

**BIOSYSTEMATIC STUDIES ON THE APHIDIIDAE OF ISRAEL (HYMENOPTERA:  
 ICHNEUMONOIDEA). 2. THE GENERA *EPHEDRUS* AND *PRAON***

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ABSTRACT

The authors present descriptions, records and biological data for the species of the genera *Ephedrus* and *Praon* occurring in Israel. *Praon unitum*, sp. n. is described.

GENUS *EPHEDRUS* HALIDAY 1833

*Ephedrus* Haliday, 1833, Entomol. Mag. 1:261,485.

*Elassus* Wesmael, 1835, Nouv. Mem. Acad. Sci. Belles-Lett. Bruxelles 9:85-86.

*Head*: transverse, as wide as or wider than thorax at tegulae (rarely slightly narrower). Maxillary palpi 4-segmented, labial palpi 2-segmented. Antenna 11-segmented in both males and females. *Thorax*: Notaulices distinct at least partially. Forewing venation complete, with 5 closed cells (basal, median, 2 radial, and pterostigmal cells); pterostigma elongately triangular. *Abdomen*: Propodeum with more or less regular and distinct carinations dividing the segment into 4 peripheral and one central pentagonal areolae. Petiole long or short, with isolated long setae; gaster lanceolate. Ovipositor sheaths usually slender and long (sometimes wide and short but not in the species recorded in Israel), apex roundly pointed or straight-edged, with isolated, longer or shorter apical setae.

Pupation inside host aphid. Emergence hole cut at posterior apex of host, usually beneath siphunculi, circling the cauda. Mummies and adults colored dull to shiny black (rarely dark brown).

*Ephedrus* is generally considered the most primitive of the Aphidiidae, its wing venation (Fig. 1) being the most complete for the family and very similar to that of the Braconidae. *Ephedrus* shows no unique modifications or specialized structures.

KEY TO THE SPECIES OF *EPHEDRUS* HALIDAY OCCURRING IN ISRAEL

1. Notaulices distinct at anterolateral aspect of mesoscutum, more or less erased dorsally, their faint or imagined extensions meeting posteriorly at a deep central fovea (Fig. 12).  
 Petiole (Figs. 14,15) short, less than two times as long as width at spiracles..... *E. persicae* Froggatt
- Notaulices distinct at anterolateral aspect of mesoscutum only, erased dorsally, no central fovea posteriorly (Fig. 6). Petiole more than twice as long as width at spiracles (Fig. 5) *E. niger* Gautier, Bonnamour & Gaumont

*Ephedrus niger* Gautier, Bonnamour & Gaumont 1929

(Figs. 1-7)

*Ephedrus niger* Gautier, Bonnamour & Gaumont, 1929, Bull. Soc. Entomol. Fr. 1929:92-95.

*Ephedrus campestris* Stary, 1962, Opusc. Entomol. 27:87-91.

**Female**

**Head:** dorsal view, transverse, as wide as thorax at tegulae, with sparsely-distributed, short and medium-length setae, especially on vertex and face. Eyes with sparse, very short setae, slightly protuberant at corners of head, transverse diameter equal to width of temple. Curvature of temple more moderate than that of eyes. In anterior view (Fig. 2), eyes moderate-sized, bordered medially by two rows of ventrally-pointing setae, reaching genae at articulation of mandibles, vertical diameter 3 times width of gena. Face with about 3 shorter rows of setae between antennal inserts and clypeus. About 3 medially-directed setae slightly lateral to center-line of face. Tentorial index about 0.7. Clypeus with about 7 long setae. Apex of ligula lined with a row of 10 short dagger-like setae. Antenna 11-segmented, scape and pedicel short, subglobular, flagellar segments (Fig. 3) elongate. F1 basally narrower, 5 times longer than maximum width, 1.25 times longer than F2, apical segment pointed, about 1/3 longer than preapical segment.

**Thorax:** Pronotum short. Mesoscutum (Fig. 6) with distinct notaulices anterolaterally, dorsally very weak or entirely erased, with long, sparsely distributed setae. Forewing (Fig. 1) venation complete; 2nd abscissa of radius slightly longer than 1st interradiial vein; pterostigma elongate, about 4 times longer than wide, width about twice length of 1st abscissa of radius.

**Abdomen:** Propodeum (Fig. 5) distinctly carinate, delineating an elongate central pentagonal areola, carinae posteriorly slightly arcuate, centrally straight and almost parallel, meeting anteriorly forming a right or obtuse angle, sloped edges of carinae ribbed. Petiole (Fig. 5) rectangular, about 3 times longer than width at spiracles, dorsum almost smooth, with raised central rectangular area bordered laterally by 2 distinct longitudinal carinae, with 1 shorter, less distinct central carina. Gaster lanceolate. Ovipositor sheaths (Fig. 7) long and narrow, apex straight.

**Coloration:** Body predominantly dark brown to black. Base of F1, petiole and ovipositor sheaths slightly lighter. Legs usually same color as petiole, with coxa and femur darker. Wing venation dark brown.

**Length:** 2.3-3.1 mm.

**Male:** similar to female, with following notable differences: F1 more or less parallel-sided. Length 1.7-2.4 mm.

**Host Records**

From *Uroleucon inulae* (Ferrari) on *Inula viscosa* (Abu Ghosh, 7-8/74, 8/75, 11/75, 7/76, 7-8/81; Bet Guvrin, 8/76; Bustan haGalil, 6/75, 8/76; Eshta'ol, 6/75; Nahal Bustan, 6/74, 8/74, 8/75; Sasa, 8/75; Ziqim 5/75) and from *Macrosiphum rosae* L. on *Rosa* sp. (Jerusalem, 8/75).

## NOTES

*Ephedrus niger*, first described from France, has been recorded in several European countries (Bulgaria, Czechoslovakia, France, Germany, Italy, Russia, Finland) and in South Korea. This is the first record of this species from Israel. Its main host, *Uroleucon inulae*, is specific to the composite weed *Inula viscosa*. *E. niger* has been collected throughout the range of its host's dispersal in Israel.

This parasite has emerged from material collected from April through November, except for the month of September when its host mummies produced only hyperparasites.

The host plant, *I. viscosa*, often carries large numbers of a second aphid species, *Capitophorus inulae* (Passerini), very similar to *U. inulae* in size, color and superficial appearance. Occasionally, populations of these two species are intermixed. Mixed colonies show parasitization of *Uroleucon*, but not of *Capitophorus* aphids.

The female parasite oviposits in isolated aphids attacked at random. Mummies are most frequently found within 25 cm of the apices of plant shoots, where the aphid hosts are most numerous, and are easily found due to their shiny black color against the green background of the plant. Mummies do not settle on any characteristic part of the plant and can be found loosely attached, scattered on the upper and lower sides of the leaves and on the stems.

Since neither the host plant nor the aphid host of *E. niger* are of economic importance, this wasp can be considered economically indifferent. Populations of *U. inulae* seem to be unaffected by *E. niger*, and in spite of its presence are often numerous.

*Macrosiphum rosae* (L.) was recorded on one occasion as host to *E. niger*, and represents a new world record for the association. *E. niger* has been recorded in other countries from several additional *Uroleucon* and *Macrosiphoniella* spp., but although many specimens of these genera were collected during the course of this study, no additional host records have been obtained for this species in Israel.

In the laboratory, a female *E. niger* caged with a colony of *Uroleucon sonchi* (Geoffroy) on *Sonchus oleraceus*, reproduced successfully. Many parasitic Hymenoptera have wider host ranges in the laboratory than in the field (Stary, 1966).

It is possible that the Israeli *E. niger* represents a local race or subspecies, for two reasons: (1) Biologically, it has a narrower host range than reported for the species elsewhere; and (2) while morphologically it very closely matches Stary's (1962) description of the species, it is noted that in typical *E. niger*, the first interrarial vein and the second abscissa of the radial vein are of equal length, whereas all the Israeli material at hand shows the second abscissa of the radial vein to be the longer of the two.

