v.1969 (1 ♂, 2 ♀), Nahal Adurayim, 29.iv.1969 (1 ♀), all A.F.; Biddu, 20.vi.1973, D. Furth (1 ♀); Ha'Solclim, 21.vi.1969, A.F. (1 ♂, 1 ♀); Jericho, 5.v.1970, A.F. (4 ♀), 27.iv.1973, A.F. (1 ♀), 9.vi.1943, Bytinski-Salz (1 ♀); Beer Sheva, 8.viii.1977 (1 ♂, 1 ♀); Arad, 25.iv.1970 (1 ♂, 3 ♀); Ein Boqueq, 30.vii.1977 (1 ♀); Sedom, 26.vi.1976 (1 ♂, 1 ♀), Jeruham, 26.iv.1973 (1 ♂); Avdat, 11.iv.1970 (1 ♂, 3 ♀), 14.iv.1975 (1 ♀), 1.v.1975 (1 ♂); Shivta, 4.vi.1970 (1 ♂, 6 ♀), 23.vi.1976 (1 ♂, 6 ♀); Ramon, 4.viii.1970 (1 ♂), all A.F.; Ramon, 6.ix.1974, F. Kaplan (1 ♂, 2 ♀); Ha'Meishir, 20.vii.1971, A.F. (3 ♂); Bir Rachme, 14.vi., Bytinski-Salz (1 ♀); Eilat, 25.iii.1970, A.F. (2 ♂); Sinai, Qzaima, 28.v.1970, A.F. (1 ♂, 3 ♀) all in TU. TURKEY: Kastamonu, 20.vii.1962, Guichard & Harvey (1 ♀, BM). SYRIA: Djerablus am Euphrat, v.1914, Pietschmann (1 ♂, 2 ♀, WM); Qunaitra, 7.vi.1969, A.F. (1 ♂, 2 ♀), 9.v.1970, A.F. (1 ♀, TU). LEBANON: Cedern, b. Becharré, 24-30.vi.1931, Zerny (1 ♀, WM). EGYPT: 6th Tower Suez Rd., 28.vi.1924, H.C.F., emerged 3.vii.1924 from capitulum of *Asteriscus graveolens* (1 ♂, 1 ♀, HUB). Sinai, Ras Sudar, 1.vii.1972 (1 ♂, 1 ♀); Wadi Geragenia, 16.vii.1974 (1 ♀); El Arba'in, 14.vii.1974 (1 ♀); A-Raba, 24.ix.1977 (1 ♀); Mt. Katharina, 2 500 m, 13.vii.1974 (2 ♀), all collected by A.F. and deposited in TU. LIBYA: Tripolitania, Zuara, 7-21.v.1958, K. M. Guichard (1 ♂); Garian-Mizda Road, Km 40, 22.v.1951, K. M. Guichard (1 ♂, BM). ALGERIA: Zentral Algerien, Hassi Rabah, 11-20.x.1929, Zerny (6 ♂, 3 ♀, WM & TU); Laghoust, 1921, C. Dumont (2 ♂); Lagourat, C. Dumont (1 ♀); El Golca, iv.1919, C. Dumont (1 ♂, MNHP); Biskra, iv. (2 ♀, HUB), 19.v.1894, B. M. Eaton (1 ♂, BM). TUNISIA: Maknassy, 22.vi.1927, C. Dumont (1 ♂, MNHP). MOROCCO: Taroudant, v.1939, L. Berland (1 ♀); Moyen Atlas, 1 700 m, 3-10 and 21.vi.1928, Mission F. le Cerf Tizi s'Tkrine (1 ♂), Moyen Atlas, Azrou, 1928, R. Benoist (1 ♀, MNHP). CANARY ISLANDS: Lanzarote, Haria, 18.v.1964, K. M. Guichard (1 ♂, BM). FRANCE: Le Beaussset (Var), 1919, Ancy-Séguy (1 ♀, MNHP). KENYA: Tsavo, 11-12.i.1972, A.F. (2 ♀, TU).

Distribution. Turkey, Syria, Lebanon, Israel, Egypt, Libya, Algeria, Tunisia, Morocco, Canary Islands, France, Kenya? (see remarks).

Remarks. The two females from Kenya are doubtfully determined as this species, and therefore not included as paratypes.

from coll. W.C.
(Fefio) Karamate 4/11/71
(Coccol) 20/7/81
(Mizda) 15/3/77
from Canarian
4/19/71
1 ♀ 4 ♂
1 ♂ 2 ♀ 12/3/82

Goniurellia munroi spec. nov., figs 6, 12, 22

Differs from *G. tridens* in the following:

Length 2,50-3,75 mm; wing 2,75-3,20 mm; oviscapae (ventral aspect) 0,65-0,90 mm.

