

**BIO SYSTEMATIC STUDIES ON THE APHIDIIDAE
OF ISRAEL (HYMENOPTERA: ICHNEUMONOIDEA)
4. THE GENERA *PAUESIA*, *DIAERETUS*, *APHIDIUS* AND *DIAERETIELLA***

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ABSTRACT

The authors present descriptions, records and biological data for species of the genera *Pauesia*, *Diaeretus*, *Aphidius* and *Diaeretiella* occurring in Israel. *Aphidius uroleuci*, *A. magdae* and *A. myzocallidis* are described as new.

KEY WORDS: Hymenoptera, Aphidiidae, *Pauesia*, *Diaeretus*, *Aphidius*, *Diaeretiella*

INTRODUCTION

This article, fourth in a series of five, continues the presentation of a revision of the species of aphidiidae found in Israel. It deals with the four genera *Pauesia*, *Diaeretus*, *Aphidius* and *Diaeretiella*, includes the descriptions of three new species and several new host records (marked by asterisks).

Genus *Pauesia* Quilis 1931

Pauesia Quilis, 1931, Eos. 7:67-69.

Protaphidius Ashmead, 1900, Canad. Entomol. 32: 368

Paraphidius Stary, 1958, Sb.Faun. Praci Entomol. Odd. Nar. Mus. Praze. 3: 56,91.

Head: Transverse, wider than thorax at tegulae, less than twice as wide as distance between eyes. Face wide, eyes large, often hemispherical (Fig. 2). laterally prominent. Maxillary palpi 4-segmented, labial palpi 3-segmented (Fig. 4). Antenna filiform, with a variable number of flagellar segments (14-29).

Thorax: Mesoscutum with more or less distinct notaulices. Forewing; Pterostigma triangular and very sclerotic; metacarp distinctly developed, always longer than width of pterostigma; radial vein distinct, divided into two abscissae; pterostigmal cell incomplete; radial and median cells confluent and completed by fused intermedian and median veins on lower side and by the second interrational vein distally.

Abdomen: Propodeum with rami of central areola more or less developed, sometimes effaced on longitudinal part, completing a concave, wide, central areola. Petiole variable, usually elongate, centrally constricted. Gaster lanceolate. Ovipositor sheath variable, more or less curved upwards to almost straight.

Parasites of aphids of the subfamily Cinarinae.

The genera *Pauesia* and *Aphidius* Nees are considered to be closely related. Most of the species presently classified in *Pauesia* were originally described under the genera *Aphidius*, *Coelonotus* Foerster and *Protaphidius* Ashmead. Stary (1958), while reviewing the genus *Aphidius*, erected the genus *Paraphidius*, which has subsequently been synonymized with *Pauesia*.

Pauesia was known from Israel before the present study. Bodenheimer and Neumark (1955) recorded *Aphidius varius* Nees as a widespread parasite of *Cinara palaestinensis* Hille Ris Lambers. Mackauer (1964 b) subsequently placed the name *varius* as a *species dubium* due to loss of type material and changed the determination to *Pauesia pini*. However, all Israeli material collected during the present study has been determined as *P. silana* Tremblay, and this was confirmed by Prof. E. Tremblay (pers. commun. 1979).

More than 40 known species of *Pauesia* are known. In Israel only *P. silana*, has been reared from the *Cinara* spp. collected during the present study. The closely related *P. pini* does not appear to exist in Israel. *P. silana* can be separated from *P. pini* by its fewer-segmented (17–18, vs. 20–21) flagellum (Starý, 1960b; Tremblay, 1975; Watanabe and Takada, 1965). The accurate illustration of Bodenheimer and Neumark (1955) indicates that the species they dealt with does was not *pini*.

Pauesia silana Tremblay 1969
(Figs. 1–7)

Pauesia silana Tremblay, 1969, Boll. Lab. Entomol. Agr. Portici. 27:153–160.

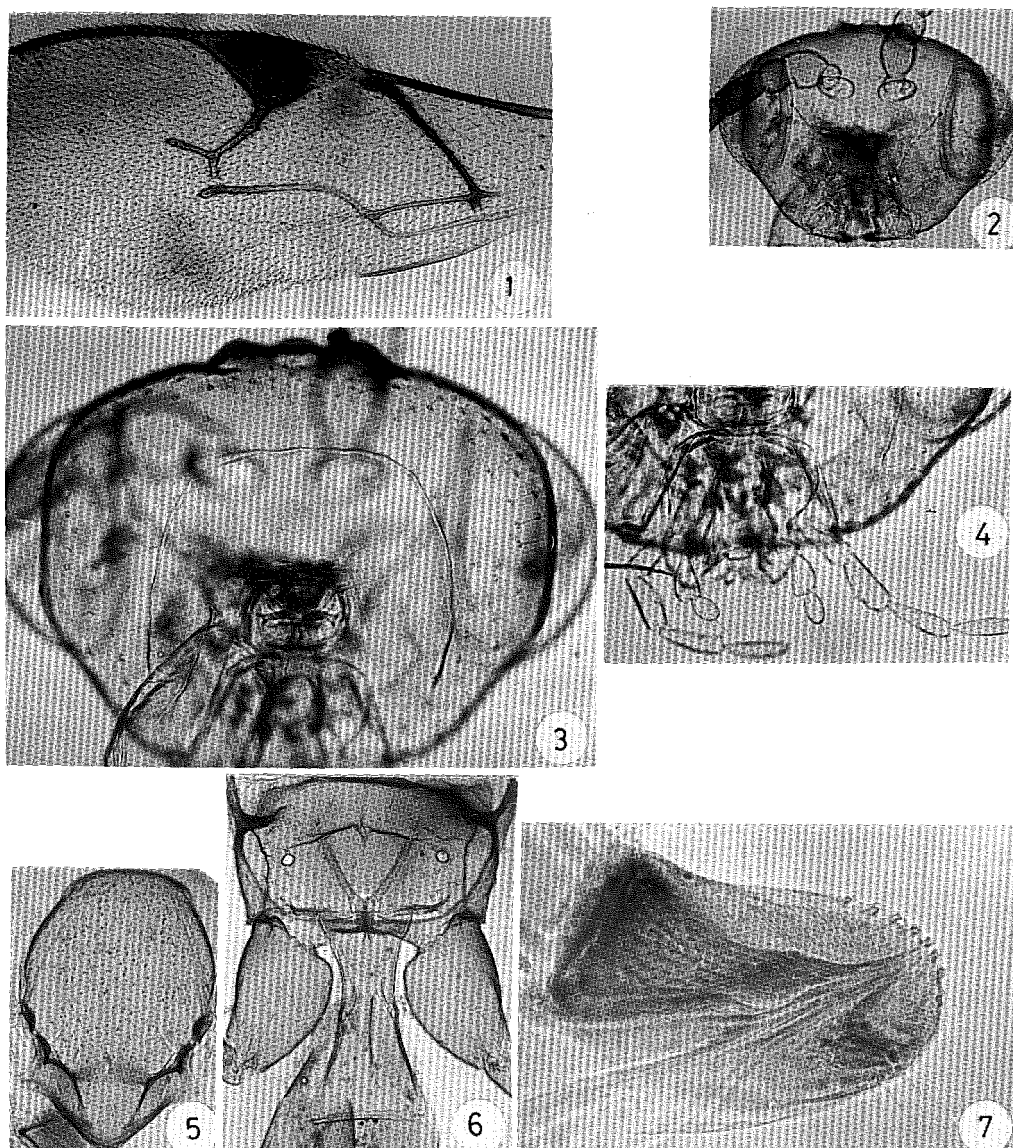
Female

Head: In dorsal view, transverse, distinctly wider than thorax at tegulae. Transverse eye diameter about twice width of temple. Ocellar triangle right-angled. Temple behind ocelli slightly depressed to occipital carina. In anterior view (Fig. 2), eyes large, protruding, with isolated short setae; vertical diameter about 3 times width of gena. Frons almost hairless, face with scattered long setae, row of about 4 long setae borders each eye; mesad of these rows, scattered shorter setae point ventrally. Hairless center-line of face bordered by long setae; clypeus with about 11 long setae. Labrum with about 14 long setae; ligula with 8 marginal very fine setae in relatively large sockets, centrally with 2 long sub-apical setae. Tentorial index 0.6–0.7. Occipital carina (Fig. 3), dorsally transverse, laterally almost parallel-sided, slightly rounded. Antenna 17–18 flagellar segments; F1 parallel-sided, F2 with rounded sides, equal to or slightly longer than F1.

Thorax: Pronotum short, not covered by mesoscutum. Mesoscutum (Fig. 5) gibbous, faint but distinct notaulices present anterolaterally, disappearing before reaching dorsum; long scattered setae follow general path of erased notaulices posteriorly. Scutellum with about 15 scattered long setae. Forewing (Fig. 1): Pterostigma widely triangular, length slightly less than three times width (11:4), centrally darker; metacarp slightly shorter than length of pterostigma; first radial abscissa slightly shorter than width of pterostigma; second radial abscissa shorter than first; second inter-radial vein equal to 0.5 times second radial abscissa.

Abdomen: Propodeum (Fig. 6) with 2 strong, slightly arched transverse carinae extending to and disappearing above the spiracles; a weak central carina extends anteriorly from the transverse carinae to anterior border of segment; propodeum depressed posterior to transverse carinae; about 7 long setae near posterolateral borders, about 13 long setae evenly distributed on each side of central anterior carina. Petiole (Fig. 6) about 3 times longer than width at spiracles, which are situated near middle of segment; strongly constricted anterad of, slightly constricted posterad of spiracles; width of anterior apex (before segment begins to narrow) about $\frac{2}{3}$ that of posterior apex; faint ridges on widening areas anterad and posterad of spiracles; apical $\frac{1}{3}$ of segment with sparsely distributed long setae. Gaster lanceolate. Ovipositor sheaths (Fig. 7) rounded apically, about 8 sensilla with short setae spread along the posterior apex; base of sheaths more heavily sclerotized than apex, a triangular sclerotic area extending dorsally from base.

Coloration: Variable, mainly yellow to brown. Eyes black, vertex and ocelli dark brown. Antennal scape yellow, pedicel dorsally brown, ventrally lighter, funicle dark brown except for lighter base of F1. Mouthparts yellow except for reddish-brown apices of mandibles and brownish



Figs. 1-7. *Pauesia silana* Tremblay ♀. 1. Forewing. 2. Head, anterior view. 3. Head, posterior view. Maxillary and labial palpi. 5. Mesoscutum. 6. Propodeum and petiole. 7. Ovipositor sheath.

apical segment of maxillary palpi. Mesoscutum and scutellum yellow, metanotum brown; mesopleura dark brown. Petiole yellowish-brown. Gaster basally yellow, becoming gradually darker to dark brown toward black ovipositor sheaths. Forelegs yellow except for dark brown apex of tarsi, middle and hindlegs primarily brownish.

Length: 2.8–3.5 mm.

Male

Similar to female, with following notable differences: Coloration usually darker; petiole broader; antenna 18–20 flagellar segments. *Length*, 2.5–3.3 mm.

Mummy: Dull brown. Emergence hole usually situated between siphunculi, above cauda. Often, the incompletely cut exit hole closes after adult emergence.

HOST RECORDS: From *Cinara palaestinensis* Hille Ris Lambers on *Pinus halepensis* (Hemed, 6/74; Lakhish, 2/77; Merkaz Shapira, 5/73, 2,4/74; 2–3/77; Newe Ativ, 6/75; Rehovot, 2/77).

NOTES: In Israel, *Pauesia silana* has been reared solely from *Cinara palaestinensis* on pine trees. None of its other reported hosts (Starý, 1976) have been recorded in Israel. Many collections of *Cinara tujafilina* (Del Guercio) on *Thuja* sp., even in the vicinity of pine trees with *P. silana*-parasitized aphids, have failed to yield this species.

According to Bodenheimer and Neumark (1955), *P. silana* primarily attacks second host instars. Development takes from 13 days in summer to 35 days in winter. Mummies may be found stuck on pine needles, branches or on tree trunks.

P. silana is the only primary parasite and the most frequently encountered natural enemy of *C. palaestinensis*. Although there are records of predators, their impact seems negligible when compared to that of this parasite. Pine branches infested with *C. palaestinensis* and smeared with a ring of sticky glue for trapping insects (Mfg: Plant Protection Ltd. Kent, England) in Merkaz Shapira (3–4/80) caught several of these parasites within two days whereas no predators were caught even after two weeks.

Bodenheimer and Neumark (1955) report that in the absence of parasites and predators, an initial infestation of 40 aphids caged on young pine trees (3 m high) reproduced so rapidly that the trees were entirely covered with aphids after 30 days. Despite this finding, their stated opinion was that the parasite is not a limiting factor of the aphid.

Weekly observations and aphid counts made over a period of 6 weeks (March–May, 1974), on a young *Pinus halepensis* sapling (1 m high) in Merkaz Shapira, showed how an initial infestation of *C. palaestinensis* (mixed instars) was slowly destroyed. Although the aphids were assiduously ant-attended, after a slight buildup, their population declined and disappeared. During this period, adult *P. silana* were observed actively seeking out hosts on the tree and numerous aphids were observed at various stages of parasitization. No predators were seen on the tree nor were there indications of there having been any.

The fact that *Cinara palaestinensis* has never been reported to reach damaging population levels in Israel, indicates that *P. silana* is of definite economic value.

Genus *Diaeretus* Foerster, 1862

Diaeretus Foerster, 1862, Verh. Naturh. Ver. Preuss. Rheinl. 19:249–250.

Head: Transverse, wider than thorax at tegulae. Eyes large. Maxillary palpi 4–5-segmented, labial palpi 2-segmented. Occiput distinctly margined. Antenna 13–16 flagellar segments.

Thorax: Prothorax not covered by mesoscutum. Mesoscutum gibbous. Notaulices completely erased. Forewing: Pterostigma triangular, longer than metacarp; radial vein distinct, longer than width of pterostigma; distad of basal cell, except for cubital cell and barely visible segment of cubital vein, all other veins effaced.

Abdomen: Propodeum with a distinct lateral carina, laterally bending posteriorly to spiracles, producing a wide, posteriorly open, central areola. Petiole elongate, widening slightly towards apex. Gaster lanceolate. Ovipositor sheaths wide, short, slightly narrowing toward blunt apex; ovipositor slightly curved downward.

Foerster (op. cit.) designated *Aphidius leucopterus* Haliday as the type species of *Diaeretus*. The trait he chose to characterize this genus (in a very brief description) was the reduced venation of the wings. Over the years, many Aphidiidae sharing this trait were assigned to this genus. Starý (1960a), using several additional morphological characteristics, divided *Diaeretus* into three genera: *Diaeretus sensu stricto*, *Diaeretiella* and *Diaeretellus*. By this reorganization, *Diaeretus* became monotypic. Tremblay (1979) studied the male genitalia of ten aphidiid genera, all with reduced wing venation, and concluded that the three above-mentioned genera, together with *Adialytus* and *Paralipsis*, represent a homogeneous group of evolutionarily advanced species.