The female of *E. niger* attempts to oviposit in its hosts without previously examining them by antennal tapping. Griffiths (1961) reported such behavior with *Monoctonus crepidis* Haliday (= *paludum* Marshall), a species not found in Israel. It seems that after sensing a potential host from a distance of a few millimeters, examination of the aphid is carried out while contacting it by the ovipositor sheaths. If accepted as a host, oviposition lasts 7-11 seconds. If not accepted, the parasite breaks off contact with the aphid within 1-2 seconds and moves on. Oviposition was observed to take place only in 2nd and 3rd instar aphids. Often, attempts to oviposit are thwarted when the aphid rapidly stops feeding and walks away, while the parasite folds its abdomen forward and begins jabbing toward its former site. Though the aphid is no longer nearby, the parasite usually continues its attempt

to make contact by walking forward, the apex of its abdomen leading and poised. *E. niger* does not select any particular part of the aphid for insertion of the ovipositor. In the laboratory, at a temperature of  $26 \pm 1.5^{\circ}\text{C}$ , development took 7 days from oviposition to mummy formation and another 7-8 days to emergence of adults. Under the same conditions, with water-diluted honey as food, adult longevity was 6-7 days. Copulation lasts about 20 seconds.

On one occasion, a single male with distinctly unique markings on its propodeum and petiole was found (Figs. 16-18). The description of this specimen as a new species is being withheld pending the acquisition of additional material.

*Ephedrus persicae* Frogatt 1904  
(Figs. 8-15)

*Ephedrus persicae* Frogatt, 1904, Agric. Gaz. N.S.W. 15:611-612.

*Ephedrus nevadensis* Baker, 1909, Pomona Col. J. Entomol. 1:23.

*Ephedrus nitidus* Gahan, 1917, Proc. U.S. Natl. Mus. 53:195.

*Ephedrus vidali* Quilis, 1931, Eos 7: 72-74.

*Ephedrus pulchellus* Stelfox, 1941, Proc. R. Ir. Acad. (B). 46:139.

*Ephedrus interstitialis* Watanabe, 1941, Insecta Matsum. 15:139-140.

*Ephedrus impressus* Granger, 1949, Mem. Inst. Sci. Madagascar, Ser. A. 2:412.

*Ephedrus (Ephedrus) holmani* Starý, 1958, Sb. Faun. Práci Entomol. Odd. Nar. Mus. Praz. 3:68-70.

*Ephedrus (Ephedrus) palaestinensis* Mackauer, 1959, Beitr. Entomol. 9:867-868.

#### Female

**Head:** Dorsal view (Fig. 9), transverse, with rounded corners, as wide as thorax at tegulae, shiny with scattered medium and long setae, especially on temple and face. Eyes medium-sized, slightly protuberant, with sparse short setae, transverse diameter about equal to width of temple. Ocellar triangle acute. In anterior view (Fig. 10), eyes oval, vertical diameter 3-4 times width of gena. Face with scattered long setae, those near midline generally directed medially. Tentorial index about 0.5. Clypeus with about 11 long setae. Labrum with about 5 long setae. Apex of ligula with 4-8 short, dagger-like setae. Antenna (Fig. 11) 11-segmented. Scape and pedicel short, globular, flagellar segments elongate. F1 widens slightly from middle to apex, about 4.5 times longer than maximal width, about 1/3 longer than F2. Apical segment about 1.2 times length of pre-apical segment.

**Thorax:** Pronotum (Fig. 9) short, not hidden by mesoscutum. Mesoscutum (Fig. 14) gibbous with distinct notaulices rising anterolaterally, erased dorsally (rarely faintly visible), their imagined extensions meeting posteriorly in a deep central fovea (Fig. 12). Sparsely scattered long setae distributed on dorsum, somewhat shorter and denser anteriorly. Forewing (Fig. 8): Venation complete; radial abscissa 2 shorter than interr radial 1; pterostigma elongate, more than 5 times longer than wide, slightly wider than length of radial abscissa 1.

**Abdomen:** Propodeum (Fig. 14) with distinct carinae delineating a central pentagonal areola. Postero-lateral carinae arcuate, narrowest centrally at point where they merge with arcuate posterior carina. Petiole (Figs. 14, 15) short, slightly longer than width at spiracles,

dorsum more or less smooth. Gaster lanceolate, ovipositor sheaths (Fig. 13) long and narrow, apices pointed roundly with about 3 short dagger-like setae.

**Coloration:** Predominantly very dark brown to black. Mouth parts, F2, petiole and legs light brown to yellowish. Wing venation dark brown.

**Length:** 1.7-2.2 mm.

**Male:** similar to female, with the following notable differences: F1 shorter and wider, about equal to F2. Length 1.2-1.5 mm.

#### Host Records

From *Absinthaphis* sp. on *Artemisia* sp. (Rephidim, 1/76); from *Aphis brunnea* Ferrari on *Ononis pubescens* (E. of Jerusalem, 2/76, 1/77); from *A. chloris* Koch on *Hypericum triquetrifolium* (Nes Ziyona, 3/76; Negba, 4/77); from *A. craccivora* Koch on *Astragalus* sp. (Jericho, 2/75), on *Polygonum equisetiforme* (Rehovot, 3/75) and on *Statice sinuata* (Qalya, 2/76); from

*A. epilobiaria* Theobald on *Epilobium hirsutum* (Abu Ghosh, 11-12/75, 12/76); from *A. fabae* Scopoli on *Calendula* sp. (Auja el Fauqa, 3/75), on *Solanum luteum* (Jericho, 2/75; Rehovot, 1-2/77; Rephidim, Sinai, 1/76), on *Urtica* sp. (Rehovot, 3/75), on *Notobasis syriaca* (Lower Galilee, 4/75) and on an unidentified plant (En Gedi, 12/74); from

*A. gossypii* Glover on *Calendula* sp. (Amirim, 12/76), on *Citrus* spp. (Rehovot, 12/76), on *Crataegus* sp. (Rehovot, 2-3/77), on *Dodoneum villosum* (Rehovot, 2-3/75), on *Duranta repens* (Rishon leZiyyon, 1/76), on *Ferula* sp. (Rehovot, 1/77), on *Gossypium* sp. (Bet El'azari, 11/77), on *Hibiscus rosa-sinensis* (Merkaz Shapira, 4/74), on *Punica granatum* (Merkaz Shapira, 4/76; Rehovot, 4/75), on *Rosa* sp. (Amirim, 12/76; Rehovot, 1/77), on *Tecomaria capensis* (Rehovot, 1/75, 3/75, 1/77, 11/77; Rishon leZiyyon, 1/76), on *Trifolium* spp. (Rehovot, 11/75; Amirim, 12/76) and on unidentified ornamentals (En Yahav, 3/75); from

*A. hederae* Kaltenbach on *Hedera helix* (Rehovot, 2/77); from *A. intybi* Koch on *Cichorium pumilum* (Sha'alvim, 5/80); from *A. punicae* Passerini on *Punica granatum* (Merkaz Shapira, 6/73; Rehovot, 4/75); from *A. verbasci* Schrank on *Verbascum* sp. (Merkaz Shapira, 3/81); from *A. zizyphi* Theobald on *Ziziphus spina-christi* (Jericho, 2/76, 1/77); from *Brachycaudus amygdalinus* Schouteden on *Prunus amygdalus* (Merkaz Shapira, 4/76; Newe Ativ, 5/77); from

*B. helichrysi* Kaltenbach on *Heliotropium* sp. (En Gedi, 3/76) and on *Cynoglossum* sp. (Mt. Hermon, 5/77); from

*Hayhurstia atriplicis* (L.) on *Chenopodium* sp. (Rehovot, 2-3/77); from *Hyadaphis foeniculi* Passerini on an unidentified umbelliferous plant (Lakhish, 3/79); from

*Hyalopterus pruni* Geoffroy on *Phragmites australis* (En Gedi, 12/74); from *Melanaphis donacis* Passerini on *Phragmites australis* (Tel Dan, 10/74; En Gedi, 12/74; Bet Dagan, 2/77); from

*Eulachnus tuberculostemmata* Theobald on *Pinus halepense* (Rehovot, 2/78); and from unidentified aphids on *Atriplex* sp. (Jericho, 1-2/75), on *Crataegus* sp. (Mt. Hermon, 5/77), on *Emex spinosa* (Rehovot, 3/75), on *Mentha* sp. (Wadi Shak, Sinai, 3/74), on *Quercus* sp. (Rehovot, 5/77), on *Solanum luteum* (Rephidim, Sinai, 1/76), on *Ziziphus*

*spina-christi* (Qiryat Gat, 1/77), and on unidentified plants (Amirim, 3/77; En Gedi, 4/78; Sede Boqer, 3/74). *Ephedrus persicae* was collected free (no host data) in Rehovot on the following dates: 2-3/76, 2/77, 7/77, 12/77, 7/78.