Head. Length-height-width ratio 6,9:7,5:10,0; frontal stripe bare.

Wing (fig. 6). Basal 0,25 of stigma hyaline or very pale yellow; small hyaline indentation in marginal cell does not reach second vein; connection of 'bulla' to costa at least as wide as half width of 'bulla'; proximal border of pattern usually slightly indented along third vein; first posterior cell with only the rounded hyaline spot; discal cell with only one ray in addition to ray on posterior crossvein; distance between crossveins 1,27-1,50 (n = 6) times longer than anterior crossvein.

Abdomen. Male genitalia: 9th tergum as in fig. 12; aedeagus similar to that of *G. omissa*, as illustrated in fig. 17, lacking spines or sharp appendages in sclerotized part, vesica 9,5 times longer than sclerotized part; dorsal side of female oviscapae longer than combined length of last two terga, ventral side 0,26 times length of wing; aculeus as in fig. 22.

Hust. Unknown.

MATERIAL EXAMINED. Holotype ♂, allotype ♀ and 6 ♂, 4 ♀ paratypes. NORTHERN RHODESIA: Shangombo, 7.viii.1952, Carp Exp: Munro (M.1143), holotype and paratypes deposited in PPI, paratypes also in TU. Additional paratypes: NORTHERN RHODESIA: Shangombo, N.R. Marsh Island, 10.viii.1952, Carp Exp: Munro, (1 ♀), SOUTH AFRICA: N. Transvaal, Njelele R. (Farm 'Joan'), Sept. 1939, H. K. Munro (M. 674) (3 ♂, 2 ♀, PPI). SOUTH WEST AFRICA: Gobabeb, Kuisch River Bed, 25.i.1978 (3 ♂, 1 ♀), 26.i.1978 (4 ♂, 3 ♀), 27.i.1978 (3 ♂, 2 ♀), 29.i.1978 (2 ♂, 2 ♀), 30.i.1978 (2 ♂, 1 ♀), 3.ii.1978 (1 ♂), all O. Lomholdt (CM).

The species is named in honour of Dr. H. K. Munro, of the Plant Protection Research Institute, Pretoria, for his outstanding contribution to the study of the Ethiopian Tephritidae.

Distribution. Zambia (Northern Rhodesia), South Africa, South West Africa (Namibia).

Goniurellia omissa spec. nov., figs 3, 7, 17, 23

Differs from *G. tridens* in the following:

Length 2,70-3,15 mm; wing 2,50-2,80 mm; oviscapae (ventral aspect) 0,75 mm.

Head (fig. 3). Length-height-width ratio 7,5:7,6:10,0; frontal stripe usually with a few hairs near lunule, sometimes bare; face with a shallow longitudinal carina reaching ventrally the distinctly projecting epistome; proboscis spatulate, labella about 1,5 times longer than antenna, 3-4 times longer than wide.

Wing (fig. 7). Pattern reaches or almost reaches subcosta; connection of 'bulla' with costa at most as wide as half width of 'bulla'; first posterior cell with only the rounded hyaline spot; discal cell with only one ray in addition to ray on posterior crossvein; distance between crossveins 1,08-1,15 (n = 10) times longer than anterior crossvein.

Abdomen. Male genitalia similar to those of *G. munroi*; aedeagus as in fig. 17; dorsal side of female oviscapae as long as combined length of last two terga, ventral side 0,27 times length of wing; aculeus as in fig. 23.

Hab. Unknown.

MATERIAL EXAMINED. Holotype ♂, allotype ♀ and 1 ♀ paratype. SOUTH AFRICA: Pretoria, 27.xi.1928, H. K. Munro, deposited in PPI. Additional paratypes: Pretoria, Daspoort, 1.xii.1928 (1 ♂, 2 ♀), 10.xi.1929 (1 ♀), 24.xi.1929 (2 ♀); Pietersburg 10 m N., 25.i.1954 (M 1278) (1 ♂), all collected by H. K. Munro (PPI & TU).

Remarks. The external morphology and genitalia of this species are very similar to those of *G. munroi*, but the species may be distinguished from the latter and other congeners by the spatulate proboscis.

Goniurellia persignata spec. nov., figs 8, 13, 18, 24

Trypanea augur Hendel (in part) 1927: 199, Taf. XV, fig. 10.