Since Haliday's type material of *leucopterus* could not be found, Starý (1958) designated a neotype for the species and redescribed both the species and the genus.

***Diaeretus leucopterus* (Haliday) 1834**
(Figs. 8–15)

Aphidius leucopterus Haliday, 1834, Entomol. Mag. 2: 103.

Aphidius expectatus Gautier and Bonnamour, 1936, Bull. Mens. Soc. Linn. Lyon. 5: 74–75.

Female

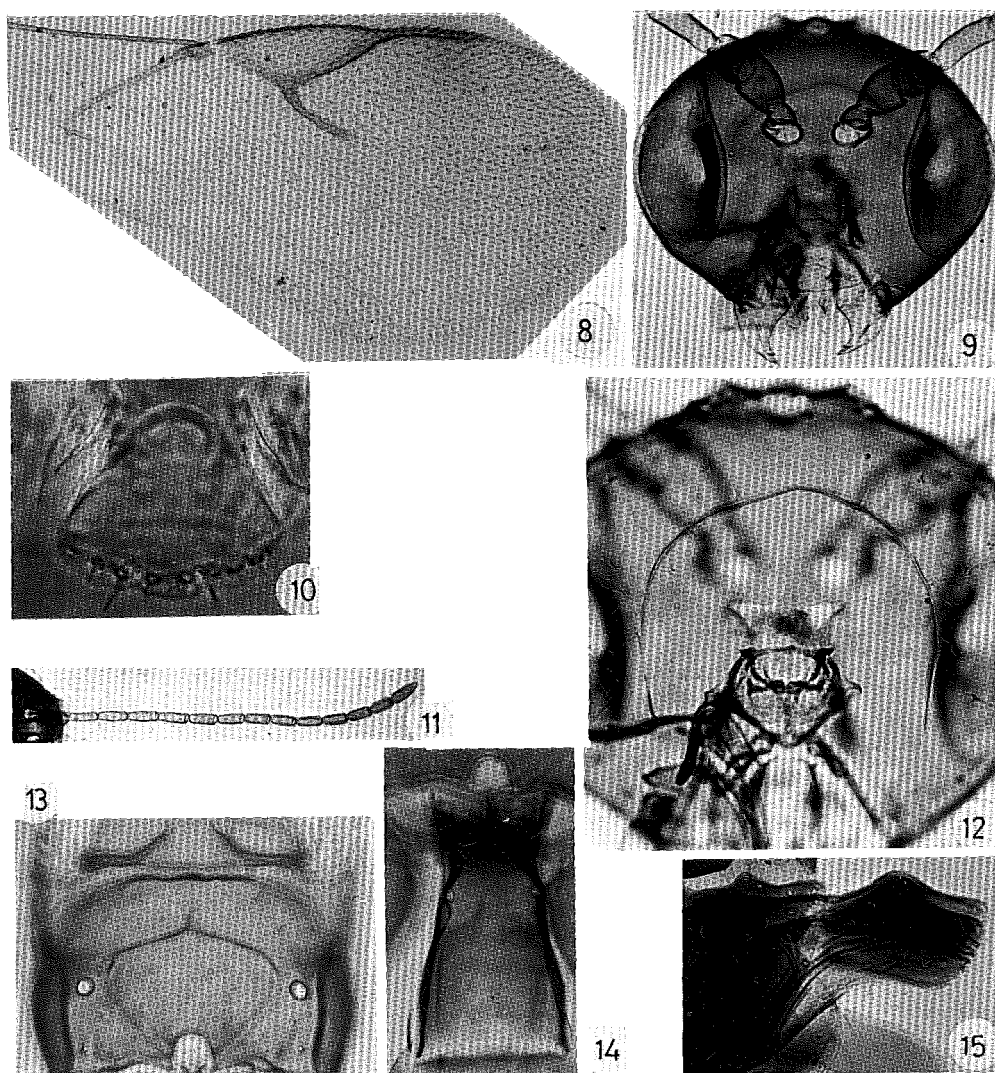
Head: In dorsal view, wide, rectangular, with rounded corners, distinctly wider than thorax at tegulae, shiny, with moderate-length, sparsely scattered setae. Eyes at anterolateral corners of head, transverse diameter about equal to temple. Ocellar triangle right-angled. In anterior view (Fig. 9), head subcircular; eyes oval, completely hairless, vertical diameter about 4 times width of gena. Medium-length setae scattered over face, isolated setae on frons. Clypeus wide, with 4–9 long setae. Labrum with 6–7 irregularly-placed long setae; apex of ligula (Fig. 10) with 8 short dagger-like setae and 2 long sub-apical setae; maxillary palpi 4–5-segmented, labial palpi 2-segmented. Tentorial index 0.6–0.7. Occiput (Fig. 12) distinctly margined by a slightly raised circular carina (from about 8 to 4 o'clock positions). Antenna (Fig. 11) 13–14 flagellar segments; scape and pedicel rounded; F1 parallel-sided, about 3 times longer than wide, very slightly shorter than F2; apical segment bluntly pointed.

Thorax: Pronotum short. Mesoscutum smooth, shiny, notaulices erased but outlined by two rows of sparse setae. Forewing (Fig. 8): Proximal segment of cubitus mostly colorless; basal and first cubital cells almost contiguous; cubital cell 2 elongate; cubitus faint beyond cubital cell 2, reaching posterior edge of wing; pterostigma triangular, about 3 times longer than wide, about twice as long as metacarp; radius subequal to metacarp; remaining veins all erased.

Abdomen: Propodeum (Fig. 13) smooth and shiny, divided by a strong lateral carina which slopes slightly and then bends sharply posteriorly toward spiracles; anterior section of segment divided by a central carina, with 2–4 long setae near each corner. Petiole (Fig. 14) almost 3 times longer than width at spiracles which are slightly raised on tubercles located somewhat anterad of center of segment; dorsum raised, narrowing and descending anterad of spiracles, posteriorly narrowing slightly and again widening; apex rounded, seeming almost swollen, with a few long setae on each side and a lateral row of long setae slightly before apex. Gaster lanceolate. Ovipositor sheaths (Fig. 15) short, dorsum strongly convex, apex almost straight, with 7–10 short pipe-like processes, each with a short seta; ovipositor slightly bent downwards.

Coloration: Primarily brown to dark brown. Eyes black. Mouthparts yellow. Coxae dark brown, trochanters yellow, femora brown, tibiae mostly brown, yellowish near articulations, tarsi pale brown. Wings clear, shiny, venation brown.

Length: 1.7–1.9 mm.



Figs. 8–15. *Diaeretus leucopterus* (Haliday) ♀. 8. Forewing. 9. Head, anterior view. 10. Ligula. 11. Antenna. 12. Head, posterior view. 13. Propodeum. 14. Petiole. 15. Ovipositor mechanism.

Male

Similar to female, with following notable differences: Antenna 14–15 flagellar segments, slightly more setose. Length 1.5–1.7 mm.

Mummy: shiny brown; parasite pupa situated exclusively in abdomen of host, empty head of mummy becoming almost transparent. Emergence hole is always situated above cauda, on posterior dorsal slope of host's abdomen. Parasite attaches mummy to the pine needle, which it appears to be hugging.

HOST RECORDS: From *Eulachnus tuberculostemmata* (Theobald) on *Pinus halepensis* (Bet Guvrin, 2/77; Kadoori Agric. Sch., 4/75; Kefar Ezyon, 9/74; Lakhish, 2/77; Merkaz Shapira, 2/74, 2/75, 3/77; Newe Ativ, 10/74; Poleg Nature Preserve, 8/76; Rehovot, 2/77, 2–3/78, 5/78; Tel Aviv, 7/74).

NOTES. This species, collected in many areas of the country, is monophagous on *Eulachnus tuberculostemmata* (Theobald), an aphid which feeds exclusively on the needles of *Pinus halepensis*. Wherever *E. tuberculostemmata* has been found, *D. leucopterus* has been present. Although this aphid tends to disperse as individuals, not producing compact colonies, by running along one pine-needle after another, *D. leucopterus* manages effectively to find its widely scattered hosts. Generally it has been found to parasitize between 90–100% of its host's populations.

No instance of tree damage by this aphid was ever observed. *D. leucopterus* appears to be of value as a biological control agent in Israel. These observations are in agreement with those of Trémblay (1975), who reports *D. leucopterus* to be of great practical importance in Italy, where it controls a different *Eulachnus* sp.

Genus *Aphidius* Nees 1819

Incubus Schrank, 1802, Fauna Boica. 2:315 (suppressed by Opinion 284, I.C.Z.N.)

Aphidius Nees, 1819, Nova Acta Acad. Leop. Carol. 9: 302.

Theracmion Holmgren, 1872, Ofvers. K. Vetensk. Akad. Forh. 29: 99.

Head: Transverse, about as wide as thorax at tegulae. Maxillary palpi 3–4-segmented, labial palpi 2–3-segmented. Number of antennal segments variable, 11–21.

Thorax: Notaulices distinct laterally, erased on dorsum. Forewing: Pterostigma elongate; radial and median cells confluent, bounded posteriorly by fused median and intermedian veins, distally by second interrational vein. **Abdomen:** Propodeum distinctly areolated, central areola usually closed anteriorly, moderately narrow. Petiole elongate, dilating slightly posteriorly, with costate, costulate or rugose markings along lateral aspect. Gaster lanceolate. Ovipositor sheaths short, blunt; ovipositor straight.

Taxonomically, the genus *Aphidius* has been the most problematic of all the Aphidiidae. Containing the greatest number of species it includes many of the family's most beneficial species. Different emphasis given to the significance of various morphologic characters has led to disagreement among taxonomists in identifying many taxa as valid species or as synonyms. As a result, *Aphidius* has had widely varying numbers of species included in it (Narayanan et al, 1962; Mackauer and Starý, 1967; Mackauer, 1968). Eady (1969) noted the specific significance of the sculpturing on the lateral aspect of the petiole, and classified *Diaeretellus*, *Diaeretiella*, *Lysaphidius* and *Euaphidius* as subgenera of *Aphidius*. During the present study only *Diaeretiella* and *Aphidius* have been found in Israel. They are treated as separate genera because of the consistent and distinctive differences between them.

Starý (1973), reviewed most of the European species of *Aphidius* and significantly reduced the number of recognized species. He introduced the use of the tentorial index as an important key character for species identification in *Aphidius*. More recently he recommended defining this

index to two decimal places (Starý, Gonzalez and Hall, 1980). According to our experience, this range is too narrow for the intraspecific variation occurring in *Aphidius*, and in identifying material collected in Israel we have accepted values for the tentorial index slightly above and below those reported by Starý. As to other characters, Starý concluded that lateral sculpturing of the petiole — rugose, costate, costulate or strigose — is the prime key character in *Aphidius*, whereas the relative length of the first and second funicular segments is variable, hence of secondary importance. Coloration too, varies with the season and developmental conditions, hence is a misleading trait, although sometimes useful for preliminary orientation. Characters such as carination of propodeum and petiole, wing venation and structure of genitalia, although exhibiting variation, are more consistent than coloration and may be regarded as valid.

Pungerl (1983) studied the variability in characters commonly used to distinguish between *Aphidius* species (number of antennal segments, tentorial index, relative length of forewing veins and anterolateral sculpture of petiole) and found all to be much more variable than previously supposed.

KEY TO THE SPECIES OF *APHIDIUS* NEES OCCURRING IN ISRAEL (females)

1. Antenna with 11 flagellar segments *A. salicis* Haliday
- Antenna with a greater number of segments 2
2. Petiole anterolaterally rugose (Fig. 30) *A. ervi* Haliday
- Petiole anterolaterally costate or costulate 3
3. Petiole anterolaterally costate (Fig. 23) 4
- Petiole anterolaterally costulate (Fig. 50) 5
4. Antenna with 13 flagellar segments (occasionally 12 or 14-segmented), F1 brown, basally with narrow yellow band, labial palpi 2-segmented *A. colemani* Viereck
- Antenna 14–15 flagellar segments, F1 unicolorously yellowish, labial palpi 3-segmented *A. magdae*, n. sp.
5. Antenna 12–13 flagellar segments 6
- Antenna with a greater number of flagellar segments 7
6. Tentorial index 0.3–0.4, radial vein distinctly bent above interradiar vein 2 *A. matricariae* Haliday
- Tentorial index 0.5, radial vein evenly arcuate along entire length *A. myzocallidis*, n. sp.
7. Antenna with 14–15 flagellar segments 8
- Antenna with a greater number of flagellar segments 10
8. Maxillary palpi 3-segmented *A. absinthii* Marshall
- Maxillary palpi 4-segmented 9
9. Labial palpi 3-segmented, tentorial index 0.4–0.5 *A. uzbekistanicus* Luzhetskii
- Labial palpi 2-segmented, tentorial index 0.5–0.6 *A. uroleuci*, n. sp.
10. Antenna 15–16 flagellar segments, tentorial index 0.5–0.6 central areola of propodeum rhomboidal (Fig. 44) *A. rosae* Haliday
- Antenna 16–18 flagellar segments, tentorial index 0.4–0.5, central areola of propodeum elongate (Fig. 49) *A. urticae* Haliday group

Aphidius absinthii Marshall 1896
(Figs. 16–19)

Aphidius absinthii Marshall, 1896, in E. André, Espèce Hyménoptères d'Europe et d'Algérie 5: 605–606.

?*Bracon melanocephalus* Nees, 1811, Mag. Ges. Naturf. Fr. Berlin 5: 29.

?*Aphidius* (*Aphidius*) *lutescens* Haliday, 1834, Entomol. Mag. 2: 99.

?*Aphidius* (*Aphidius*) *asteris* Haliday, 1834, Entomol. Mag. 2: 100–101.

Aphidius commodus Gahan, 1927, Proc. U.S. Natn. Mus. 70(8): 3–4.

?*Aphidius cardui* Marshall var. *artmesiae* Ivanov, 1927, Entomol. Mitt. 16: 429.

Female

Head: In dorsal view, transverse, about as wide as thorax at tegulae, almost square anteriorly, arcuately narrowing posteriorly, matt with sparse short setae. Transverse eye diameter slightly greater than temple. Ocellar triangle right. In anterior view (Fig. 17), eyes oval, medium–small, vertical diameter about 2–3 times width of gena. Clypeus slightly protuberant, with 8–12 long setae. Maxillary palpi 3–segmented, labial palpi 2–segmented; ligula rounded, evenly lined with a row of about 8 submarginal long setae. Tentorial index about 0.5–0.6. Occiput margined by slightly raised, inversely U-shaped, fine carina. Antenna 14–15 flagellar segments; F1 subequal to F2, parallel-sided, 3.0–3.5 times longer than wide; apical segment about 1.5 times longer than preapical segment. Sparsely scattered long setae cover face, patternless except for those bordering the orbits which form a single line beginning from about the level of the antennal sockets to the gena.