#### NOTES

This species, first described from Australia, is of almost cosmopolitan distribution. Mackauer (1959b) listed many subsequent descriptions to be synonyms, but maintained *E. palaestinensis* Mackauer 1959, described from material sent to him by I. Harpaz, as a local subspecies. The morphological trait used to separate *E. persicae persicae* from *E. persicae palaestinensis* was the length of the second abscissa of the radial vein relative to that of the first interrarial vein: the former vein is shorter in the nominate subspecies, both are equal in *palaestinensis*. Starý (1974b) sunk this subspecies as another synonym of *E. persicae*. Having examined many hundreds of specimens of the local *E. persicae*, it appears that, although one may occasionally find specimens where these veins are of equal length, in most cases the second radial abscissa is shorter and the difference is merely one of normal intraspecific variability. We have been unable to find any other consistent characteristics, morphological or biological, to support the maintenance of *palaestinensis* as a distinct subspecies.

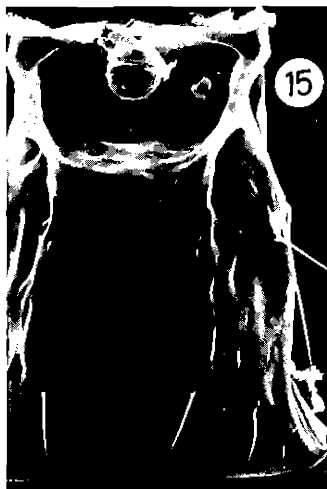
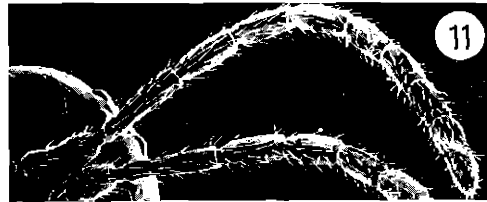
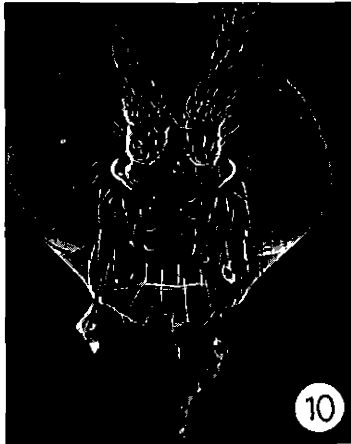
*E. persicae* was known in Israel from 7 hosts before the onset of this study (Mescheloff and Rosen, 1989). Around the Mediterranean basin it has been reared from 28 different hosts. In the present study we have added 10 new world host records. All records except one are of aphids from genera previously known to be associated with this parasite. *Eulachmus tuberculostemmata* is an unusual host for this species and was recorded on one occasion only.

*Ephedrus persicae* attacks aphids feeding on a wide range of plant hosts, and has been reared from October through July. Populations peak during January-March, when *E. persicae* can be found in all the climatic zones of the country, from Mt. Hermon in the north to the Sinai peninsula in the south, from the coastal plain in the west to the Jordan Valley in the east.

Though apparently present in Israel throughout the year, populations of *E. persicae* are generally small. Usually only a few isolated aphids within a colony are found parasitized, and when other parasite species are also present among the host aphids, their numbers are usually greater than those of *E. persicae*. An exceptional observation was with *Aphis brunnea* on *Ononis pubescens*. On several occasions this aphid was found parasitized to a great extent.

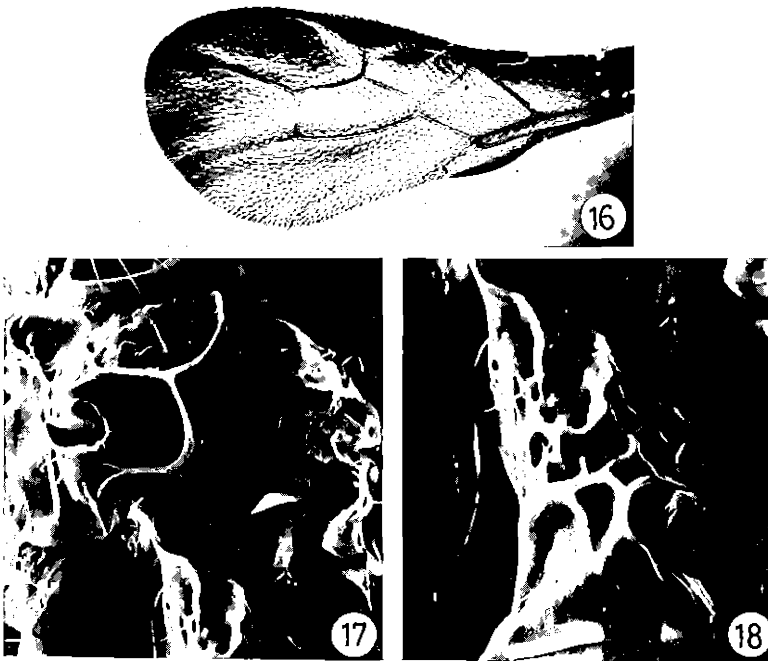


Figs. 1-7 — *Ephedrus niger*. 1. Forewing; 2. Head, anterior view; 3. Flagellum; 4. Head, dorsal view; 5. Propodeum, petiole; 6. Thorax, dorsal view; 7. Ovipositor complex.

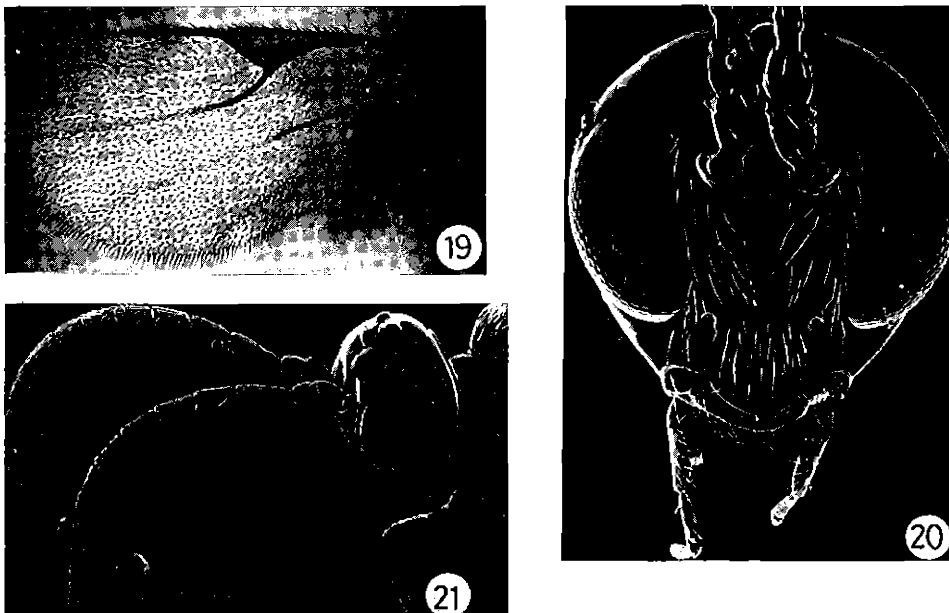


**Figs. 8-15 — *Ephedrus persicae*.** 8. Forewing; 9. Head and prothorax, dorsal view; 10. Head, anterior view; 11. Antenna; 12. Central fovea of mesothorax; 13. Ovipositor complex; 14. Thorax, propodeum, petiole, dorsal view; 15. Petiole, dorsal view.





Figs. 16-18 – *Ephedrus* sp. ? near *niger*. 16. Forewing; 17. Propodeum; 18. Petiole, dorsal view.



Figs. 19-21 – *Praon dorsale*. 19. Forewing; 20. Head, anterior view; 21. Head, lateral view

## GENUS *PRAON* HALIDAY 1833

*Praon* Haliday, 1833, Entomol. Mag. 1:261, 483-484.

*Achoristus* Ratzeburg, 1852, Die Ichneumoniden der Forstinsecten 3:31-32.

*Aphidaria* Provancher, 1886, Additions et Corrections Faun. Hym. Québec: 151-152.

**Head:** Subquadrate, as wide as or wider than thorax at tegulae. Clypeus densely covered with long setae (Figs. 20,30). Maxillary palpi 4-segmented. Labial palpi 3-segmented. Occiput strongly margined. Antenna filiform, with variable number of segments (13-23). **Thorax:** Mesoscutum strongly prominent, falling vertically to prothorax, more or less setose; notaulices distinct throughout (Figs. 24,32). Forewing (Figs. 19,29,36,42,46): Pterostigma triangular, medially slender; metacarp distinct; radial vein developed, never reaching wing apex so that pterostigmal cell is incomplete; radial cell 1 and median cell 1 distinctly separated by median abscissa 1; interrarial veins effaced; intermedian vein more or less distinct. **Abdomen:** Propodeum (Figs. 26,33) convex, centrally acarinate, smooth. Petiole (Figs. 27,34) quadrate or a little longer than wide. Gaster of female lanceolate, of male spatulate. Ovipositor sheaths nearly straight to slightly curved upwards (Figs. 28,35), slenderly triangular, pointed at apex with sparse setae. Pupation in cocoon spun beneath empty host mummy.