Trypanea sp. 2, Kugler & Freidberg 1975: 68.

Differs from *G. tridens* in the following:

Length 2,9-4,4 mm; wing 2,8-4,0 mm; oviscapae (ventral aspect) 0,8-0,9 mm.

Head. Length-height-width ratio 6,4:7,1:10,0.

Thorax. Pollinosity on mesonotum, scutellum and abdomen often with a brownish tinge.

Wing (fig. 8). Pattern dark brown to black; large hyaline indentation in marginal cell rounded apically, not crossing second vein; marginal cell very seldom (7,5% of specimens) with a smaller additional hyaline indentation; submarginal cell seldom (17% of specimens) with a small hyaline dot between marginal indentation and anterior crossvein; connection of 'bulla' with costa usually broader than half width of 'bulla'; proximal border of pattern deeply indented along third vein; first posterior cell with only the rounded hyaline spot; middle ray of discal cell less than half length of anterior crossvein; distance between crossveins 1,31-1,64 (n = 7) times longer than anterior crossvein.

Abdomen. Male genitalia: 9th tergum as in fig. 13; aedeagus (fig. 18): sclerotized part bears a distinct bidentate or tridentate fork-like prolongation; vesica longer than sclerotized part; dorsal side of female oviscapae longer than combined length of last two terga, ventral side 0,245 times length of wing; aculeus as in fig. 24.

Hab. Flower heads of *Pulicaria arabica* Cass. (Compositae). According to Munro (1955), De Lotto's specimens from Eritrea were reared from flower heads of *Gonysa* sp. (Compositae).

MATERIAL EXAMINED. Holotype ♂, allotype ♀, 5 ♂, 5 ♀ paratypes. ISRAEL: Tel Aviv, 27.vii.1976, A.F., deposited in TU. Additional paratypes: ISRAEL: Tel Aviv, 17.vii.1976, ex. *Pulicaria arabica* 5.viii.1976 (2 ♂, 2 ♀), 24.vi.1977 (3 ♂), 4.vi.1977 (1 ♀), 2.xii.1976 (1 ♂); Qala'at Nemrod, 10.vi.1976 (1 ♀); Bar'am, 11-14.xi.1977 (1 ♀); Gedera, 11.vi.1969 (1 ♂); all A.F.; Ekron, 31.vii.1941 (1 ♂), Jerusalem, 26.vii.1945 (1 ♀), both Bytinski-Salz; Jerusalem, 21.x.1947 (1 ♂), 25.x.1947 (1 ♀), both O. Theodor, 2.xi.1951, Aharoni (1 ♂); Jericho, 7.iv.1970 (8 ♂, 3 ♀); Kallia, 13.ii.1975 (1 ♀); Mishor

Rotem, 19.vii.1971 (1 ♀), all A.F. (all in TU); Rehoboth, 29.x.1931 (1 ♂), 5.vii.1931 (1 ♂), 3.i.1933 (1 ♂), all Aharoni (all in SM). Sinai, Nu'eiba, 6.ix.1974 A.F. (1 ♀, in TU). TURKESSTAN: Raziad, 30.viii.1927, Cockrell (1 ♂, USNM). CYPRUS: Akrotiri For., 27.v.1937, Marvomoustakis (1 ♂, BM). EGYPT: Kerdace, 27.ii.1921 (1 ♀, WMI); Cairo, iii. (3 ♂); Assuan, ii. (6 ♂, 2 ♀); Siala, iii. (1 ♂) (all HUB). Sinai: Wadi Hibran, 16.vii.1969 (2 ♂, 1 ♀); St Katharina, 12.vii.1969 (1 ♀), 25.v.1971 (3 ♂, 2 ♀), 14.viii.1971 (1 ♂), 18.vii.1974 (3 ♂); A-Raba, 24.ix.1977 (3 ♂, 1 ♀), all A.F.; El Arba'in, 14.vii.1974, A.F. (1 ♂), F. Kaplan (1 ♀); Wadi Geragenia, 2 000 m, 16.vii.1974, A.F. (1 ♂); Wadi Tlach, 15.vii.1974, A.F. (1 ♂), F. Kaplan (2 ♀); Wadi Shag, 17.vii.1974, A.F. (2 ♂); Mt. Abbas, 17.vii.1974, A.F. (3 ♂) (all in TU). MOROCCO: Defilia, nr. Figuig, 5-20.iv.1966, A. M. Hutson (5 ♂, 2 ♀, BM). ETHIOPIA: Asmara, Eritrea, Acria, 2.v.1950, G. De Lotto (No. 862/23) (3 ♂, 2 ♀, BM & PPI).