Thorax: Pronotum short, not covered by gibbous mesoscutum. Mesoscutum with moderately deep crenulate notaulices, present only on sides of segment, erased dorsally but irregularly demarcated by two lines of sparse long setae. Anterior border of prescutellar groove slightly irregular. Forewing (Fig. 16): Pterostigma wide, about 3 times longer than maximal width, 1.5–2 times length of metacarp; radial vein distinctly bent above second interradiar vein, first abscissa slightly arcuate, about 1.2 times longer than second abscissa which is straight and more or less parallel to anterior edge of wing.

Abdomen: Propodeum (Fig. 18) distinctly areolated; central areola elongate, narrow, pentagonal, formed by two strong, roundly divergent carinae, closed anteriorly by much weaker anterior carinae; anterior areolae with 3–6 long setae, posterior areolae with about 3 long setae. Petiole (Fig. 18) elongate, gradually widening slightly toward apex, about 3 times longer than width at spiracles; dorsum with faint irregular rugosities anteriorly and with a weak central keel on impressed area behind the slightly raised spiracular tubercles; lateral area with about 9–13 fine costulae. Gaster lanceolate. Ovipositor sheaths (Fig. 19) bluntly elongate, ventrum almost straight, dorsum slightly concave. Maximal length about 2.5 times maximal width.

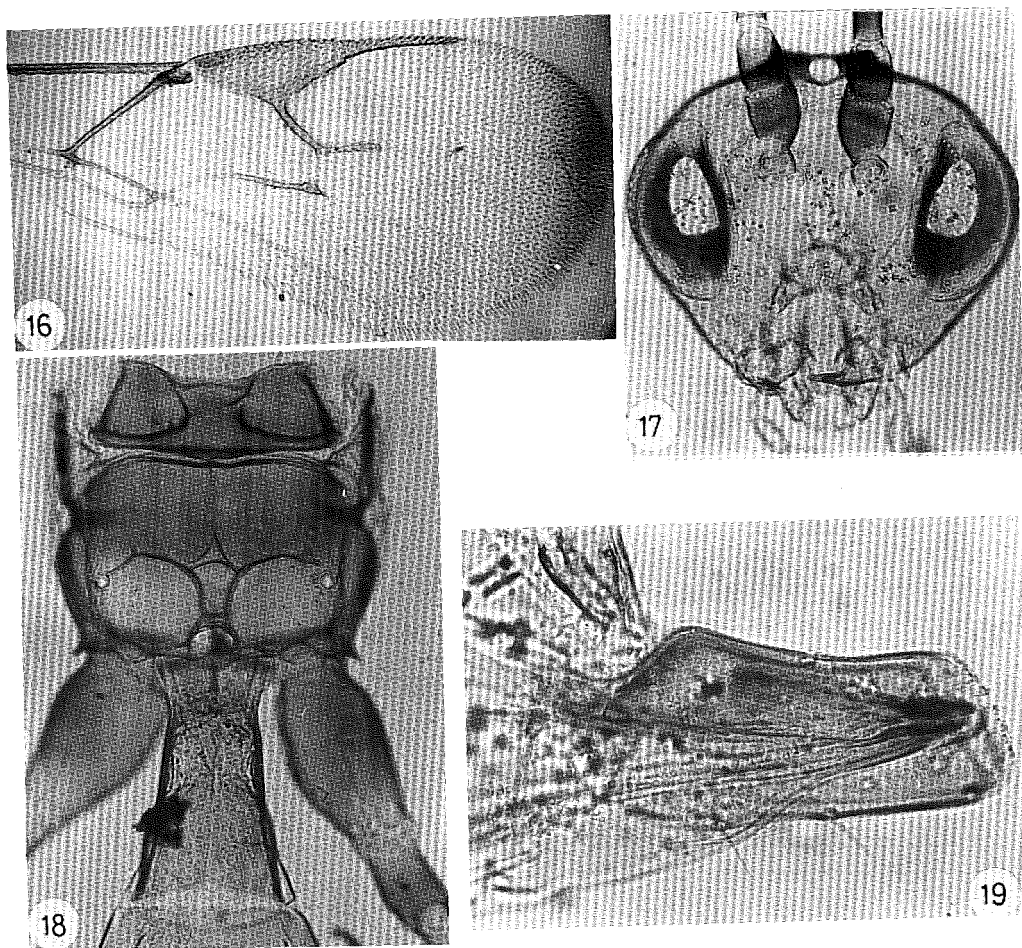
Coloration: Predominantly orange–yellow with only the following areas colored differently: eyes and ocelli black, antenna brown, except for slightly lighter ventral aspect of scape and pedicel and a narrow orange–yellow band at base of F1; metanotum, anterior 0.5 of propodeum, femur, tibia and tarsus of mid and hind legs and ovipositor sheaths brown. Wings yellow–tinged hyaline, venation golden brown.

Length: about 2.7 mm.

Male

Similar to female, with following notable differences: Antenna 15–16 flagellar segments; coloration much darker than females, predominantly brown, with face, mouthparts, petiole and anterior half of abdomen yellow. Length 2.0–2.2 mm.

HOST RECORDS: From *Macrosiphoniella riedeli* Szelegiewicz on *Centaurea* sp. (Mt. Hermon, 1500 m, 5/77) and from *Macrosiphoniella* nr. *macrura* Hille Ris Lambers on *Centaurea* sp. (Mt. Hermon, 1200 m, 5/77).



Figs. 16–19. *Aphidius absinthii* Marshall ♀. 16. Forewing. 17. Head, anterior view. 18. Propodeum and petiole. 19. Ovipositor sheaths.

NOTES: This first record of *Aphidius absinthii* in Israel seems to represent the southern limit of its distribution in the Mediterranean region. The Mount Hermon ridge, ending at the northern limit of the Syrian-African Great Rift Valley, provides an incursion of a more northern climate into this region. This parasite is restricted almost exclusively to aphids of the genus *Macrosiphoniella* (Mackauer Starý, 1967).

Aphidius colemani Viereck 1912

(Figs. 20–26)

Aphidius colemani Viereck, 1912, Proc. U.S. Natn. Mus. 42: 141.

Aphidius platensis Brèthes 1913, An. Mus. Nac. Hist. Nat. B. Aires. 24: 41.

Aphidius hubrichi Brèthes, 1913, An. Mus. Nac. Hist. Nat. B. Aires. 24: 41–42.

Aphidius porteri Brèthes, 1915, Ann. Zool. Apl. 2: 3.

Aphidius aphidiphilus Benoit, 1955, Ann. Mus. R. Congo Belge, Ser. 8Vo, Zool. 36: 349.

Aphidius leroyi Benoit, 1955, Ann. Mus. R. Congo Belge, Ser. 8Vo, Zool. 36: 350.

Female

Head: In dorsal view, transverse, wider than thorax at tegulae, shiny, with sparse, medium-length setae. Transverse eye diameter about 1.2 times wider than temple. In anterior view, eyes large, oval-shaped, slightly convergent toward clypeus; vertical diameter about 3–3.5 times width of gena. Clypeus strongly margined ventrally, slightly protuberant, with about 10 long setae. Labrum bluntly triangular with a transverse row of about 6 long setae; maxillary palpi 4-segmented, labial palpi 2-segmented; ligula with 6 short dagger-like apical setae and 2 longer subapical setae, each with 2 accessory setae. Tentorial index 0.3–0.4. Occiput margined by raised circular to subcircular carina. Antenna (Fig. 22) 13–14 flagellar segments (rarely 12-segmented), F1 about equal to F2, 3.5 times longer than wide; apical segment about 1.5 times longer than preapical segment.

Thorax: Pronotum short, with faint carinae dividing it laterally into thirds. Mesoscutum with shallowly crenulate notaulices laterally; irregular rows of short setae outline their erased paths dorsally. Forewing (Fig. 20): Pterostigma 3.5–4.2 times longer than wide, about 1.5 to 2 times longer than metacarp; radial vein evenly arcuate, first abscissa about $1\frac{1}{3}$ times length of second abscissa.

Abdomen: Propodeum (Fig. 21) distinctly areolated, central areola variable, from moderately narrow to relatively short and wide. Petiole with dorsum (Fig. 24) raised and rounded anteriorly, about 2.5 times longer than width at spiracles which are not protuberant; anterolaterally (Fig. 23) with 4–6 distinct costae. Gaster lanceolate. Ovipositor sheaths (Fig. 25) about twice longer than wide; ovipositor straight.

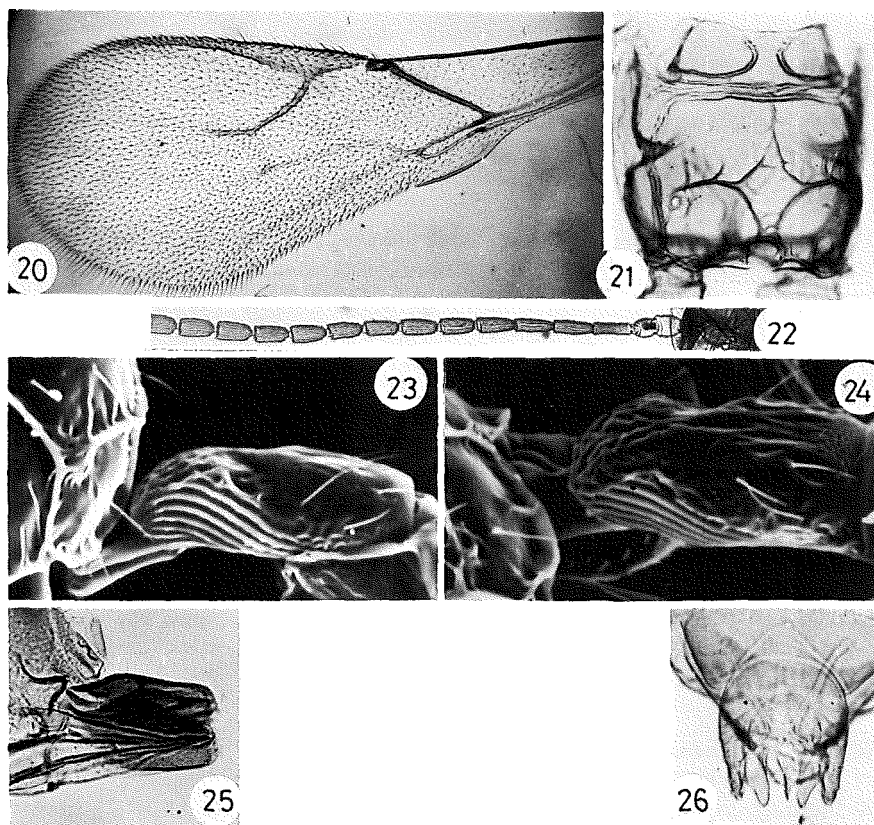
Coloration: Predominantly brown. Head dark brown, face, clypeus and mouthparts yellowish-brown except for brown apices of mandibles. Eyes black. Antenna brown except for yellowish scape, pedicel and narrow ring at base of F1. Prothorax brown; mesoscutum dark brown. Wings hyaline, venation brown. Propodeum brown; petiole yellowish. Gaster dark brown, slightly lighter toward apex. Ovipositor sheaths black.

Length: 1.7–2.2 mm.

Male

Similar to female with following notable differences: Antenna 15–16 flagellar segments, petiole darker than in female. Genitalia as in Fig. 26. Length 1.7–2 mm.

HOST RECORDS From *Aphis chloris*** Koch on *Hypericum triquetrifolium* (Negba, 4/77); from *A. citricola** van der Goot on *Bougainvillea spectabilis* (Rehovot, 2–3/75); from *A. craccivora** Koch on *Anagallis arvensis* (Rehovot, 5/77), on *Phalaris* sp. (Bet Nir, 4/77), on *Trifolium* sp. (Merkaz Shapira, 4/75); from *Aphis epilobiaria*** Theobald on *Epilobium hirsutum* (Abu Ghosh,



Figs. 20–26. *Aphidius colemani* Viereck. ♀. 20. Forewing. 21. Propodeum. 22. Antenna. 23. Petiole, lateral view. 24. Petiole, oblique view. 25. Ovipositor and sheaths. 26. Genitalia male.