The systematic position of the genus *Praon* has been somewhat of an enigma. Whereas it is generally considered to be evolutionarily more advanced than the primitive, braconid-like *Ephedrus*, the unique means of pupation found in this genus has given cause for debate (Mackauer, 1959a; Tobias and Kyriak, 1971; Starý, 1974a). Majority opinion is that *Praon*'s peculiar form of pupation, wherein the last instar larva opens the venter of the aphid and spins its cocoon beneath its host, is a derived adaptation and not an ancestral form of behavior.

*Praon*-formed mummies are all pale or whitish.

Cuticles of mummified aphid parasitized by *Praon* spp. appear thinner and more fragile than those that remain after parasitization by other aphidiid genera. *Praon* spp. are among the larger-sized aphidiids; cocoons spun by the larvae appear, almost always, to be slightly larger than the aphid cuticle from which the larva emerged. When on rare occasions cocoons were spun inside the aphid mummy, as with other genera, the aphid was found incapable of containing it. In one instance (*Praon volucre* in *Hyperomyzus lactucae* (L)), the aphid cuticle split widely along the venter to accommodate the cocoon. In another instance (*P. volucre* in *Aphis fabae* Scopoli), the delicate cuticle of the aphid split at several points.

From a taxonomic viewpoint, *Praon* is particularly problematic. Intra-specific variation is often as great as the interspecific range. One example is from an unmated *P. volucre* that oviposited in a laboratory colony of *Schizaphis graminum* (Rondani) on *Triticum durum*. Of the 46 male progeny produced, variation in the number of antennal segments ranged from 17 to 21. The mesoscutum too was variable as to the presence or absence of hairless areas.

Starý (1983) erected the genus *Parapraon* based exclusively on differences in wing venation. Johnson (1987) recognized *Parapraon* as a "junior subjective synonym of *Praon*", having noted that Starý's new genus did not allow for the true variation actually present in the species assigned to *Parapraon*.

Takada (1968) chose the relative length and width of wing veins as a prime key characteristic. This trait is of no value for separating the Israeli *Praon* spp. Starý (1976, 1979) used coloration of the first flagellar segment as a means to divide the genus into two

large sub-groups. However, he noted that this was unreliable, as specimens of *P. bicolor* (not found in Israel) from one series could fall into either group (personal communication, 1979). Mackauer (1959a) relied on the shape and number of sensoria on the ovipositor sheaths. Smith (1944), though dealing with species not represented in Israel, chose traits which have proved the easiest and most reliable: patterns of wing venation and coloration of the various body segments.

Three characters showed consistently reliable differences between 2 or more of the 5 species of *Praon* found in Israel: Patterns of wing-vein origin, shape of the occipital carina, foramen and associated structures, and shape and chaetotaxy of the ligula. The latter is a difficult diagnostic character.

#### KEY TO THE SPECIES OF *PRAON* HALIDAY OCCURRING IN ISRAEL (females)

1. Intermedian vein distinctly colored throughout (base of vein at origin from cubital cell II as dark and distinct as insert at median vein (Fig. 36) . . . . . 2
- Intermedian vein not evenly colored throughout (base at origin from cubital cell II colorless or at least distinctly lighter than at insert at median vein (Fig. 29) . . . . . 3
- 2(1). Intermedian and cubital veins usually distinctly separated at origins (Fig. 42), occasionally together or widely separated. Antenna usually 17-18-segmented (rarely 15-16). Thorax uniformly colored dark brown to black, occasionally somewhat lighter ventrally. Gaster centrally dark brown, anterior and posterior segments somewhat lighter . . . . . *P. volucre* (Haliday)
- Intermedian and cubital veins always widely separated at points of origin from cubital cell II (Fig. 36). Antenna 15-17-segmented (rarely 18). Dorsum of thorax dark brown, usually somewhat lighter ventrally. Gaster brown with anterior and posterior segments lighter . . . . . *P. rosaecola* Stary
- 3(1). First abscissa of median vein colored at proximal 1/3 at most (Fig. 29). Intermedian vein usually entirely colorless, occasionally faintly colored (when colored, the intermedian and cubital veins originate distinctly separately from cubital cell II) . . . . . *P. exsoletum* (Nees)
- First abscissa of median vein distinctly colored for more than 1/2 its length. Intermedian vein pale to erased on proximal 1/2, distinctly colored on distal 1/2. When base of intermedian vein is visible, it arises from cubital cell II together with the cubital vein (Fig. 19); when erased, the imaginary extension of the visible 1/2 points toward a common origin with the cubitus . . . . . 4
- 4(3). Antenna 18-20-segmented. Thorax dark brown dorsally, somewhat lighter ventrally. Propodeum, petiole and anterior aspect of gaster orange-brown, as venter of thorax, remainder of gaster dark brown. Wing venation brown . . . . . *P. dorsale* (Haliday)
- Antenna 16-17-segmented. Thorax yellow to yellow-brown, only slightly lighter ventrally. Propodeum same color as thorax. Petiole slightly lighter, gaster brown. Venation of wings light brown to yellow . . . . . *P. unitum* sp. n.

*Praon dorsale* (Haliday) 1833  
(Figs. 19-28)

*Aphidius (Praon) dorsalis* Haliday, 1833, Entomol. Mag. 1:484.

*Blacus discolor* Nees, 1834, Hymenopterorum Ichneumonibus Affinium Monogr. 1:192-193.

**Female**

**Head:** Dorsal view, transverse, wider than thorax at tegulae, rounded at corners, smooth, sparsely setose, width of temple about equal to transverse eye diameter. Ocellar triangle distinctly acute. In anterior view (Fig. 20), eyes oval with sparse, very short setae, vertical diameter about 4 times width of gena, slightly convergent toward clypeus. Clypeus raised with a distinct marginal thickening ventrally, densely covered with about 24 long setae. Labrum triangular, about 11 long setae bordering the apex. Mandibles relatively deeply bidentate. Tentorial index 0.2. Midline of face hairless, moderately covered by long setae between the hairless area and the orbits. Occiput delineated by raised, oval-shaped carina, slightly narrowed toward frons (Fig. 20). Antenna 18-20-segmented: F1 very slightly narrowing in middle, about 5 times longer than width in middle; F2 0.6-0.8 times length of F1.

**Thorax:** Mesoscutum (Figs. 24,25) moderately smooth and shiny, covered with long setae, with small to moderate-sized hairless areas on lateral lobes. Notaulices deep and distinct throughout, almost meeting posteriorly. Forewing (Fig. 19): Pterostigma triangular, narrowed medially, about 4 times longer than wide; metacarp shorter (0.6-0.9:1); radius shorter than metacarp; first abscissa of median vein colored basally, gradually paling toward distal insert in intermedian vein; intermedian vein paler (sometimes colorless) basally than distally, emerging from cubital cell II together with cubital vein.

**Abdomen:** Propodeum (Fig. 26) convexly rounded, mostly covered with long setae which radiate centrally. Petiole (Fig. 27) about 1.2 times longer than width at spiracles, which are located at about 1/3 length from anterior apex on lateral tubercles. Gaster spindle-shaped. Ovipositor sheaths (Fig. 28) elongate, dorsally slightly concave, narrowing toward rounded apex, two long conical spines, one at upper and one at lower edge of apex, with 1-2 longer setae between them.

**Coloration:** Head dark brown, face lighter. Eyes black. Mandibles (except for orange-brown apices), maxillary and labial palpi yellow to light brown. Antennal scape, pedicel and F1 yellow (sometimes not entirely so), remainder of flagellum dark brown. Thorax predominantly orange-brown to brown, distinctly lighter ventrally (in paler specimens only dorsal sclerotizations near tegulae and metanotum may be darker). Wings hyaline, venation brown. Legs yellowish, pretarsi darker. Propodeum as dorsum of thorax, sometimes very slightly darker than thorax. Petiole yellowish to orange-brown, lighter than propodeum. Gaster dark brown, except for lighter anterior segment. Ovipositor sheaths dark brown.