Distribution. U.S.S.R. (Turkestan), Cyprus, Israel, Egypt, Morocco, Ethiopia.

Goniurellia spinifera spec. nov., figs 9, 14, 19, 25

Trypanea sp. 1, Kugler & Freidberg, 1975: 68.

Differs from *G. tridens* in the following:

Length 2,1-3,5 mm; wing 2,2-3,3 mm; oviscapae (ventral aspect) 0,6-0,7 mm.

Head. Length-height-width ratio 7,0:7,4:10,0; frontal stripe bare.

Wing (fig. 9). Connection of 'bulla' with costa much narrower than half width of 'bulla'; first posterior cell with only the round hyaline spot; discal cell with only one

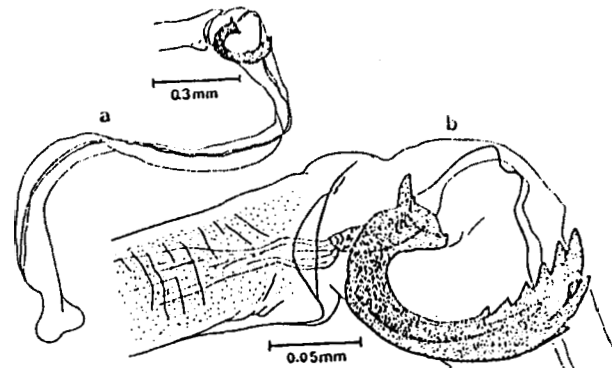


Fig. 19. a. Aedeagus of *Goniurellia spinifera* spec. nov. b. Detail of the same

ray in addition to ray on posterior crossvein; distance between crossveins 1,15-1,50 ($n = 7$) times longer than anterior crossvein.

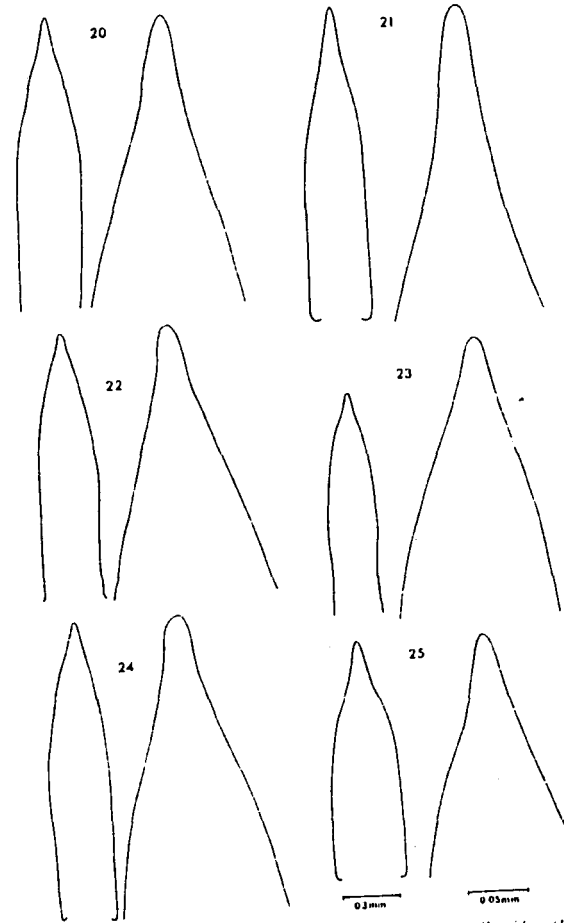
Abdomen. Male genitalia: 9th tergum (fig. 14) large, subrectangular, with very broad surstyli; each of the twisted rods bears one bifurcating tooth (or united pectussetae) at the apex, and two smaller tooth-like processes near the middle; phallosome very short, only slightly longer than the sickle-like barbed aedeagal spine; vesica about 13 times longer than wide (fig. 19); dorsal side of female oviscape about as long as combined length of last two terga, ventral side 0,235 times length of wing; aculeus (fig. 25) short, 3,5 times longer than wide.

Hab. Flower heads of *Pulicaria undulata* (L.) Kostel (Compositae). The record of *P. crassa* (see below) is, in my opinion, a misidentification.