11/75); from *A. fabae** Scopoli on *Ammi visnaga* (Bene Re'em, 4/74), on *Calendula* sp. (Jerusalem, 12/75), on *Chenopodium* sp. (Hula Nature Preserve, 5/75; Kadoori Agr. Sch. 4/75; Rehovot, 3/75), on *Notobasis syriaca* (Kadoori Agr. Sch. 4/75), on *Polygonum* sp. (Merkaz Shapira, 4/74), on *Solanum luteum* (Abu Ghosh, 11/75; Rehovot, 5/77), on *Solanum* sp. En Gedi (12/74), on *Sylibum marianum* (Kare Deshe, 3/77; Rosh Pinna, 3/77), on an umbelliferous plant (En Gedi, 1/79; Rehovot, 5/77) on *Urtica* sp. (Hemed, 5/77; Rehovot, 3/75), on *Withania somnifera* (Jericho, 1/75); from *Aphis gossypii*** Glover on *Chrysanthemum* sp. (Rehovot, 4/75), on a cucurbitaceous plant (En Gedi, 3/75), on *Duranta repens* (Rehovot, 1/75), on *Gundelia tournefortii* (Lakhish, 3/79), on *Hibiscus rosa-sinensis* (Rehovot, 12/76), on *Punica granatum* (Merkaz Shapira, 5/73, 4/76, 4/77), on *Rosa* sp. (Amirim, 12/76; Hazor Ashdod, 11/76; Merkaz Shapira, 4/73), on *Tecomaria capensis* (Jerusalem, 1-2/75; Rehovot, 1/77); from *Aphis hederæ*** Kaltenbach on *Hedera helix* (Bet Guvrin, 1/78, 11/78; Jerusalem, 12/75; Rehovot, 2/77; Merkaz Shapira, 4/75); from *Aphis intybi* Koch** on *Cichorium pumilum* (Sha'alvim, 5/80); from *Aphis nerii** Boyer de Fonscolombe on *Calotropis procera* (Jericho 1,2,4/75, 1/77; En Gedi, 2/74), on *Nerium oleander* (Nueiba, 3/77; Qiryat Gat, 5/75; Rehovot, 9/73, 4/74, 11/75, 4/77); from *Aphis punicae* Passerini on *Punica granatum* (Merkaz Shapira, 6/73, 4/74, 5/75, 4/77; Rehovot, 5/74); from *Aphis umbrella*** on malvaceous plants (Jericho, 2/75; Rehovot, 1/77); from *A. verbasci*** Schrank on *Verbascum* sp. (Qevuzat Yavneh, 4/76); from *Aphis zizyphi* Theobald on *Ziziphus spina-christi* (Golan Hts. 5/77; Maghar, 5/75; Qiryat Gat, 1/77; Yad Mordekhai, 5/75); from *Brachycaudus amygdalinus*** (Schouteden) on *Polygonum equisetiforme* (Hazor Ashdod, 11/76; Qiryat Gat, 12/77; Rehovot, 2/75), on *Amygdalus communis* (Rehovot, 5/73, 4/75); from *Brachycaudus helichrysi*** (Kaltenbach) on *Centaurea* sp. (Qalya-Dead Sea, 3/76), on *Helianthus annuus* (Bet haShitta, 4/77), on *Heliotropum* sp. (En Gedi, 3/76), on an unidentified plant (Rehovot, 2/74); from *Brachycaudus* sp. on *Centaurea cyanus* (Merkaz Shapira, 5/78); from *Hayhurstia atriplicis*** (L.) on *Chenopodium* sp. (Rehovot, 2/77); from *Capitophorus eleagni*** van der Goot on *Notobasis syriaca* (Mehola, 3/77); from *Hyadaphis foeniculi* (Passerini) on an umbelliferous plant (Lakhish, 3/79); from *Macrosiphum euphorbiae*** (Thomas) on *Sylibum marianum* (Merkaz Shapira, 4/77); from *Macrosiphum rosae*** (L.) on *Rosa* sp. (Lod, 5/77); from *Melanaphis* of *pyrarius/sacchari*** grp. on *Sorghum halepense* (Hula, 5/75, 2/77); from *Myzus persicae** (Sulzer) on *Bougainvillea spectabilis* (Merkaz Shapira, 12/77), on cruciferous plants, (Abu Ghosh, 8/75; Amirim, 12/76), on *Chrysanthemum* sp. (Rehovot, 2/74), on *Epilobium hirsutum* (Abu Ghosh, 11/75), on *Erodium* sp. (Rehovot, 3/75), on *Euphorbia chamaepeplus* (Jerusalem, 12/75), on *Gerbera jamesonii* (Rehovot, 4/74), on *Lycopersicum esculentum* (Rehovot, 5/75), on *Veronica cymbalaria* (Rehovot, 7/77), on an unidentified plant (Amirim, 12/76); from *Rhopalosiphum maidis** (Fitch) on *Phalaris* sp. (Sede Terumot, 3/77), on *Triticum durum* (Rehovot, 11/78), on graminaceous species (Brekhat Ram, 4/73; En Gedi, 1/79); from *Rhopalosiphum padi*** (L.) on *Avena* sp. (Rehovot, 1/76), on *Cenchrus pauciflorus* (En Gedi, 5/77), on *Triticum durum* (Bet Guvrin, 4/77; Bet Shean, 3/77; Qevuzat Yavneh, 4/76; Rehovot, 1/77; Rewaha, 4/77; Shafir, 4/77); from *Schizaphis graminum** (Rondani) on graminaceous plants (Pardes Hanna, 4/77; Sede Terumot, 3-4/77); from *Schizaphis (Paraschizaphis) rosazebdoi*** Ilharco on *Typha australis* (Abu Ghosh, 11/75); from *Sitobion fragariae* (Walker) on graminaceous plants (Bet Nir, 4/77; En Gedi, 5/77; Qalya-Dead Sea, 2/76; Rehovot, 5/77); from *Thelaxis confertae*** Börner on *Quercus* sp. (Rehovot, 5/77); from unidentified aphid species on *Chrysanthemum* sp. (Gedera, 3/74), on *Cnicus benedictus* (Golan Hts. 5/82), on a cucurbitaceous plant, (En Gedi, 3/75), on *Euphorbia* sp. (Merkaz Shapira, 4/77), on graminaceous plant (Gedera, 4/77; Qevuzat Yavneh, 2/76; Rehovot, 4/77; Sede Terumot, 4/77), on *Helxine soleirolii* (Rehovot, 1/77), on *Inula viscosa* (Abu Ghosh, 11/75; Amirim, 3/77), on *Lamium amplexicaule* (Mt. Hermon, 1600 M. 5/77), on malvaceous weeds, (En Gedi, 6/82), on *Amygdalus persica* (Rehovot, 5/73), on *Punica granatum* (Qevuzat Yavneh, 4/75), on *Sylibum marianum* (Rosh pinna, 3/77), on *Typha australis* (Abu Ghosh, 7/76; Pelugot, 12/77), on *Urtica* sp. (Rehovot, 5/77). *Aphidius*

colemanni was also collected without any host data (En Avdat, 3/74; En Gedi, 4/78; Rehovot, 4-5/77).

NOTES: Starý (1975) classified several species as synonyms of *Aphidius colemanni* and compiled a combined host list for the taxon. Until that time this species was known in Israel under the name *Lysaphidus platensis* and had been reared only from *Toxoptera aurantii* Boyer de Fonscolombe on citrus (Rosen, 1969). Whereas Rosen found it rather rare in citrus groves, *A. colemanni* is one of the most frequently encountered aphidiids in Israel.

Incidentally, we have examined 2 syntype specimens of *Aphidius transcaspicus* Telenga (courtesy of Dr. V. Tobias, Zoological Institute, Leningrad) and found it to differ from our concept of *A. colemanni*.

During the course of this study, *A. colemanni* was reared from 29 different aphid species. Of these, 14 (marked **) are new world records and 12 (marked *) are new records for the Mediterranean region. The recovery of many specimens of *Thelaxes confertae* parasitized by *A. colemanni* represents a new host genus for this parasite.

A. colemanni was common from November through May, being encountered most frequently during April. It is distributed throughout the country, from Mt. Hermon in the north (1600 m) to Nueiba along the eastern coast of the Sinai peninsula in the south, from the coast of the Mediterranean in the west and across the country to the Jordan valley and the Dead Sea in the east.

In the laboratory, colonies of *A. colemanni* were reared on *Schizaphis graminum* on seedlings of *Triticum durum* grown in vermiculite. At $22 \pm 2^\circ\text{C}$, development took 9–11 days. Laboratory colonies of *Metopolophium dirhodum* were not acceptable hosts, female wasps rejecting them for oviposition.

A. colemanni is capable of distinguishing healthy from diseased aphids: *S. graminum* at an early stage of infection by *Entomophthora planchoniana* were not accepted for oviposition. However, when caged with only a few (4–5) acceptable hosts, females would repeatedly oviposit in the same aphid.

The separation of *A. colemanni* from *A. matricariae* can be difficult. Both species abound in the same hosts colonies during the same seasons, and share many overlapping traits. Distinguishing between them by the costate and costulate markings on the anterolateral aspect of the petiole requires experience. Moreover, slide-mounted specimens are not easily positioned in a way that allows accurate examination of this trait and when examining dried specimens, the legs often hide this area.

Table 1 presents a summary of four characters found to simplify the accurate separation of these species.

Aphidius ervi Haliday 1834

(Figs. 27–32)

Aphidius ervi Haliday, 1834, Entomol. Mag. 2: 100.

?*Aphidius infirmus* Nees, 1834, Hymenopterorum Ichneumonibus Monographiae, Genera Europaea et Species Illustrantes. 1:18–19.

Aphidius ulmi Marshall, 1896, in E. André, Espèces des Hyménoptères d'Europe et d'Algerie. 5: 576–577.

Aphidius medicaginis Marshall, 1898, in E. André, Espèces des Hyménoptères d'Europe et d'Algerie. 5:245–250.

Aphidius fumipennis Györfi, 1958, Acta Zool. Hung. 4: 133.

Aphidius ervi Haliday ssp. *nigrescens* Mackauer, 1962, Beitr. Ent. 12: 642–643.

Aphidius caraganae Starý, 1963, Sb. Entomol. Odd. Nar. Mus. Praze. 35: 603–604.

Aphidius mirotarsi Starý, 1963, Sb. Entomol. Odd. Nar. Mus. Praze 35: 605–607.

Table 1. Traits for simplified separation of *A. colemani* and *A. matricariae*

Character	<i>A. colemani</i>	<i>A. matricariae</i>
Shape of radial vein	Arcuate: first and second abscissa merge smoothly above second interrarial vein (Fig. 20)	Bent: first and second abscissa meet creating an obtuse angle (Fig. 33)
Anterior dorsum of petiole	Raised and rounded (Fig. 24)	Even with and meeting petiole squarely (Fig. 37)
Coloration of Antennal F1	Evenly brown except for narrow yellow band at base (Fig. 22)	Yellow, sometimes becoming a bit darker apically (Fig. 34)
Segmentation of maxillary palpi	Usually 4-segmented (rarely 3-segmented)	Usually 3-segmented (rarely 4-segmented) (Fig. 35)

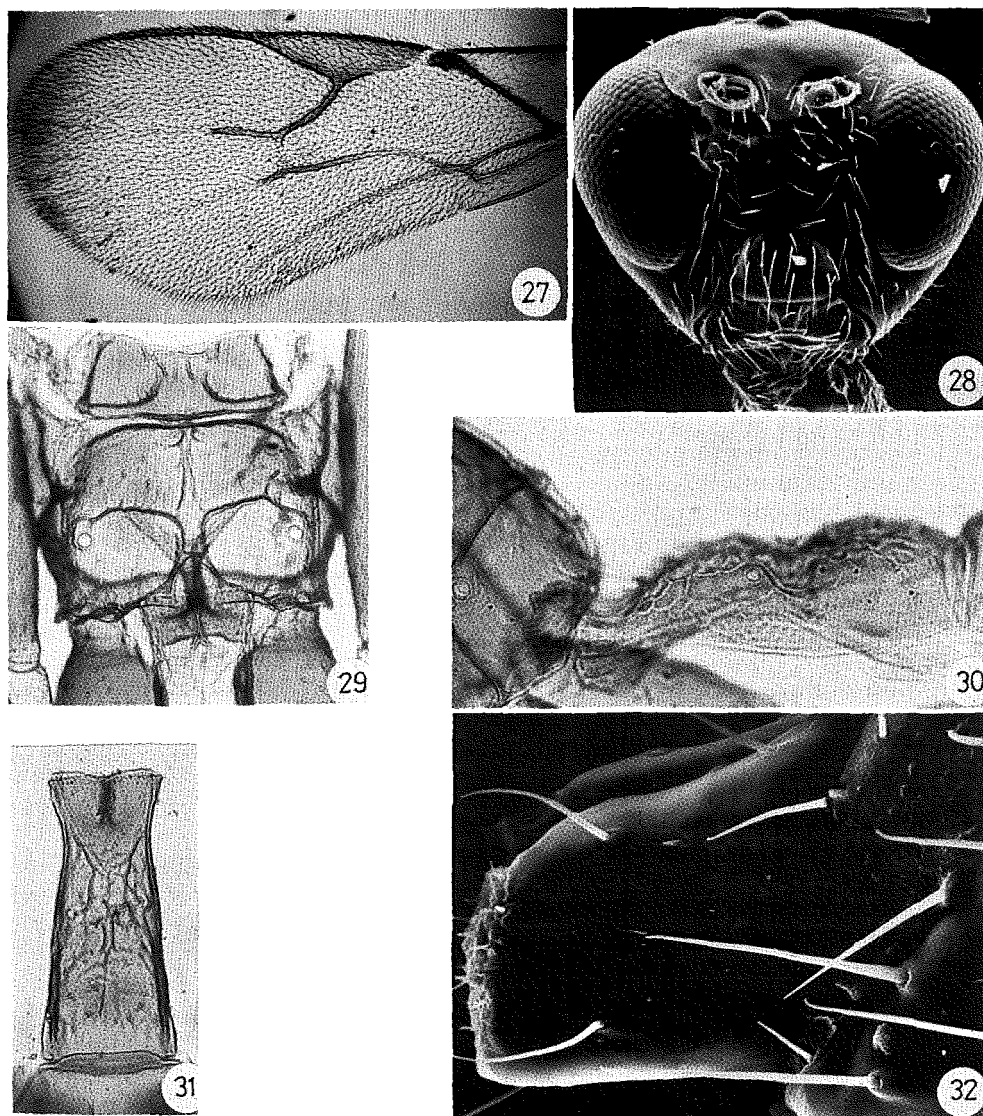
Female

Head: In dorsal view, transverse, wider than thorax at tegulae, shiny with sparse medium-length setae. Transverse eye diameter about 1.2 times greater than width of temple. Ocellar triangle right. In anterior view (Fig. 28), eyes large, oval shaped, strongly convergent toward clypeus, vertical diameter about 4 times width of gena. Clypeus rounded, protuberant, with about 14 long setae. Labrum bluntly triangular with about 10 long peripheral setae. Maxillary palpi 4-segmented, labial palpi 3-segmented. Ligula with 8 short apical setae and 2 longer subapical setae, each with 3 medium-length accessory setae. Tentorial index about 0.3–0.4. Occiput margined by raised oval-shaped carina. Antenna 17–19 flagellar segments; F1 about as long as F2, about 3 times longer than wide; apical segment arcuately pointed, longer than preapical segment.

Thorax: Pronotum short, with faint rugosities, about 7 long setae spread near anterior edge of each side. Anterior edge, viewed laterally, raised and slightly rolled back, giving a saddle-like appearance. Mesoscutum with deep crenulate notaulices present on antero-lateral aspect only, erased on dorsum but demarcated by two wide rows of scattered setae almost to apex of segment. Forewing (Fig. 27): Pterostigma elongate, about 4 times longer than wide, about 1.2 times longer than metacarp; radial vein distinctly bent above second interrarial vein, first abscissa slightly arcuate, slightly longer than 2nd abscissa; second intermedian vein colorless except for anterior base.

Abdomen: Propodeum (Fig. 29) distinctly areolated, central areola elongate and narrow. Anterior areolae with 4–10 long setae, posterior areolae with 3–7 long setae. Petiole (Fig. 31) elongate, slightly widening posteriorly, 2.5–3.5 times longer than width at spiracles; dorsum irregularly rugose, anteriorly with an irregularly defined central keel; carination on posterior $\frac{1}{3}$ lighter, with scattered long setae; anterolateral aspect (Fig. 30) irregularly rugose. Gaster lanceolate. Ovipositor sheaths (Fig. 32) short, wide, maximum length about 1.6 times longer than maximum width. Ovipositor straight.

Coloration: Predominantly dark brown. Head and face dark brown to black. Clypeus and mouthparts light orange-brown except for reddish apices of mandibles. Antenna dark brown except for the lighter ventrum of scape and pedicel and a narrow lighter ring at base of F1. Thorax and propodeum dark brown. Prothorax and petiole slightly lighter to yellow brown. Wings brownish, venation brown. Legs orange-brown. Abdomen dark brown (except for lighter orange



Figs. 27–32. *Aphidius ervi* Haliday ♀. 27. Forewing. 28. Head, anterior view. 29. Propodeum. 30. Petiole, lateral view. 31. Petiole, dorsal view. 32. Ovipositor sheath.

brown area near anterior and posterior sutures of first post-petiolar segment) becoming darker toward black ovipositor sheaths.