**Length:** 1.9-2.7 mm.

**Male:** Similar to female, with following notable differences: Coloration darker; antenna (Fig. 21) 19-21-segmented. Length 1.3-1.8 mm.

### Host Records

From *Uroleucon carthami* (Hille Ris Lambers) on *Carthamus tinctoria* (Hafez Hayyim, 5/74; Gal'on, 4/79); from

*U. picridis* Fabricius on a composite plant (HaGosherim, 5/77); from

*U. sonchi* (L.) on *Sonchus oleraceus* (Qiriat Gat, 5/75); and from

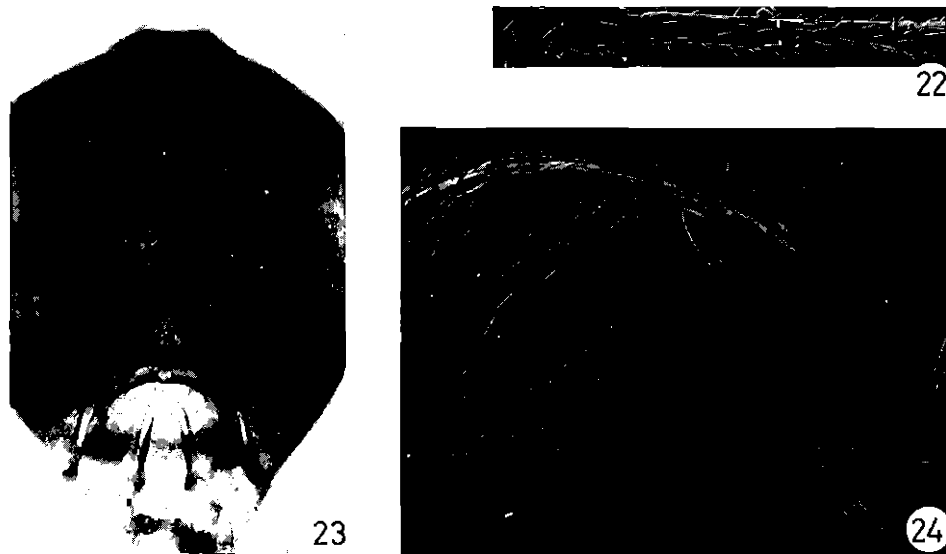
*Paczoskia* sp. on a composite plant (Hemed, 5/77).

### NOTES

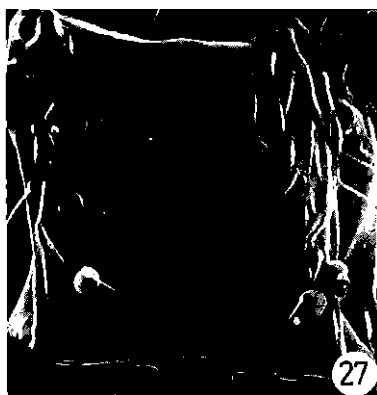
Material of this species was determined by Dr. P. Stary as *P. dorsale*. However, certain morphological differences exist between it and the revised description of that species (Mackauer, 1959a; Tremblay *et al.*, 1986). Particularly noticeable are the generally smaller number of antennal segments, and the relative lengths of F1 and F2. It is, therefore, possible that this is a distinct species, closely related to *P. dorsale*. Samples ex *Uroleucon sonchi* run to *P. flavinode* (an exclusive parasite of *Tuberculoides* spp.) in the keys of Stary (1976) and Takada (1968). In Mackauer's (1959a) key, they run to the *dorsale-absinthii* couplet, but do not key out with either species.

This species has been reared in Israel only during April and May, exclusively ex dactynotine aphids (*Uroleucon* and *Paczoskia*). Though sometimes numerous, as in *U. carthami* on *Carthamus tinctoria* during 1979, this parasite does not attack economically important aphids. Avidov and Kotter (1966) did not find this species on safflower, even though other parasites of its potential hosts were found.

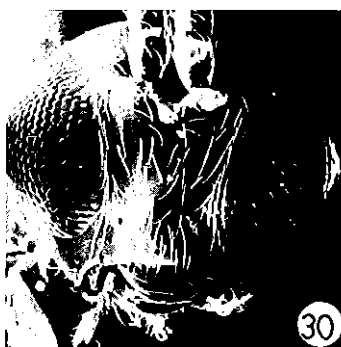
Stary (1976) reports this species to be present in several Mediterranean countries (Spain, S. France, Corsica, Italy, Sicily) and Bulgaria. Whereas Mackauer (1961) regarded *Praon longicorne* Marshall as a synonym of *P. dorsale*, Tremblay and Pennachio (1985) and Tremblay *et al.* (1986) have concluded that these are distinct species.



Figs. 22-24 — *Praon dorsale*. 22. Antenna (scape, pedicel, F1, F2); 23. Head, posterior view (occipital carina and foramen); 24. Mesothorax, lateral view;



Figs. 25-28. – *Praon dorsale*. 25. Mesothorax, scutellum, dorsal view; 26. Metanotum, propodeum, dorsal view; 27. Petiole, dorsal view; 28. Ovipositor complex.



Figs. 29-30 – *Praon exsoletum*. 29. Forewing; 30. Head, anterior view

***Praon exsoletum* (Nees) 1811**  
(Figs. 29-35)

*Bracon exsoletus* Nees, 1811, Mag. Ges. Naturf. Fr. Berlin. 5:30.

*Aphidius (Praon) exoletus* Haliday, 1833, Entomol. Mag. 1:484.

*Praon palitans* Muesebeck, 1956, Bull. Brooklyn Entomol. Soc. 51:27-28.

**Female**

**Head:** Dorsal view, subrectangular, wider than thorax at tegulae, corners more rounded posteriorly than anteriorly, smooth, shiny, sparsely setose. Transverse eye diameter equal to width of temple. Ocellar triangle acute. In anterior view (Fig. 30), eyes large, oval, slightly convergent toward clypeus, with sparse very short setae, vertical diameter 5 times width of gena. Clypeus strongly margined ventrally, densely covered with 16-20 long setae. Labrum bluntly triangular, with 8-9 long apical setae. Tentorial index 0.2. Occiput (Fig. 31) ovaly delineated by raised carinae. Antenna 16-18-segmented. F1 somewhat narrowing centrally, about 6 times longer than minimum width. F2 about 2/3 length of F1.

**Thorax:** Smooth, shiny. Mesoscutum (Fig. 32) bearing long setae, lateral lobes with irregular, small hairless areas. Notaulices deep, distinct throughout, almost meeting dorsally. Forewing (Fig. 27): Pterostigma elongatedly triangular, proximal 1/3 relatively narrow, about 3 times longer than maximal width, about twice length of metacarp, which is slightly shorter than radius; first abscissa of median vein faint at base, colorless beyond 1st 1/3; intermedian vein pale to colorless along entire length; intermedian and colored cubital veins originate separately from cubital cell II.

**Abdomen:** Propodeum (Fig. 33) convex, a few long setae scattered near anterolateral corners, remainder with isolated sparse shorter setae. Petiole (Fig. 34) short, only slightly longer than width at spiracles, which are situated on lateral tubercles about 1/3 beyond anterior apex; dorsal surface smooth, almost hairless; usually 3 long setae on sides, posterior to spiracles. Gaster lanceolate. Ovipositor sheaths (Fig. 35) short, rounded, with 2 long conical apical spines, one at upper and one at lower edge of apex, with 1 longer seta between them.

**Coloration:** Head dark brown. Eyes black. Face brown. Clypeus and mandibles (except for darker apices) yellowish. Palpi yellow. Antennal scape, pedicel and F1 yellow, remainder of flagellum dark brown. Mesonotum brown to dark brown. Prothorax, metathorax, venter of entire thorax and propodeum light brown. Legs light brown, pretarsi slightly darker. Petiole light brown except for darker, more sclerotized carinae outlining segment. Gaster anteriorly light brown, gradually darkening toward dark brown ovipositor sheaths.

**Length:** 1.5-1.7 mm.

**Male:** Similar to female, with following notable differences: Coloration generally darker; antenna 18-20-segmented. Length 1.4-1.5 mm.

**Host Records**

From *Therioaphis trifolii* f. *maculata* (Buckton) on *Medicago sativa* (L.) (Avigedor, 7-8/74, 12/74, 8/75, 8/76, 5/78; Bet Hillel, 10/74; Bet She'an, 10/75; Jericho, 7/74; Kefar Ahim, 5/74; Orot, 7/73).