MATERIAL EXAMINED. Holotype ♂, allotype ♀ and 4 ♂, 9 ♀ paratypes. ISRAEL: Kallia, 15.ii.1977, ex. flower heads of *Pulicaria undulata*, M. Kaplan, deposited in TU. Additional paratypes: ISRAEL: Kallia, 25.iii.1975, A.F. (2 ♀); Jericho, 7.iv.1970, A.F. (3 ♂, 5 ♀); Wadi Kelt, 25.iii.1975, A.F. (2 ♂, 2 ♀); Ein Feshcha, 15.iii.1977, M. Kaplan (1 ♂, 1 ♀); Ein Gedi, 26.iv.1970 (3 ♂, 1 ♀), 29.iv.1971 (5 ♂, 3 ♀); Shefech Zohar, 8.iii.1972 (1 ♂); Arad, 25.iv.1970 (1 ♀); Hazeva, 10.iv.1972 (3 ♂, 2 ♀); Jotveta, 11.iv.1972 (1 ♂, 1 ♀); Amudei Anram, 26.iv.1974 (1 ♀); Eilat, 25.iii.1970, ex. *Pulicaria undulata* 4.iv.1970 (1 ♂, 3 ♀); Eilat, 25.iii.1970 (9 ♂, 5 ♀); Avdat, 11.iv.1970 (3 ♀), 1.vi.1975 (1 ♂), all A.F.; Ramon, 20.iv.1967, J. Kugler (2 ♂); Sinai: Ein Um Ahmed, 25.iii.1969 (6 ♂); Wadi Nazeib, 24.iii.1969 (1 ♀), both A.F.; Dahab, 7.iv.1973, M. Kaplan (3 ♂) (all in TU). SAUDI ARABIA: Haddat-ash-Sham, 14 & 15.vi.1972, swept *Lepadenia* (2 ♀, BM). ADEN: xii.1898, O. Simony (1 ♀, WM). EGYPT: 6th Tower Suez Road, 25.iv.1925, from *Pulicaria crassa*, emerged 1.iv. (1 ♂) and 3.v.1925 (1 ♀, MM); Des. Arabique, Entre le Nil et la mer Rouge, 1910, J. Couyat (1 ♂, MM); Sinai: Miide, 13.iv.1973 (1 ♀), 25.v.1971 (1 ♂); 20 km S. Miide, 12.iv.1973 (2 ♂); Firan, 9.iv.1973 (3 ♂, 1 ♀); Wadi Garandal, 29.iii.1969 (5 ♂, 2 ♀); Wadi Tlach, 15.vii.1974 (1 ♂); St Katharina, 12.vii.1969 (1 ♀), all A.F.; Wadi Geragenia, 16.vii.1974, F. Kaplan (1 ♂); A-Thur, 12.iv.1973, A.F. (1 ♀), (all in TU). SUDAN: W. Darfur, N. Jebel Murra, Dariba Lakes, 8 000 ft., 15-17.vi.1932, M. Steele (2 ♂, BM & PPI); W. Darfur, Jebel Murra, Killing, 7 000 ft., 7.iv.1932, Miss M. Steele (1 ♀, PPI); Khartoum, 14.iii.1930, on Hambrook fruits, H. W. Bedford (1 ♂, BM); Jakar, 1917, H. W. Bedford (1 ♂, BM). ETHIOPIA: Eritrea, Debaroa, 17.ix.1948, G. De Lotto (625) (2 ♀, PPI); 36 km E. Nazareth, 29.xii.1971, A.F. (6 ♂, 3 ♀); 62 km E. Nazareth, 29-31.xii.1971, A.F. (1 ♂, 1 ♀, TU).

Distribution. Israel, Saudi Arabia, Aden, Egypt, Sudan, Ethiopia. The record of this species from South Africa (Kugler & Freidberg 1975) is a mistake.

Remarks. The structure of the male genitalia of this species departs remarkably from that of the other congeners (see figures and descriptions). The differences may be sufficient to warrant subgeneric status, but because the relationships between this species and its congeners (whether it is the sister group of the other congeners together or to a sublineage thereof) have not been clarified, I am not proposing subgeneric status for it now.



Figs 20-25. Aculeus of *Goniurellia* species with magnification of apex. 20. *G. tridens* (Hendel). 21. *G. longicauda* spec. nov. 22. *G. manoi* spec. nov. 23. *G. unisa* spec. nov. 24. *G. persignata* spec. nov. 25. *G. spinifera* spec. nov.