Length: 2.3–3 mm.

Male

Similar to female with following notable differences: Antenna 18–19 flagellar segments; coloration slightly darker than that of female; Length 2.2–2.6 mm.

Mummy: Straw colored.

HOST RECORDS: From *Acyrtosiphon pisum* (Harris) on *Medicago sativa* (Avigedor, 11/74, 8/75, 4/77; Be'er Toviyya, 4/74; Bet Dagan 4/76; Bet She'an 3/77; Dimona, 4/76; Emeq Yizre'el, 4/77; Gonen, 4/76; Paran (Sinai), 4/76; Revivim, 4/76; Yotvata, 4/76; Sede Eliyyahu, 3/77); on *Trifolium* sp. (Gedera, 4/74) and from *Macrosiphum euphorbiae* on *Chenopodium album* (Rehovot, 5/77).

NOTES: *Aphidius ervi*, one of the larger species of aphidiids, has been previously recorded in Israel only from its most common host, *Acyrtosiphon pisum*. It has also been collected here for the first time from *Macrosiphum euphorbiae*. Mackauer and Starý (1967) previously considered this a doubtful host-parasite relationship.

The rugose carination on the anterolateral aspect of the petiole is a reliable diagnostic character for this species.

This species has been collected throughout the country, wherever *Medicago sativa* is found infested with *A. pisum*, in climatic areas ranging from coastal to desert. *A. ervi* is the dominant parasite of this host.

A. ervi was collected and exported from Israel to California for the biological control of *Acyrtosiphon kondoi* Shinji there. It was found to accept *A. kondoi* as a host and was evaluated to be of high potential toward this end (Gonzalez et al., 1978).

Aphidius matricariae Haliday 1834 (Figs. 33–39)

Aphidius matricariae Haliday, 1834, Entomol. Mag. 2: 103.

Aphidius (*Aphidius*) *cirsii* Haliday, 1834, Entomol. Mag. 2: 101.

Aphidius (*Aphidius*) *arundinis* Haliday, 1834, Entomol. Mag. 2: 104.

Aphidius phorodontis Ashmead, 1889, Proc. U.S. Natn. Mus. 11: 662.

Aphidius chrysanthemi Marshall, 1896, in E. André, Espèces des Hyménoptères d'Europe et d'Algerie. 5: 591–592.

Aphidius polygoni Marshall, 1896, in E. André, Espèces des Hyménoptères d'Europe et d'Algerie. 5: 602–603.

Aphidius lychnidis Marshall, 1896, in E. André, Espèces des Hyménoptères d'Europe et d'Algerie. 5: 607.

Aphidius valentinus Quilis, 1931, Eos. 7: 46–48.

Aphidius affinis Quilis, 1931, Eos. 7: 48–50.

Aphidius arundinis Haliday var. *obscuriforme* Quilis, 1931, Eos. 7: 50–51.

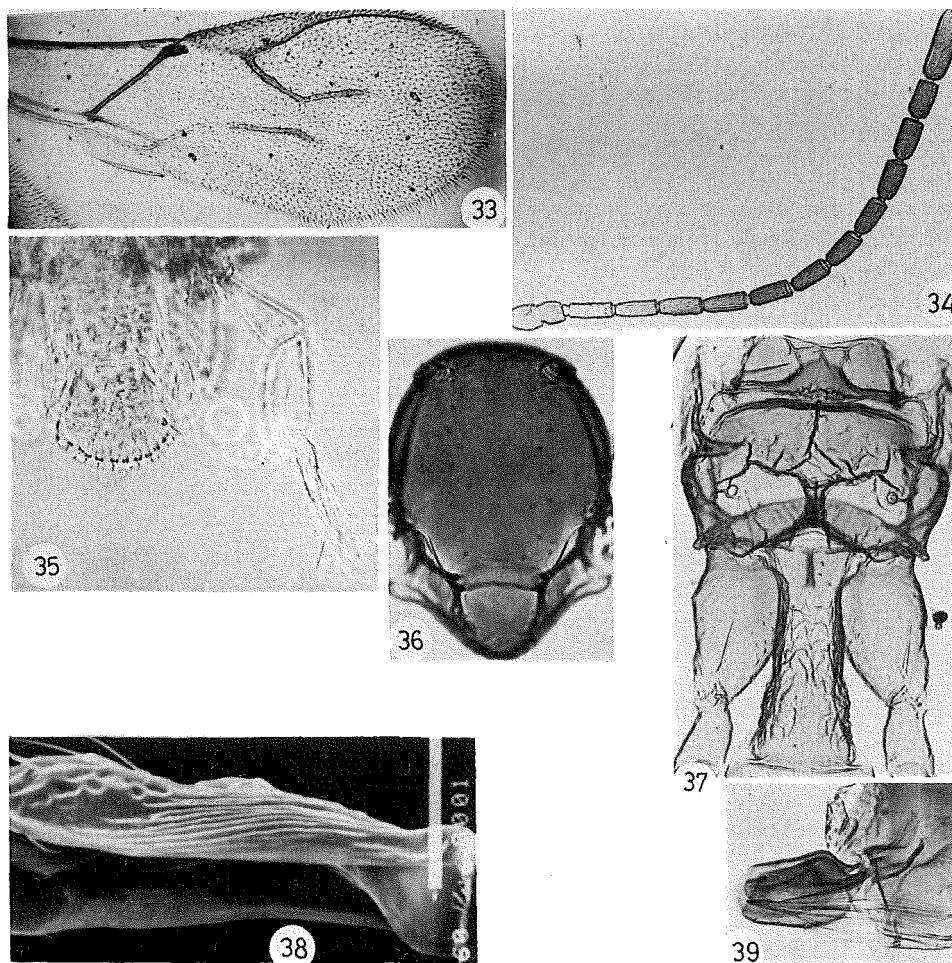
Aphidius discrytus Quilis, 1931, Eos. 7: 65–67.

Aphidius merceti Quilis, 1931, Eos. 7: 58–61.

Aphidius baudysi Quilis, 1934, Eos. 10: 10–11.

Aphidius renominatus Hincks, 1943, Entomol. Mon. Mag. 79: 44.

Aphidius nigritleus Smith, 1944, Aphidiinae N. Am. p. 61.



Figs. 33–39. *Aphidius matricariae* Haliday. ♀. 33. Forewing. 34. Antenna. 35. Ligula and maxillary palp. 36. Mesoscutum. 37. Propodeum and petiole, dorsal view. 38. Petiole, oblique view. 39. Ovipositor mechanism.

Female

Head: In dorsal view, transverse, wider than thorax at tegulae, shiny, with scattered short setae. Transverse eye diameter slightly greater than width of temple. Ocellar triangle right to acute. In anterior view, eyes medium-sized, oval, vertical diameter about 3.5 times width of gena. Clypeus rounded ventrally, slightly protuberant, with about 9 long setae. Labrum rounded apically with about 9 long setae scattered over surface. Maxillary palpi 3-segmented (Fig. 35), occasionally 4-segmented, labial palpi 2-segmented. Ligula (Fig. 35) with 8–10 short dagger-like setae apically and 2 longer subapical setae, with or without accessory setae. Tentorial index 0.3–0.4. Occiput margined by raised subcircular to inversely U-shaped carina. Antenna (Fig. 34) 12–13 flagellar segments; F1 about as long as F2, about 3 times longer than wide; apical segment longer than preapical segment.

Thorax: Pronotum short, faintly carinated. Mesoscutum (Fig. 36) with shallowly crenulate notaulices anterolaterally, erased on dorsum but outlined by irregular rows of sparse short setae. Forewing (Fig. 33): Pterostigma elongate, about 3.5–4 times longer than wide, about 1.5 times longer than metacarp; radial vein distinctly bent above second interradiial vein, first abscissa slightly longer than second abscissa.

Abdomen: Propodeum (Fig. 37) distinctly areolated, central areola somewhat variable, usually moderately narrow. Petiole (Fig. 37) elongate, about 3–3.5 times longer than width at spiracles; dorsum centrally rugose, anterolaterally (Fig. 38) with 8–9 fine costulae. Gaster lanceolate, ovipositor sheaths (Fig. 39) short, length about twice maximal width; ovipositor straight.

Coloration: Head dark brown; face brown; clypeus and mouthparts yellow except for brown apex of mandibles. Antennal Scape and pedicel light brown, F1 yellowish, becoming darker near apex, remainder of flagellum brown to dark brown. Pronotum brown; mesoscutum dark brown; thorax light brown ventrally. Wings hyaline, venation brownish. Petiole yellowish. Gaster entirely dark brown. Ovipositor sheaths black.

Length: 1.3–1.8 mm.

Male

Similar to female with following notable differences: Antenna 14–15 flagellar segments (occasionally 16-segmented); coloration darker. Length 1.1–1.4 mm.

HOST RECORDS: From *Aphis craccivora* Koch on *Medicago* sp. (Rehovot, 2/74), on *Trifolium* sp. (Shimron, 2/74); from *Aphis fabae* Scopoli on *Chenopodium* sp. (Rehovot, 3/75), on *Galium tricornutum* (Hemed, 2/76, Kadoori Agr. Sch., 4/74), on *Notobasis syriacus* (Kadoori Agr. Sch., 4/75), on *Sylibum marianum* (Rosh Pinna, 3/77), on *Urtica urens* (Rehovot, 2/76), on *Urtica* sp. (Hemed, 5/77), on *Withania somnifera* (Jericho, 1/75); from *Aphis gossypii* Glover on *Carduus argentata* (Merkaz Shapira, 5/76), on *Duranta repens* (Rehovot, 4/75), on *Lamium amplexicaule* (Rehovot, 2/77; Ma'barot, 3/75), on a malvaceous plant (Rehovot, 4/75), on *Salvia* sp. (Ma'ale haHamisha, 1/78), on *Veronica* sp. (Jericho, 2/75); from *Aphis hederæ* Kaltenbach on *Hedera helix* (Merkaz Shapira, 4/75); from *Aphis umbrella* Börner on malvaceous plant (Auja el Fauqa, 3/75; Hemed, 1/78; Jericho 2/76; Merkaz Shapira, 4/74, 3/79; Qalya–Dead Sea, 3/82; Rehovot, 1/75, 1/76); from *Aphis zizyphi* *n *Ziziphus spina-christi* (Yad Mordekhay, 5/75); from an *Aphis* sp. on ?*Cardamine hirsutum* (Jericho, 1/77); from *Brachycaudus amygdalinus* Schouteden on *Polygonum equisetiforme* (Rehovot, 2/75; Qiryat Gat, 12/77), on *Amygdalus communis* (Bet Dagan, 2/76; Newe Ativ, 5/77); from *Brachycaudus helichrysi* Kaltenbach on *Calendula* sp. (Merkaz Shapira, 3/74), on *Chrysanthemum* sp. (Rehovot, 6/74), on *Conyza* sp. (Tel Dan, 2/78), on *Cynoglossum* sp. (Mt. Hermon, 5/77), on *Helianthus annuus* (Bet haShitta, 4/77); from *Brachycaudus* sp. on *Reseda* sp. (Bet Lid, 3/76); from *Brevicoryne brassicae* on a cruciferous plant, (Rehovot, 3/77); from *Capitophorus eleagni* Del Guercio on *Notobasis syriaca* (Mehola, 3/77), on *Sylibum marianum* (Mehola, 3/75); from *Capitophorus inulae* Passerini on *Inula viscosa*

(Abu Ghosh, 11/75; Jericho, 1–2/75; Poleg Nature Preserve, 3/76; Ra'ananna, 2/77); from *Macrosiphum euphorbiae** Thomas on *Fumaria capreolata* (Rehovot, 3/76), on *Senecio vernalis* (Bet Lid, 3/77); from *Myzus mali** (Ferserari) on *Malus sylvestris* (Bet Dagan, 5/75); from *Myzus persicae* Sulzer on *Amaranthus* sp. (Yad Rambam, 10/75), on *Anthemis* sp. (Jericho, 2/75), on *Bougainvillea spectabilis* (Merkaz Shapira, 10/76, 12/77), on *Brassica oleracea* var. *capitata* (Kefar Habad, 10/75), on *Brassica* sp. (Merkaz Shapira, 4/75), on *Chenopodium* sp. (Ra'ananna, 11/75), on *Convolvulus* sp. (Kannot, 3/75; Rehovot, 12/77), on cruciferous plants, (Gedera, 3/74; Rehovot, 5/73, 7/74, 3/77, 1/78), on *Datura stramonium* (Yad Rambam, 10/75), on *Echium angustifolium* (Qalya–Dead Sea, 2/76), on *Erodium* sp. (Rehovot, 2/76), on *Galium tricornutum* (Hemed, 2/76), on *Gerbera jamesonii* (Rehovot, 3/74), on *Lamium amplexicaule* (Rehovot, 2/76), on *Lathyrus* sp. (Rehovot, 12/77), on *Lycopersicon esculentum* (Rehovot, 5/75), on *Ochradenus baccatus* (Jericho, 2/76), on *Oxalis pes-caprae* (Tel Aviv, 2/74), on *Salvia* sp. (Rehovot, 1/78), on *Senecio vernalis* (Rehovot, 1/75), on *Silybum marianum* (Aviezer, 2/75), on *Solanum* sp. (Holon, 4/80; Rehovot, 12/80), on *Sonchus oleraceus* (Jericho, 1/75), on *Withania somnifera* (Ashqelon, 3/75; Jericho, 1/75), on unidentified plants (Poleg Nature Preserve, 3/76; Ra'ananna, 4/73); from *Rhopalosiphum maidis* Fitch on *Sorghum halepense* (Merkaz Shapira, 4/77), on graminaceous plants (Rehovot, 2/74, 3/76, 4/77; Sede Terumot, 3/77; Tirat Zevi, 3/77); from *Rhopalosiphum padi* (L.) on graminaceous plants (Gedera, 2/77), on *Triticum durum* (Negba, 3/77; Qevuzat Yavneh, 4/76); from *Schizaphis graminum* (Rondani) on graminaceous plants (Rehovot, 2/77); from *Schizaphis* (*Paraschizaphis*) *rosazebdoi*** Ilharco on *Typha australis* (Abu Ghosh, 11/75); from *Sitobion avenae*** (Fabricius) on *Phalaris* sp. (Ein Zurim, 4/76); from *Sitobion fragariae*** (Walker) on graminaceous species (Bet Nir, 4/77; Kadoori Agr. Sch. 4/75); from *Uroleucon sonchi** (L.) on *Sonchus oleraceus* (Rehovot, 2/74); from unidentified aphid species on composite plants (Merkaz Shapira, 5/76; Gedera, 3/74; Ramat Gan, 5/76; Yavniel, 2/74), on cruciferous plants (Aviezer, 11/74), on *Epilobium hirsutum* (Abu Ghosh, 12/76), on *Fumaria* sp. (Rehovot, 2/74), on graminaceous species (Bet Nir, 4/77; Rehovot, 6/74; Qevuzat Yavneh 2/76) on malvaceous plants (En Gedi, 1/77), on *Solanum tuberosum* (Huseiniya, 10/74) and on *Urtica* sp. (Rehovot, 5/77). Also collected without host data (En Avdat, 3/74; Hula Nature Preserve, 5/77; Merkaz Shapira, 5/76; Rehovot, 5/77, 12/77, 2/78, 1/82).