## NOTES

*Praon exsoletum* is a monophagous, effective natural enemy of *Therioaphis trifolii* forma *maculata* (Buckton). It was first recorded in Israel by Harpaz (1953, 1955), who referred to it as *Praon* sp. Subsequently, this species was exported to the United States (van den Bosch, 1957), where it was described as the now synonymized *Praon palitans* Muesebeck. Schlinger and Hall (1960) studied its biology, behavior and morphology. It is a hot-weather species. Its populations peak during the summer months of July and August, when alfalfa, the host plant of its insect host, is growing most rapidly. This parasite is distributed throughout the country, wherever alfalfa is grown. Our field observations have indicated that mummies of *T. trifolii* parasitized by it are never numerous. They are difficult to find, in spite of the unique habit of the parasitized host climbing to a position on the upper side of a leaf before its death and mummification. *T. trifolii* is easily disturbed. Its primary reaction when contacted by *P. exsoletum* is to rapidly disconnect from its feeding site and throw itself off the plant. It would seem that part of the effectiveness of *P. exsoletum* might stem from this defense reaction: Early-instar aphids that throw themselves off their host plants in hot dry areas might not successfully return to suitable feeding sites before dying. Tremblay (1974) noted the importance of this phenomenon with regard to *Aphidius matricariae* Haliday in the biological control of *Myzus persicae* Sulzer.



Figs. 31-35 — *Praon exsoletum*. 31. Head, posterior view; 32. Mesothorax, dorsal view; 33. Propodeum, dorsal view; 34. Petiole, dorsal view; 35. Ovipositor complex.



*Praon rosaecola* Starý 1961  
(Figs. 36-41)

*Praon rosaecola* Starý, 1961, Cas. Czech. Spol. Entomol. 58:341-342.

**Female**

**Head:** Dorsal view, almost square, slightly wider than long, distinctly wider than thorax at tegulae, rounded at corners, smooth, shiny, sparsely setose laterally. Temple slightly wider than transverse eye diameter. Ocellar triangle acute. In anterior view (Fig. 37), eyes large, oval, slightly convergent toward clypeus, with sparse short setae, vertical diameter about 4 times width of gena. Clypeus slightly protuberant, ventrally margined, densely covered by about 20 long setae. Labrum (Fig. 40) semicircular with 8-11 long apical setae. Tentorial index about 0.2. Occipital carina (Fig. 39) raised, subcircular. Antenna (Fig. 38) 15-18-segmented: F1 narrowing at middle, 5 times longer than minimal width, 1/3 longer than F2.

**Thorax:** Predominantly smooth, shiny. Mesoscutum densely covered with long setae, no hairless areas. Notaulices deep and distinct throughout, almost meeting posteriorly. Forewing (Fig. 36): Pterostigma triangular, basal 1/4 narrowed, length about 3.5 times maximal width, about 2 times length of metacarp and radius; first abscissa of median vein basally faint, apically colorless; intermedian vein distinctly colored throughout, origin at cubital cell II distinctly separated from that of cubital vein, usually by a short segment of the cell.

**Abdomen:** Propodeum convexly rounded, setose, setae generally directed toward center of segment. Petiole about 1/3 longer than width at spiracles, which are situated on raised tubercles about 1/3 beyond the anterior apex; distinct carinae on lateral margins of segment; dorsal surface convex, centrally smooth, laterally slightly granulate to wavy. Gaster lanceolate. Ovipositor sheaths (Fig. 41) elongate, tapering, slightly concave dorsally, apically rounded with a long cone-shaped apical spine at the upper and lower edges.

**Coloration:** Head dark brown, face somewhat lighter. Clypeus and mandibles (except for darker apices) yellow-brown, palpi yellow to brown. Antenna brown to dark brown; sometimes scape, pedicel and basal 1/2 of F1 yellowish-brown. Dorsum of thorax dark brown, ventrally somewhat lighter. Legs yellowish-brown. Wings hyaline, venation brown. Propodeum as thorax. Petiole orange-brown. Gaster brown, slightly lighter anteriorly and posteriorly. Ovipositor sheaths dark brown.

**Length:** 2.0-2.2. mm.

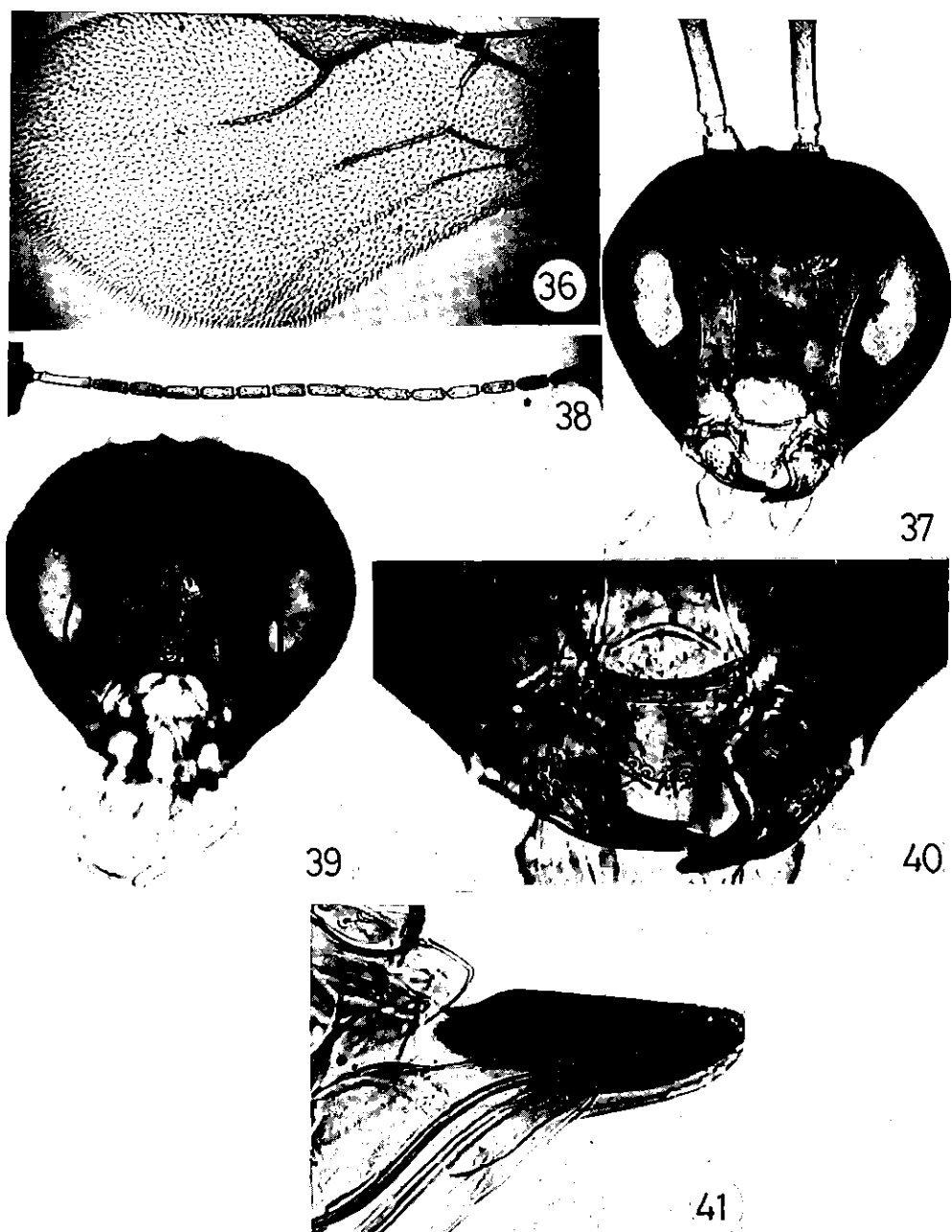
**Male:** Similar to female, with the following notable differences: Coloration generally darker; antenna 19-21-segmented. Length 1.5-1.9 mm.

**Host Records**

From *Macrosiphum rosae* (L.) on *Rosa* spp. (Birket Ram, 10/74; Karkur, 4/75; Rehovot, 4/80).

#### NOTES

*Praon rosaecola*, described by Starý (1961) from Czechoslovakia, is here recorded for the first time in Israel. Although Starý, Leclant and Lyon (1975) report its presence in Corsica, this species has not been reported from other Mediterranean countries nor from central Asia (Starý 1976, 1979). *Macrosiphum rosae*, the exclusive host of this parasite, can be found year-round on rose bushes, cultivated and wild, throughout most of the country. Despite this common occurrence of its host, *P. rosaecola* was found on only 3 occasions, in widely separated localities. From November 1980 through April 1981, weekly collections of *M. rosae* in Rehovot, at the site where *P. rosaecola* had been collected previously, failed to provide this parasite. It seems, however, that this wasp would be a good candidate for augmented introductions aimed toward the biological control of aphids on commercially grown roses.