ACKNOWLEDGEMENTS

I thank Prof. J. Kugler (TU) and Dr Wayne N. Mathis (USNM) for reading the manuscript and suggesting many useful remarks, and Miss Holly B. Williams (USNM) and Mr Carlos R. Vilela (São Paulo) for reading the final draft. Thanks are also due to Mrs T. Feler (TU) for slide-mounting the fly terminalia, Mr W. Ferguson (TU) and Mrs Elaine R. Hodges (USNM) for making the drawings, and Mr A. Shoob (TU) for preparing the photographs. Dr R. E. Linnavuori is gratefully acknowledged for collecting tephritids for this study.

REFERENCES

- AVIDOV, Z. & E. KÖPFER. 1966. The pests of safflower *Carthamus tinctorius* L. in Israel. *Scripta Hierosolymitana* 18: 9-26.
- BECKER, T. 1907. Zur Kenntnis der Dipteren von Central-Asien. 1. Cyclorrhapha schizophora holometopa und Orthorrhapha brachycera. *Annuaire du Musée Zoologique de l'Académie Impériale des Sciences de St.-Petersburg* 12: 253-317, 7 plates.
- . 1912. Persische Dipteren von drei Expeditionen der Herrn N. Zarudny 1898 und 1901. *Annuaire du Musée Zoologique de l'Académie Impériale des Sciences de St.-Petersburg* 17: 503-654.
- DIRLBEK, J. & O. DIRLBEKOVA. 1971. Ergebnisse der mongolisch-tschechoslowakischen entomologisch-botanischen Expeditionen (1965, 1966) in die Mongolei. Nr. 26: Diptera, Trypetidae, 2 Teil. *Acta Faunistica Entomologica Musei Nationalis Pragae* 14: 165-172.
- FRAUENFELD, G. 1857. Beiträge zur Naturgeschichte der Trypeten nebst Beschreibung einiger neuer Arten. *Sitzungsberichte der Mathematisch-Naturwissenschaftlichen Classe der Kaiserlichen Akademie der Wissenschaften* 22: 523-557.
- FREIDBERG, A. & J. KUGLER. 1977. The type-species of *Goniurellia* Hendel, 1927 (Insecta: Diptera: Tephritidae). *Bulletin of Zoological Nomenclature* 33: 208-211.
- HARDY, D. E. 1968. The fruit fly types in the Naturhistorisches Museum, Wien (Tephritidae-Diptera). *Annalen des naturhistorischen Museums in Wien* 71: 107-155.
- HENDEL, F. 1910. Über acalyptrate Musciden. *Wiener Entomologische Zeitung* 19: 105-127.
- . 1927. Trypetidae. In: Lindner, E. (ed.) *Die Fliegen der paläarktischen Region*, Heft 49. Stuttgart.
- . 1931. Nachtrag zu den paläarktischen Trypetiden (Neue ägyptische Arten, von Prof. Émile Étienne Bey gesammelt). *Bulletin de la Société Royale Entomologique d'Égypte* 15: 1-13.
- HERING, E. M. 1956. Bohrsfliegen von Iran 1954 (Dipt., Trypetidae). *Jahresheft des Vereins für Vaterländische Naturkunde in Württemberg* 111: 82-89.
- KUGLER, J. and A. FREIDBERG. 1975. A list of the fruit-flies (Diptera: Tephritidae) of Israel and nearby areas, their host plants and distribution. *Israel Journal of Entomology* 10: 51-72.
- MUNRO, H. K. 1955. The influence of two Italian entomologists on the study of African Diptera and comments on the geographical distribution of some African Trypetidae. *Bollettino del Laboratorio di Zoologia Generale e Agraria del R. Istituto Superiore Agrario di Portici* 33: 410-426.
- . 1957. Trypetidae. In: *British Museum (Nat. Hist.) Ruwenzori Expedition* 2(9): 853-1054. London.

- SCHINER, I. R. 1868. Diptera (Art. 1) In: *Reise der österreichischen Fregatte Novara*. Zool. 2(16). Vienna.
- SCHRANK, F. 1795. *Naturhistorische und ökonomische Briefe über das Donaumündung*. Mannheim.
- SENIOR WHITE, R. 1922. Notes on Indian Diptera. *Memoirs of the Department of Agriculture in India* 7(9): 83-109, plates 11-15.
- STEYSKAL, G. G. & S. EL-BIALY. 1967. A list of Egyptian Diptera with bibliography and keys to families. *UAR Ministry of Agriculture Technical Bulletin* 3: 1-37.

Manuscript received 24 October 1979.