NOTES: *Aphidius matricariae* was first recorded in Israel by Schlinger and Mackauer (1963) ex *Myzus persicae*. Avidov and Kotter (1966) and Rosen (1967) reared it from the same host on safflower and citrus. It has now been reared from 22 aphid species in Israel. Six of them (marked **), are new world records and another 2 (marked *), are new records for the Mediterranean region. In agreement with previous records, *Myzus persicae* is its most common and important host.

In the laboratory, colonies of *A. matricariae* were maintained on *M. persicae* on chinese cabbage and on an ornamental solanaceous plant, on *Schizaphis graminum* on wheat seedlings and on *Aphis hederae* on English ivy. *Aphis verbasci* was found to be an acceptable but unsuitable host. Development would progress through all the larval stages but cease before pupation and the parasites would die inside the killed host.

The number of flagellar segments was found to be related to the size of the adult wasp. Antenna of wasps up to 1.8 mm in body-length were mostly with 12-segmented flagella, whereas in larger specimens they were usually 13-segmented. Larger hosts such as *M. persicae* and *S. graminum* generally produced the larger parasites. Mummies of *M. persicae* containing female parasites were straw-colored and spindle-shaped, whereas those containing males were colored a darker brown and were rounded.

Aphidius matricariae is distributed from Israel's northern border down to the south central areas of the country, and from the Mediterranean to the Jordan river valley and the Dead Sea. It has not been reared from material collected south of latitude 31° 25'.

Aphidius rosae Haliday 1834
(Figs. 40–45)

Aphidius rosae Haliday, 1834, Entomol. Mag. 2: 98.

Aphidius rosarum Nees, 1834, Hymenopterorum Ichneumonibus Affinium Monographiae p. 19.

?*Aphidius xanthostoma* Bouché, 1834, Naturgeschichte der Insekten p. 163.

?*Aphidius protaeus* Wesmael, 1835, Nouv. Mem. Acad. Sci. Belles-Let. Bruxelles. 9: 75–78.

Aphidius cancellatus Buckton, 1876, Monograph of the British Aphides. 1: 111.

Female

Head: In dorsal view, transverse, wider than thorax at tegulae, smooth, shiny, with sparse scattered medium-length setae. Transverse eye diameter slightly greater than width of temple. In anterior view (Fig. 41), eyes large, oval, convergent toward clypeus, vertical diameter about 3 times width of gena. Clypeus slightly protuberant with about 10 long setae. Tentorial index about 0.5–0.6. Occiput margined by slightly raised carina. Antenna: 15–16 flagellar segments; F1 more or less equal to F2, parallel-sided, about 3.5 times longer than width. Face with scattered long setae, generally directed toward hairless mid-line, those near orbits slightly shorter, pointing ventrally. Maxillary palpi 4-segmented, labial palpi (Fig. 42) 3-segmented.

Thorax: Pronotum (Fig. 43) short, narrowing posteriorly, not covered by mesoscutum. Mesoscutum with distinct notaulices along lateral aspect only, erased extensions on dorsum outlined by irregularly spaced rows of long setae. Forewing (Fig. 40): Pterostigma about 4 times longer than wide, about 1 $\frac{2}{3}$ times length of metacarp; radial vein distinctly bent above second interrational vein, first abscissa about 1.5 times longer than width of pterostigma, about 1.3 times length of second abscissa which is roughly parallel to narrowing posterior edge of pterostigma.

Abdomen: Propodeum (Fig. 44) heavily carinated, central areola variable, usually relatively wide; anterior areolae with about 7, posterior areolae with about 2–4 long setae. Petiole (Fig. 44) about 3 times longer than width at spiracles, anterior half almost parallel-sided, dorsally rugose, centrally impressed behind spiracles with a strong but short central keel; posterior half widens slightly toward apex, generally convex, with sparse long setae. Anterolateral area with about 12 costulae. Gaster lanceolate. Ovipositor sheaths (Fig. 45) blunt.

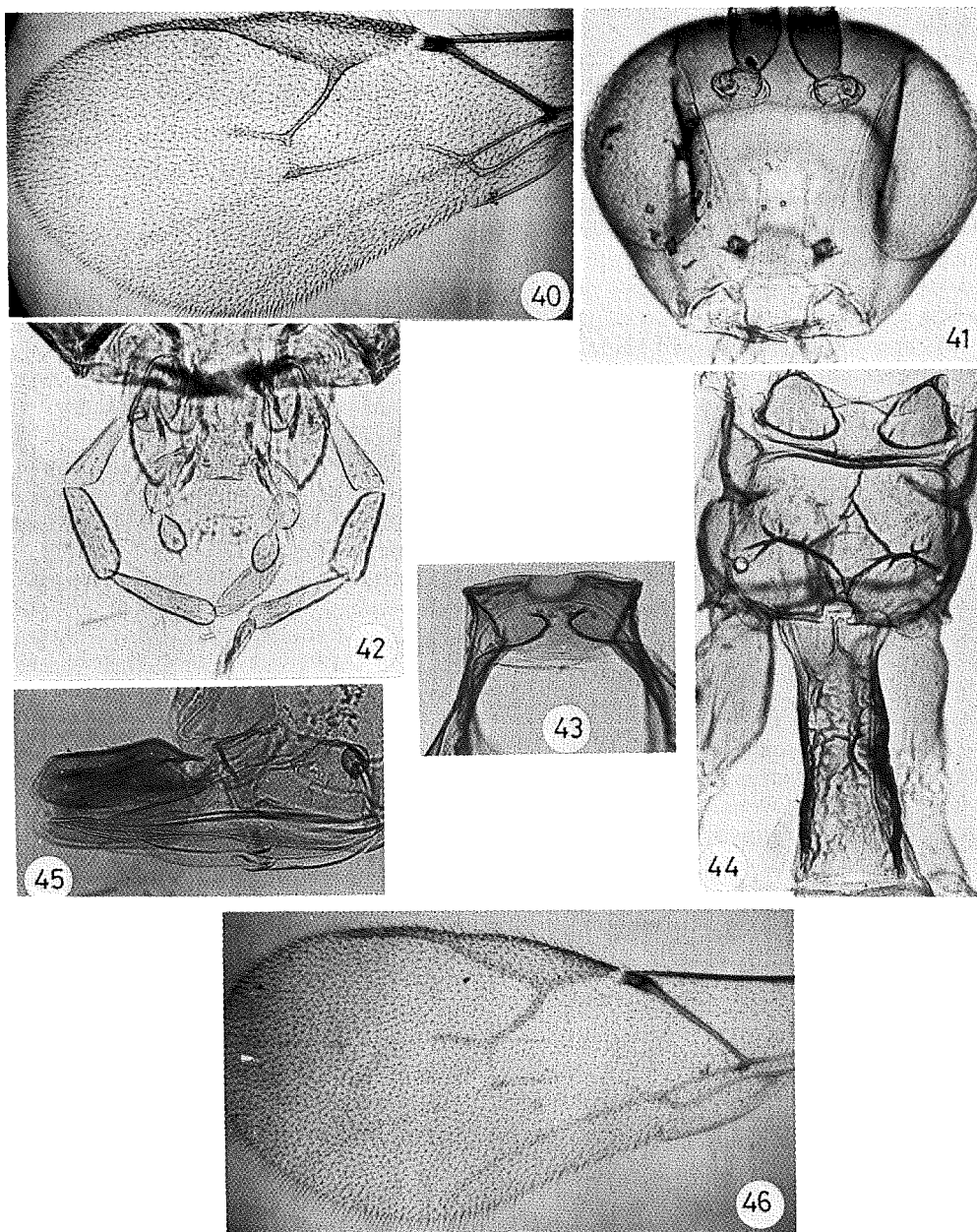
Coloration predominantly brown to dark brown. Head dark brown to black, face and mouth-parts light brown. Antenna entirely dark brown except for narrow lighter band at base of F1. Eyes black. Pronotum brown; mesoscutum, propodeum, petiole and gaster dark brown except for area near sutures of first gastral segment. Legs generally brownish dorsally and lighter ventrally. Wings tinged brownish, venation brown.

Length: 2.6–3 mm.

Males of this species were not found.

HOST RECORDS: From *Uroleucon* sp. on *Gerbera jamesonii* (Rehovot, 3/74) also collected with no host data (Rehovot, 3/74, 2–3/76, 4/77).

NOTES: Mackauer and Stary (1967) report this species to be restricted to *Macrosiphum* spp. and question the validity of several records associating it with other hosts. During this study, material collected from an unidentified *Uroleucon* sp. was determined as *A. rosae*. On several occasions, this parasite was collected live near rose bushes, infested with *Macrosiphum rosae*. However, aphids collected there failed to yield this parasite. The possibility exists that parasitized aphids leave their usual feeding positions and migrate to some hidden site, thereby avoiding collection.



Figs. 40–46. *Aphidius* spp. 40–45. *A. rosae* Haliday. ♀. 40. Forewing. 41. Face, anterior view. 42. Maxillary and labial palpi. 43. Pronotum. 44. Propodeum and petiole. 45. Ovipositor mechanism. 46. *A. salicis* Haliday ♀. Forewing.

Aphidius salicis Haliday 1834
(Fig. 46)

Aphidius salicis Haliday, 1834, Entomol. Mag. 2: 102.

Aphidius restrictus Nees, 1834, Hymenopterorum Ichneumonibus Affinium Monographiae 1: 22.

Aphidius duodecimarticulatus Ratzeburg, 1852, Ichn. Forstins. 3: 62–63.

Aphidius dauci Marshall, 1896, in E. André, Espèces des Hyménoptères d'Europe et d'Algérie. 5: 601.

Female

Head: In dorsal view, transverse, wider than thorax at tegulae, rounded anteriorly, narrowed dorsally, smooth, shiny, with sparse, moderately long setae. Transverse eye diameter slightly greater than temple, ocellar triangle right. In anterior view, eyes oval, slightly convergent toward clypeus, vertical diameter about 5 times width of gena. Clypeus slightly protuberant, with about 6 long setae. Tentorial index about 0.4. Occiput delineated by raised carina. Antenna: 11 flagellar segments; F1 subequal to F2, about 3 times longer than wide; apical segment twice length of preapical segment; flagellum widens apically.

Thorax: Pronotum short, narrowing dorsally with relatively small lateral impressions at dorsal apex. Mesoscutum smooth, shiny, with shallow, crenulate, arched notaulices rising anteriorly only, erased dorsally. Paths of notaulices continued posteriorly by two rows of sparse, moderately long setae. Forewing (Fig. 46): Pterostigma spindle-shaped, about 4 times longer than wide; first radial abscissa about 1.5 times longer than 2nd abscissa, both forming a continuous arch; second interradiial vein colorless, faintly visible; intermedian and fused median vein distinct but almost colorless except for darker area of contact with second interradiial vein.

Abdomen: Propodeum: Central areola narrow, elongate, distinctly closed anteriorly; anterior areolae usually with 5, posterior areolae usually with 2 long setae. Length of petiole about twice width at spiracles, almost parallel-sided; dorsal surface rough and flat anterad of spiracles, which are situated slightly anterad of middle of segment, slightly impressed behind spiracles, then convexly rounded and with sparse long setae to apex; anterolaterally lined with about 8 costulae. Gaster lanceolate.

Coloration: Predominantly dark brown to black; propodeum, petiole and narrow band at base of F1 colored slightly lighter brown. Legs mostly yellow brown, slightly darker on dorsal surface of femur and apex of tarsus.

Length: 2.0 mm.

Males of this species were not found.

Mummy: Straw-colored. Emergence hole at posterior dorsum, not centrally located, includes 1 siphunculus.

HOST RECORDS: From *Cavariella aegopodii* (Scopoli) on *Funiculum* sp. (HaGosherim, 5/77):

NOTES: *Aphidius salicis* is herein recorded in Israel for the first time, represented by the collection of a single female. Other records of this species (Stárý, 1966; Mackauer and Stárý, 1967) report it to be restricted to aphids feeding on umbelliferous plants.

Aphidius urticae Group

Eady (1969) separated *Aphidius* into several subgenera and species groups. Two species of his *urticae* group were found in Israel and, because of their great similarity, are treated together under the group name with comments as to their separation.

Aphidius smithi Sharma and Subba Rao 1959
(Figs. 47–50)

Aphidius smithi Sharma et Subba Rao, 1959, Indian J. Entomol. 20: 183, 186–187.

Aphidius urticae Haliday 1834
(Figs. 51–55)

Aphidius urticae Haliday, 1834, Entomol. Mag. 2: 100.

Aphidius longulus Marshall, 1896, in E. André, Espèce Hyménoptères d'Europe et d'Algérie 5: 560–561.

Aphidius loniceræ Marshall, 1896, in E. André, Espèce Hyménoptères d'Europe et d'Algérie 5: 572–573.

Aphidius silenes Marshall, 1896, in E. André, Espèce Hyménoptères d'Europe et d'Algérie 5: 603–604.

?*Aphidius euphorbiae* Marshall, 1896, in E. André, Espèce Hyménoptères d'Europe et d'Algérie 5: 606–607.

?*Aphidius goidanichi* Quilis, 1932, Boll. Lab. Entomol. Bologna. 5: 50–52.

?*Aphidius ivanovae* Telenga, 1958, Biol. Zh. Akad. Nauk Uzbekskoi SSR. 2: 54.

Aphidius ervi Haliday ssp. *nigrescens* Mackauer, 1962, Beitr. Entomol. 12: 642–643.

Aphidius rubi Starý, 1962, Polskie Pismo Entomol. 32: 112–114.

Aphidius silvaticus Starý, 1962, Polskie Pismo Entomol. 32: 114–115.

Aphidius aulacorthi Starý, 1963, Sb. Entomol. Odd. Nar. Mus. Praze. 35: 601–603.

Aphidius caraganae Starý, 1963, Sb. Entomol. Odd. Nar. Mus. Praze. 35: 603–604.

Aphidius mirotarsi Starý, 1963, Sb. Entomol. Odd. Nar. Mus. Praze. 35: 605–607.