Figs. 36-41 — *Praon rosaecola*. 36. Forewing; 37. Head, anterior view; 38. Flagellum; 39. Head, posterior view; 40. Tentorial pits, labrum, maxillae; 41. Ovipositor complex.

***Praon volucre* (Haliday) 1833**  
(Figs. 42-45)

*Aphidius (Praon) volucris* Haliday, 1833, Entomol. Mag. 1:484.

*Blacus angulator* Nees, 1834, Hymenopterorum Ichneumonibus Affinium 1:193.

*Aphidius aphidovorus* Ratzeburg, 1844, Die Ichneumonen der Forstinsecten 1:50-53.

*Praon pruni* Ivanov, 1925, Izv. Entomol. Fitopatol. Byuro Ural. 9:2.

**Female**

**Head:** Dorsal view, almost square, slightly wider than long, wider than thorax at tegulae, rounded at corners, smooth, shiny, sparsely haired. Transverse eye diameter about equal to width of temple. Ocellar triangle acute. In anterior view, eyes oval, with sparse short setae, slightly convergent toward clypeus; vertical diameter about 4 times width of gena. Face with sparse long setae, a wedge-shaped hairless area pointing up from sides of clypeus to base of antenna. Clypeus raised, densely covered by 18-24 long setae. Labrum bluntly triangular, with about 9 long apical setae. Tentorial index about 0.2. Occiput (Fig. 43) ovally delineated by a raised carina. Antenna (Fig. 44) 16-18-segmented (rarely 15); F1 slightly narrowed centrally, about 5 times longer than minimal width; F2 about 0.8 times length of F1.

**Thorax:** Smooth and shiny. Mesoscutum densely covered with long setae; lateral lobes entirely pubescent, or with small hairless areas. Notaulices deep, distinct throughout, almost meeting posteriorly. Forewing (Fig. 42): Pterostigma elongately triangular, proximal 1/3 narrow and more or less parallel-sided, about 4 times longer than wide; metacarp about 2/3 length of pterostigma, about equal to radius; first abscissa of median vein distinct at base, colorless at apex; intermedian vein evenly colored throughout, point of origin relative to that of cubital vein variable, very close together (but not joined) or widely separated.

**Abdomen:** Propodeum convexly rounded, densely setose. Petiole longer than wide at spiracles, which are situated on moderately protuberant tubercles about 1/3 beyond anterior apex; dorsum more or less smooth, slightly convex, sparsely setose. Gaster lanceolate. Ovipositor sheaths (Fig. 45) elongate, dorsum barely concave; a long, cone-shaped, apical spine at the upper and lower edges of the rounded apex, two long setae generally placed between them.

**Coloration:** Predominantly dark brown to black. Head and face dark brown. Clypeus and mandibles brown. Palpi light brown. Antenna dark brown, sometimes scape, pedicel and base of F1 yellowish. Thorax entirely dark brown to black, sometimes a little lighter ventrally. Legs yellowish, femora and pretarsi slightly darker. Wings hyaline, venation brown to dark brown. Propodeum as thorax. Petiole with varying shades of brown to orange-brown, usually darker anteriorly and laterally, the lightest part being the raised dorso-medial region. Gaster dark brown, sometimes slightly lighter at both apices. Ovipositor sheaths black.

**Length:** 1.8-2.2 mm.

**Male:** Similar to female, with the following notable differences: Coloration generally darker; antenna 17-21-segmented. Length 1.3-1.9 mm.

**Mummies** are pale brown to almost white. The emergence hole is usually aligned beneath the host's cauda.

### Host Records

From *Appelia tragopogonis* (Kaltenbach) on *Tragopogon* sp. (Mt. Hermon, 1,600 m., 6/75); from

*Aphis craccivora* Koch on *Calycotome villosa* (Newe Ativ, 5/77), on *Emex spinosa* (Rehovot, 1/76); from

*A. epilobiaria* Theobald on *Epilobium hirsutum* (Tel Dan, 10/74); from

*A. fabae* Scopoli on *Calendula* sp. (Jerusalem, 12/75), on a chenopodiaceous plant (Rehovot, 3/75), on *Solanum luteum* (Abu Ghosh, 11/75; Merkaz Shapira, 12/81), on an umbelliferous plant (Rehovot, 5/78); from

*A. zizyphi* Theobald on *Ziziphus spina-christi* (Lower Galilee, 5/75); from

*Aphis* sp. on *Polygonum equisetiforme* (Rehovot, 3/75); from

*Brachycaudus* sp. on *Glaucium oxylobium* (Mt. Hermon, 1600 m., 5/77); from

*Macrosiphum euphorbiae* Thomas on *Hypericum triquetrifolium* (Nes Ziyvona, 3/76); from

*M. (Sitobion) fragariae* (Walker) on graminaceous plants (Rehovot, 2-3/77, 6/78; Eshta'ol 5/77); from

*Macrosiphoniella riedeli* on *Centaurea* sp. (Mt. Hermon, 1400 m., 5/77); from

*Hyperomyzus lactucae* (L.) on *Sonchus oleraceus* (Zomet haSharon, 3/76; Bet Guvrin, 3/79; Jericho, 3/75; Rehovot, 4/77); from

*Myzus persicae* (Sulzer) on various cruciferous species (Abu Ghosh, 8/77; Ra'anana, 11/75), on *Bellevalia* sp. (Zomet haSharon, 3/76), on *Calendula* sp. (En Tureiba, 2/75), on *Convolvulus* sp. (Rehovot, 12/77), on *Plantago lagopus* (Merkaz Shapira, 5/76); from

*Schizaphis graminum* (Rondani) on *Avena* sp. (Pardes Hanna, 4/77), on *Triticum durum* (Rehovot, 2-3/77)

and from an undertermined aphid species on *Erodium* sp. (Hemed, 5/77).

### NOTES

This parasite has been recorded in Israel by several authors (Mackauer, 1959a,b; Rosen, 1964, 1966, 1967, 1969; Avidov and Harpaz, 1969) (ex *Myzus persicae*, *Rhopalosiphum padi* (L.) and *Sitobion fragariae* (Walker)) and without host records (Fleschner, 1963). In addition to the 48 samples collected during this study, laboratory colonies were maintained with *U. sonchi* and *M. rosae* as hosts.

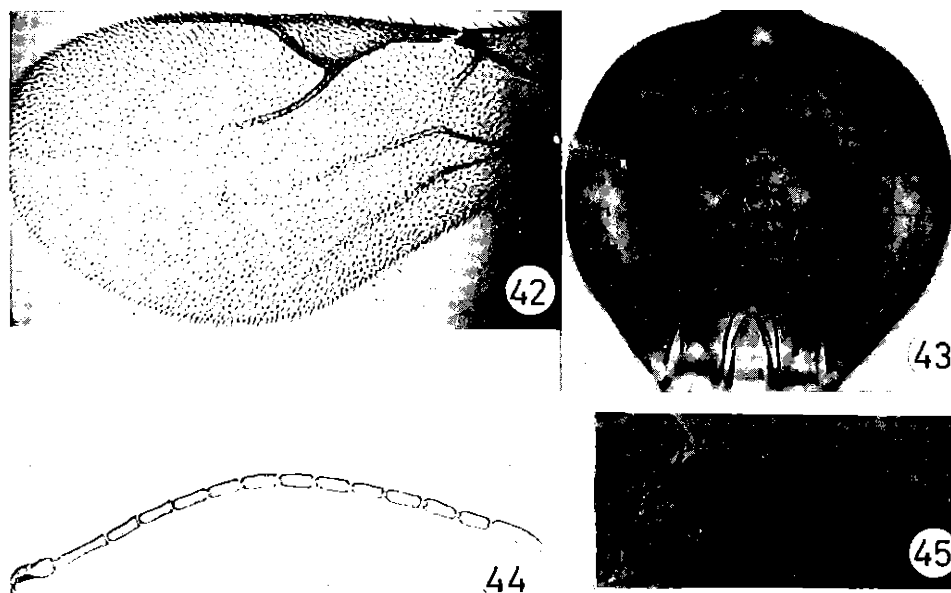
The findings of this study are in complete concurrence with Mackauer's comments (1959b) about the complexity of *P. volucre*. Not only does this species exhibit a considerable degree of polyphagy, but the many morphological inconsistencies that appear suggest that this is a species-group. However, although many samples of *P. volucre* were collected from *M. persicae*, we could find no indication of the presence of Mackauer's (1959a) subspecies *P. volucre myzophagum*. Material reared from *M. persicae* did not fit his description of this European subspecies any more than did specimens reared from other hosts.