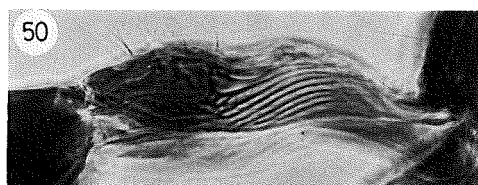
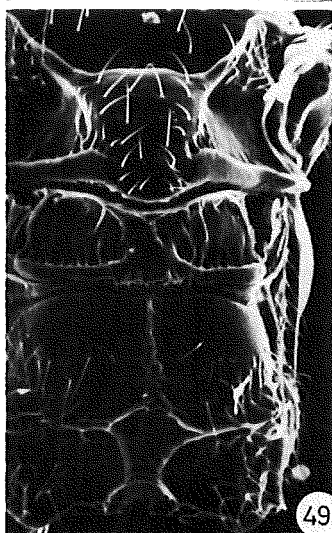
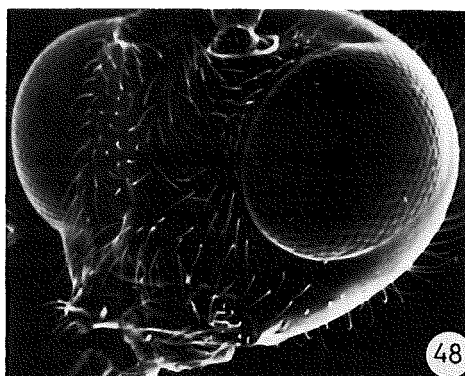
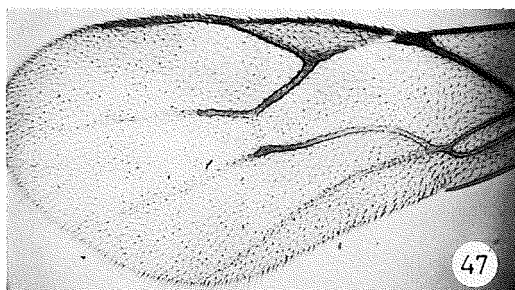
Female

Head. In dorsal view, transverse, wider than thorax at tegulae, rounded, smooth, shiny, with medium long setae. Transverse eye diameter slightly greater than width of temple. Ocellar triangle right-angled to slightly acute. In anterior view (Figs. 48, 52), eyes large, oval, strongly convergent toward clypeus, vertical diameter about 4–5 times width of gena. Clypeus protuberant, with about 12–17 long setae. Labrum rounded to triangular with about 12–15 long setae. Maxillary palpi 4-segmented; labial palpi 3-segmented; ligula with 10 short apical setae and 2 long subapical setae, each with about 6 accessory setae. Tentorial index 0.4–0.5. Occiput margined by a thin raised carina, dorsally circular, ventrally slightly divergent. Antenna: 16–18 flagellar segments; F1 more or less equal to F2, sides parallel, about 3 times longer than wide. Long setae scattered sparsely over face.

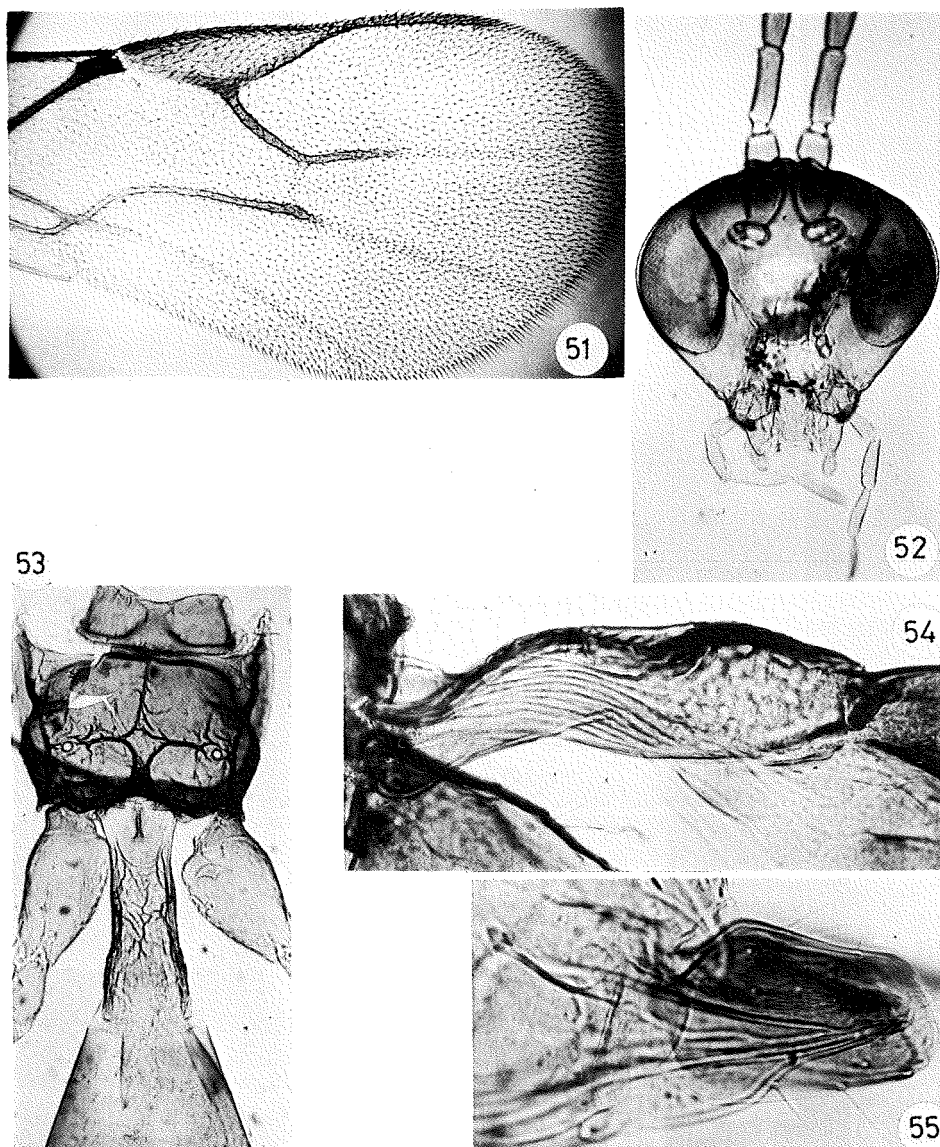
Thorax: Pronotum short, narrowing posteriorly, not covered by mesoscutum, slightly raised anteriorly in lateral view. Mesoscutum gibbous, notaulices deeply or shallowly crenulate, distinct laterally, erased on dorsum but delineated by two wide rows of setae which reach prescutellar groove. Forewing (Figs. 47, 51): Pterostigma about 4 times longer than wide, about 1.3–1.5 times length of metacarp; radial vein distinctly bent above second interradiial vein, first abscissa about equal to or slightly longer than second abscissa.

Abdomen: Propodeum (Figs. 49, 53) strongly carinated, convex, central areola moderately narrow. Anterior areolae with about 6, posterior areolae with about 6–8 long setae. Petiole (Fig. 53) about 3.5 times longer than width at spiracles; dorsally rugose with central keel, slightly impressed anterad and posterad of spiracles; posterior $\frac{1}{3}$ more or less smooth, with sparse long setae; anterolateral area costulate with about 4–12 costulae. Gaster lanceolate. Ovipositor sheaths (Fig. 55) short, maximum length about 1.7–1.9 times width; ovipositor straight.

Coloration: Variable; generally, head dark brown to black; face brownish; genae and mouth-parts brown to yellow. Antenna dark brown except for lighter ventral aspect of scape and narrow



Figs. 47–50. *Aphidius smithi* Sharma and Subba Rao. ♀. 47. Forewing. 48. Head, anterior-oblique view. 49. Metanotum and propodeum. 50. Petiole, lateral view.



Figs. 51–55. *Aphidius urticae* Haliday ♀. 51. Forewing. 52. Head, anterior view. 53. Propodeum and petiole. 54. Petiole, lateral view. 55. Ovipositor mechanism.

lighter ring at base of F1. Pronotum yellow-brown; mesoscutum light brown, usually with large elongate dark brown spots on lateral and dorsal areas; pleural and sternal areas of thorax lighter brown; metanotum and propodeum dark brown. Legs light brown, metatarsi darker. Petiole light brown, central carinated area slightly darker. Gaster alternately brown to light brown, giving a weakly banded appearance. Ovipositor sheaths dark brown to black.

Length: 2.7–3.2 mm.

Male

Similar to female with following notable differences: Coloration darker; antenna 17–18 flagellar segments. Length 2.2–3 mm.

Mummy: Pale to golden brown; emergence hole generally placed between siphunculi.

HOST RECORDS: *Aphidius smithi* was reared from *Acyrtosiphon pisum* (Harris) on *Medicago sativa* (Bet She'an, 3/77; Rehovot, 4/78).

A. urticae was reared from *Acyrtosiphon pisum* (Harris) on *Medicago sativa* (Sede Eliahu, 3/77).

NOTES: Stary (1979) considers Israel to be the westernmost extension of range for *smithi*.

Aphidius urticae and *A. smithi*, are much more difficult to separate than would seem the case from the Stary (1974) and Eady (1969) keys. The number of costulae on the anterolateral aspect of the petiole and the number of antennal segments found in the Israeli material overlap much more than reported. The antenna of both species usually have 17 flagellar segments, but *A. smithi* often has 16 flagellar segments and *A. urticae* occasionally has 18. Raychaudhuri et al. (1982) report *A. smithi* in India to have 17–18 flagellar segments and *A. urticae* to have 17. They separate these two species by using the "length:width" ratio of the pterostigma, reporting it as 4:1 for *smithi* and 5.5:1 for *urticae*. Israeli *A. smithi* and *A. urticae* do not conform with this finding. Measurements made for both species overlap and their averages are almost the same (3.8:1 and 3.7:1, respectively). The number of costulae found in specimens of Israeli *A. smithi* was almost always more than the 4–6 reported (usually 7–11, with the greatest frequency being 8–9). The number of costulae found on *A. urticae* ranged from 8 to 13, most often being 10–12.

However, the pattern of the costulae presents a means for distinguishing between these species. In *A. smithi* (Fig. 50), the costulae usually arch beneath the spiracle, they tend to straighten out and merge into the posteriorly rugose area of the petiole. In *A. urticae* (Fig. 54), costulae on the anterolateral aspect of the petiole generally continue their arched transit ventrally, reaching the ventral edge of the segment.

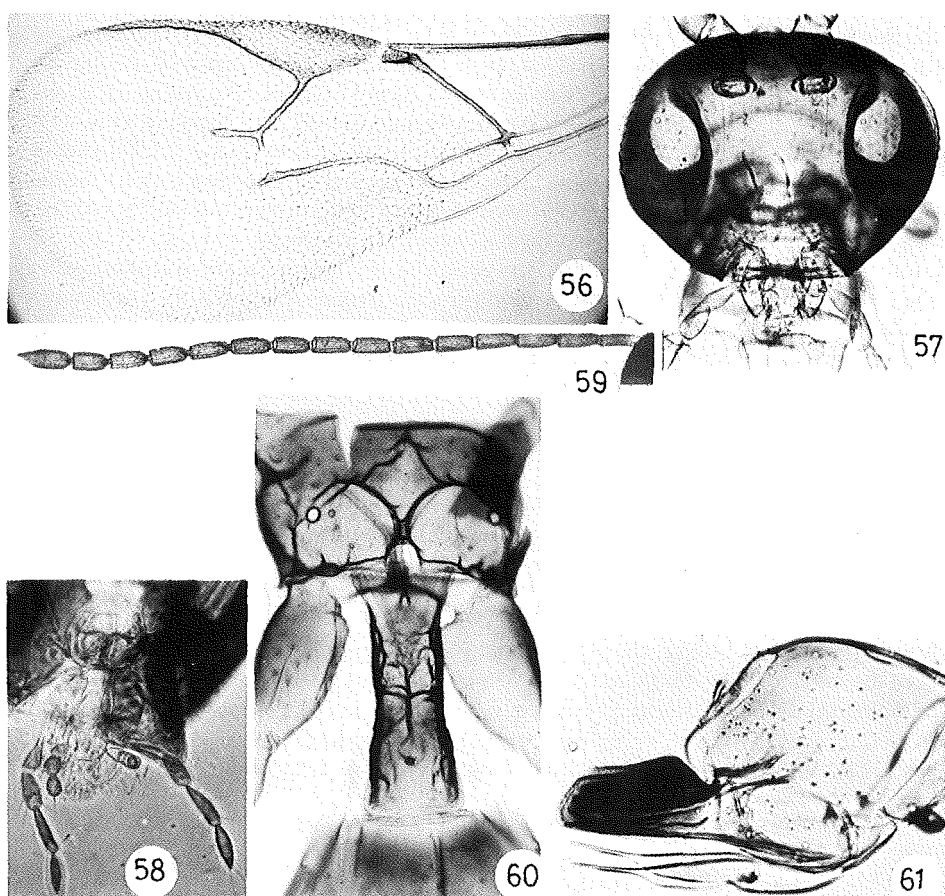
Israeli material originally identified by Stary as *A. urticae* (Gonzalez et al., 1978) does not fit the descriptions of *A. eadyi* (Stary, Gonzalez and Hall, 1980) which has replaced the name for members of this group parasitic on legume aphids. Local material known to these authors was not listed in the distribution range of *A. eadyi*. *A. eadyi* has a smaller tentorial index (0.32–0.39) and fewer costulae on the petiole (mostly 7–9) than *A. urticae*.

The assortment of diagnostic characters found useful in one location and invalid in another, reinforces the need to deal with these taxons as a species-group and relate to them more on the basis of biological traits. Specimens of *Aphidius smithi* and *A. urticae* collected in Bet She'an were shipped to California for the biological control of *Acyrtosiphon kondoi* (Gonzalez et al., 1978). Both species accepted this aphid for oviposition but neither was capable of developing in it.

Aphidius uzbekistanicus Luzhetzki 1960 (Figs. 56–61)

Aphidius uzbekistanicus Luzhetzki, 1960, in Jachontov et al. Eds. Useful and Pest insects of Uzbekistan pp. 122–123.

?*Aphidius beltrani* Quilis, 1931, Eos. 7: 51–54.



Figs. 56–61. *Aphidius uzbekistanicus* Luzhetskii. ♀. 56. Forewing. 57. Head, anterior view. 58. Maxillary and labial palpi, occipital foramen. 59. Flagellum. 60. Propodeum and petiole. 61. Ovipositor mechanism.

?*Aphidius macropterus* Quilis, 1931, Eos. 7: 54–57.

?*Aphidius granarius* Marshall var. *pailloti* Quilis, 1931, Eos. 7: 58–61.

?*Aphidius indivisus* Quilis, 1931, Eos. 7: 62–65.

Aphidius impressus Mackauer, 1965, Dt. Entomol. Z., N.F. 12: 347–349.