Although capable of developing to maturity in aphid hosts belonging to the Aphididae subtribes Brachycaudina, Dactynotina, Myzina and Aphidina, *P. volucre* seems to prefer the Dactynotina. In one laboratory experiment, male and female specimens of *P. volucre* reared from *Aphis fabae* (field-collected on *Solanum luteum*), were introduced into a cage

containing 3 colonies of aphids: *A. fabae* on *Solanum luteum*, *Uroleucon sonchi* on *Sonchus oleraceus* and *Macrosiphum rosae* on *Rosa* sp. Parasites were observed walking on all three plants. No mummies developed in *A. fabae*, only two formed in *M. rosae*, whereas those in *U. sonchi* were numerous. Although *P. volucre* is present in Israel throughout the year, with its populations peaking from February through May, colonies of its hosts rarely contain more than 3 or 4 *Praon*-parasitized aphids, usually less. Furthermore, when economically important aphids are numerous, so are the economically indifferent, but preferred, hosts of this species.

However, parasitized aphids usually wander off their host plant shortly before mummification takes place. Those mummies that do form on the host plant are almost always on the undersides of the leaves or on the stems. This tendency to wander could well be the reason for the scarcity of specimens in any one location. *P. volucre* may, therefore, be more effective than it appears.

With *U. sonchi* and *M. rosae* as hosts, *P. volucre* was found to take 7 days for development from egg to pupa at temperatures of  $22 \pm 4^{\circ}\text{C}$ ., and another 5 days till start of emergence. At  $17^{\circ}\text{C}$ ., pupal development took 12 days. At both temperatures, the development of males was more rapid, the first males beginning to emerge from the mummies about 24 hours before the first females emerged.



Figs. 42-45 – *Praon volucre*. 42. Forewing; 43. Head, posterior view; 44. Antenna; 45. Ovipositor sheath.

*Praon unitum*, sp. n.  
(Figs. 46-48)

**Female**

**Head:** Dorsal view, almost square, slightly wider than long, wider than thorax at tegulae; corners rounded, smooth, shiny, with sparse long setae. Temple slightly wider than transverse eye diameter (6:5). Ocellar triangle acute. In anterior view, eyes medium-sized, oval, slightly convergent toward clypeus, with sparse, short setae; vertical diameter about 4 times width of gena. Central area of face hairless, with 2-3 rows of sparse setae between hairless area and a single row bordering orbits. Clypeus rounded, densely covered with about 19 long setae. Labrum rounded, almost semicircular, with about 9 long apical setae. Maxillary palpi 4-segmented, labial palpi 3-segmented. Occiput ovally margined by slightly raised carina. Antenna 16-17-segmented; F1 slightly narrowed centrally, 6 times longer than minimum width; F2  $2/3$  length of F1. Tentorial index 0.25.

**Thorax:** Smooth, shiny. Pronotum punctate, setose. Mesoscutum gibbous, does not cover pronotum; central lobe densely covered with moderately long setae, lateral lobes with large hairless areas, the setae anterior to these areas shorter than those bordering them posteriorly. Notaulices deep and distinct throughout, almost meeting posteriorly. Mesonotum shiny with sparse, medium-length setae. Forewing (Fig. 46): Pterostigma elongately triangular, proximally not parallel-sided but tapering, length a little more than 3 times width; metacarp  $2/3$  length of pterostigma, subequal to radius; first abscissa of median vein colored basally, gradually paling to colorless at apex; intermedian vein very pale to colorless throughout, visible or imagined origin common with that of cubitus.

**Abdomen:** Propodeum convex, peripherally with dense, mostly long setae, medially with sparse, scattered setae. Length of petiole 1.25 times width at spiracles, which are situated on elongately protuberant tubercles about  $1/3$  beyond the anterior apex of segment. Gaster lanceolate. Ovipositor sheaths (Fig. 48) elongate, roundly pointed at apex, dorsally slightly concave. Apex of sheaths with one upper and one lower conical spines, and one longer seta between them.

**Coloration:** Head brown to dark-brown. Eyes black. Face brown, clypeus and mandibles yellowish-brown, their apices reddish-brown. Palpi yellow. Antenna: Scape and pedicel yellowish, F1 yellowish at base, gradually darkening to brown at apex, remainder of flagellum dark brown. Thorax yellow to yellowish-brown dorsally, somewhat lighter ventrally. Propodeum as thorax. Petiole slightly lighter. Legs yellowish, pretarsi darkened. Wings hyaline, venation light brown. Gaster centrally dark brown, slightly lighter at both apices. Ovipositor sheaths dark brown.

*Length:* 1.7-2.0 mm.

**Male:** Similar to female, with the following notable differences: Coloration slightly darker. Antenna 19-segmented. Length 1.6-1.8 mm.

**Host Records**

From *Macrosiphoniella sanborni* (Gillette) on *Chrysanthemum* sp. (Bet Guvrin, 9/74: 3♀♀, 3♂♂, including holotype and allotype); and from

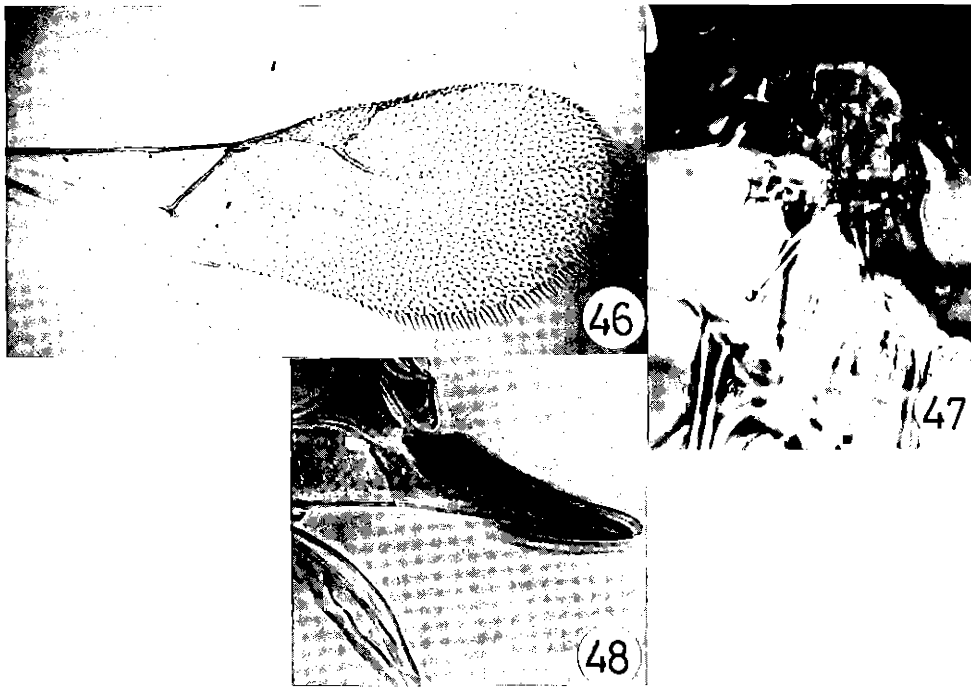
*Uroleucon sonchi* (Geoffroy) on *Sonchus* sp. (Hafez Hayyim, 5/74: 3♀♀, 2♂♂, paratypes).

## NOTES

The distinguishing characters of *Praon unitum*, sp. n. are: Intermedian and cubital veins of forewing with a common origin (hence "*unitum*"); lateral lobes of mesoscutum with large hairless areas; thorax yellow to yellow-brown; antenna 16-17-segmented. This species seems most closely related to *Praon absinthii* Bignell (also a parasite of *Macrosiphoniella* spp., but not found in Israel) but can easily be separated from it by its fewer antennal segments and paler coloration. This species was collected in the central region of Israel. As with the other species of this genus, its hosts are dactynotine aphids.

The holotype specimen, No. 867 (mounted on a card point, wings slide-mounted in balsam) and paratypes are in the aphidiid collection of the Hebrew University of Jerusalem, Faculty of Agriculture, Rehovot.

Legends to Figures



Figs. 46-48 — *Praon unitum*, sp. n. 46. Forewing; 47. Occipital foramen; 48. Ovipositor complex.



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