Female

Head: In dorsal view, transverse, slightly wider than thorax at tegulae, smooth, shiny, with sparse medium-length setae. Temple about 1.2 times transverse eye diameter. Ocellar triangle right to acute. In anterior view (Fig. 57), eyes large, oval-shaped, convergent toward clypeus, with sparse short setae; vertical diameter about 3.5–4.0 times width of gena. Clypeus slightly protuberant with about 9 long setae. Labrum bluntly triangular, transversely lined with about 7–10 long setae slightly distal to its middle. Maxillary palpi usually 4-segmented, labial palpi usually 3-segmented, occasionally 4-segmented (Fig. 58). Ligula with 6–8 short apical setae and 2 long subapical setae which extend beyond the apical setae, each with about 3 accessory setae. Tentorial index 0.4–0.5. Occiput margined by a distinct, slightly raised, inversely U-shaped carina. Antenna (Fig. 59) 14–15 flagellar segments (rarely 13); F1 slightly subequal to F2, parallel sided, about 2.5–3.0 times longer than wide; apical segment pointed, very slightly longer than preapical segment. Face with irregularly scattered long setae.

Thorax: Pronotum short, narrowing dorsally with distinct lateral depressions posteriorly. Mesoscutum smooth, shiny, with shallow notaulices rising straight on lateral aspects only; double rows of sparse long setae continue paths of notaulices posteriorly. Scutellum rounded apically. Forewing (Fig. 56): Pterostigma spindle-shaped, about 3–3.5 times longer than wide, about 1.5 times longer than metacarp; radial vein distinctly bent above second interrarial vein, first abscissa about 1.5 times longer than width of pterostigma, about 1.2 times longer than second abscissa; second interrarial vein distinct but colorless.

Abdomen: Propodeum (Fig. 60) variable but usually widely rhomboidal. Anterior areolae with variable number of long setae, most often about 7; posterior areolae with about 3 long setae. Petiole (Fig. 60) elongate, almost parallel-sided, about 3.5 times longer than width at spiracles which are located slightly anterior to middle of segment; irregular carinations near middle of dorsum merge to form a short central carina; posteriorly almost smooth with sparse long setae directed distally and posteriorly; anterolateral aspect lined with about 12 fine costulae. Gaster lanceolate. Ovipositor sheaths (Fig. 61) about twice as long as wide, dorsal hump rounded, posteriorly slightly concave, ventrum slightly convex; apex straight, sloping posteriorly toward ventrum; ovipositor straight.

Coloration generally variable. Predominantly lighter or darker shades of brown. Head dark brown, eyes black, face and mouthparts yellowish. Antenna dark brown except for narrow yellow band at base of F1. Mesoscutum brown, pronotum dorsally and laterally lighter. Legs yellowish brown, posterior femora and all tarsi darker. Wings hyaline, venation brown. Propodeum and petiole light brown with darker carinations. Gaster dark brown centrally, lighter apically, ovipositor sheaths black.

Length: about 2.4 mm.

Male

Similar to female with following notable differences: Coloration darker; antenna 16–18 flagellar segments. Length about 1.8 mm.

Mummy: Straw-colored; emergence hole at posterior dorsum, generally between siphunculi.

HOST RECORDS: From *Acyrtosiphon pisum* (Harris) on *Ononis* sp. (Mehola, 3/77); from *Sitobion avenae* (Fabricius) on *Phalaris* sp. (En Gedi 3/76) from *Sitobion fragariae* (Walker) on *Hordeum marinum* (Mt. Tabor 4/75), on *Hordeum* sp. (Bet Nir, 4/77), on *Triticum durum* (Bet Guvrin, 4/77),

on graminaceous weeds (En Gedi, 5/77; Eshta'ol forest, 4/77; Mt. Tabor, 4/75); from *Metopolophium dirhodum* (Walker) on *Medicago* sp. (Rehovot, 4/76), and from unidentified aphids on unidentified graminaceous plants (Rehovot, 5/77; Ta'anakh, 4/77).

NOTES: *Aphidius uzbekistanicus* is presently recorded in Israel for the first time. Starý (1976) reported it only from the northern Mediterranean region (Spain, S. France, Corsica, Italy, Sicily, Bulgaria, Yugoslavia and Crimea).

Although reared also from aphids on *Medicago* and *Ononis* species, *A. uzbekistanicus* is known primarily for its association with graminicolous aphids.

***Aphidius uroleuci* Mescheloff and Rosen n. sp.**

(Figs. 62–75)

Female

Head: In dorsal view (Fig. 63), transverse, wider than thorax at tegulae, rounded at corners, smooth, shiny, with sparse short setae. Eye diameter about 1.5 times wider than temple. Ocellar triangle right to acute. In anterior view (Fig. 64), eyes large, oval, convergent toward clypeus, vertical diameter 2–4 times width of gena. Clypeus rounded, slightly protuberant, with about 6–11 long setae. Labrum bluntly triangular, with scattered long setae; maxillary palpi usually 4-segmented (sometimes 3-segmented), labial palpi 2-segmented; ligula (Fig. 66) with 8 short apical dagger-like setae and 2 long subapical setae, each with 2–3 shorter accessory setae. Tentorial index 0.5–0.6. Occiput margined by slightly raised inverted U-shaped carina. Antenna (Fig. 65) 13–14 flagellar segments; F1 subequal to F2, 2.5–3.0 times longer than wide. Face with irregularly distributed sparse long setae.

Thorax: Pronotum short, not covered by mesoscutum. Mesoscutum gibbous (Figs. 67, 68), with distinct, crenulate notaulices on lateral aspect only; double rows of sparse long setae outline paths of erased notaulices on dorsum. Forewing (Fig. 62): Pterostigma 3.5–4.5 times longer than wide; metacarp about 0.5 length of pterostigma; radial vein arched, first abscissa more or less equal to second abscissa.

Abdomen: Propodeum (Figs. 69, 70) with distinct carinae diverging anteriorly from posterior apex of segment; central areola usually open anteriorly or incompletely closed by weak or broken carinae; anterior areolae with 1–3 long setae; posterior areolae with 1–4 long setae. Petiole (Figs. 71, 72) widens slightly to apex, about 3.0–3.5 times longer than width at spiracles, which are on dorsally raised tubercles; middle $\frac{1}{3}$ with a central keel and irregularly rugose; posteriorly rounded and smooth, with about 13–17 long setae; laterally (Figs. 73, 74) lined with about 8–12 costulae. Gaster lanceolate. Ovipositor sheaths (Fig. 75) elongate, wide, blunt at apex, sloping posteriorly; ovipositor straight to curved slightly upwards.

Coloration: Variable, but generally dominantly orange-brown. Eyes, ocelli and ovipositor sheaths black. Antenna (distal to a light colored ring at base of F1) brown. Wings hyaline, venation brown. Legs light, femora and tarsi darker.

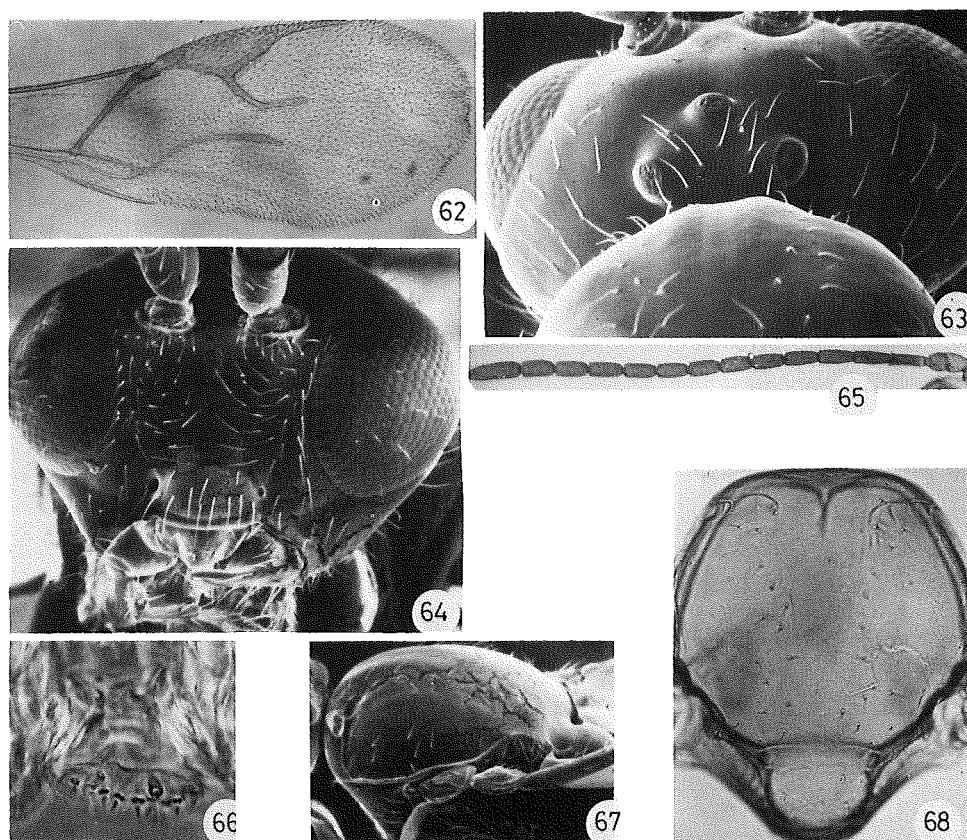
Length: 1.8–2 mm.

Male

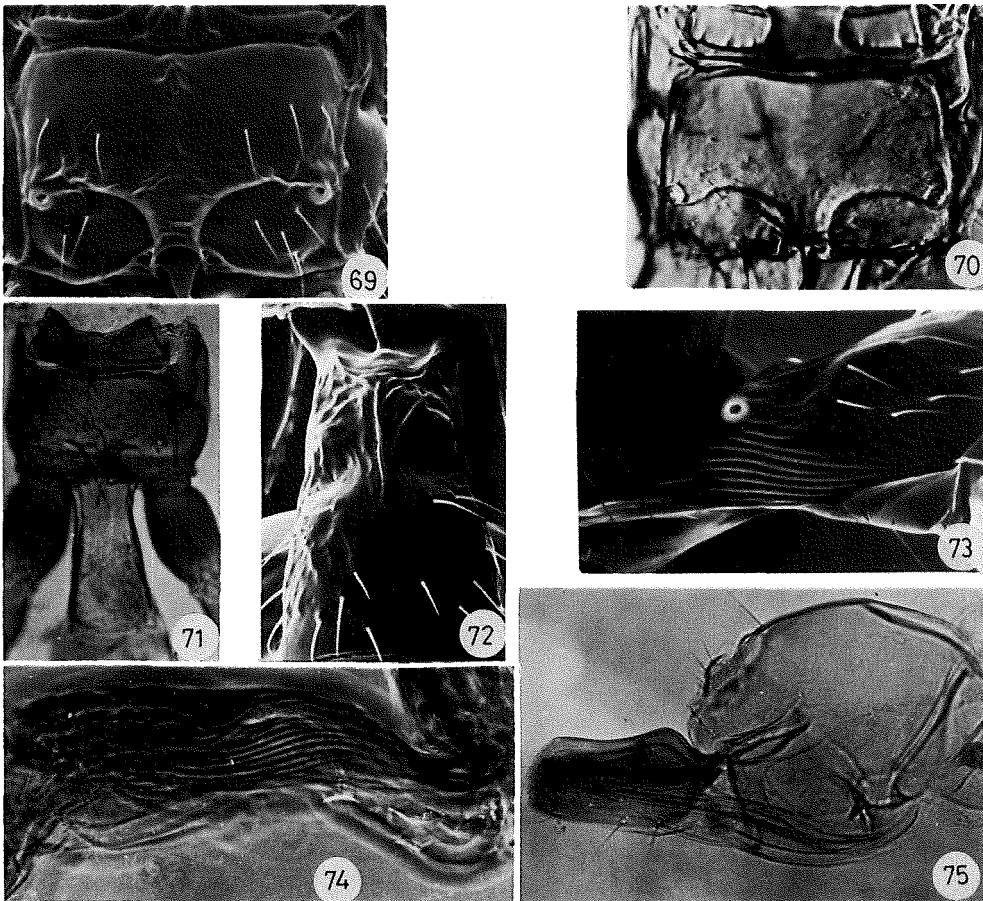
Similar to female, with following notable differences: Coloration generally darker; antenna 15–16 flagellar segments; body more setose. Length 1.9 mm.

Mummy: Light golden brown.

Host records: From *Uroleucon carthami* Hille Ris Lambers on *Carthamus tinctoria* (Gal'on 4/79), on *Carthamus tenuis* (Hafez Hayyim, 5/76); from *Uroleucon inulae* (Ferrari) on *Inula viscosa* (Abu Ghosh, 7/81; Bustan haGalil, 6/75; Hammat Gader, 4/75; Wadi Bustan, 8/74, 8/75); from



Figs. 62–68. *Aphidius uroleuci* n. sp. ♀. 62. Forewing. 63. Head, dorsal view. 64. Head, anterior view. 65. Antenna. 66. Apex of ligula. 67. Mesoscutum, lateral view. 68. Mesoscutum, dorsal view.



Figs. 69–75. *Aphidius uroleuci* n. sp. ♀. 69. Propodeum. 70. Propodeum. 71. Propodeum and petiole. 72. Petiole, dorsal view. 73. Petiole, lateral oblique view. 74. Petiole, lateral view. 75. Ovipositor mechanism.

Uroleucon jaceae (L.) on *Carthamus tenuis* (Hafez Hayyim, 5/76), on *Centaurea iberica* (Nahariyya, 6/75; Hafez Hayyim, 7/75; Wadi Bustan, 8/75); from *Uroleucon sonchi* (Geoffroy) on *Sonchus oleraceus* (Qiryat Gat, 5/75).

NOTES: *Aphidius uroleuci* is an oligophagous parasite of *Uroleucon* spp. that feed on composite plants. It has been collected from widely dispersed areas in the central and northern parts of Israel, along roadsides, in open fields and in transitional areas. Although most of the host plants are considered weeds, its association with *Uroleucon carthami* Hille Ris Lambers on safflower, *Carthamus tinctoria*, is notable. *Aphidius uroleuci* is a hot weather species. Generally, in locations where it has been collected, aphid populations have been low, usually consisting only of isolated individuals. Laboratory-emerged adult females lived for about 7 days when fed diluted honey and kept at a temperature of $27 \pm 2^\circ\text{C}$.

A. uroleuci can be easily separated from other *Aphidius* species by the combination of generally light coloration, 4-segmented maxillary palpi, 2-segmented labial palpi, antenna with 13–14 flagellar segments and usually incompletely carinated propodeum.

The holotype specimen, (No. 1132, ♀), mounted on a card point, and paratypes (6 ♀♀, 2 ♂♂) are in the aphidiid collection of the Hebrew University of Jerusalem, Faculty of Agriculture, Rehovot.

***Aphidius magdae* Mescheloff and Rosen n. sp.**
(Figs. 76–84)

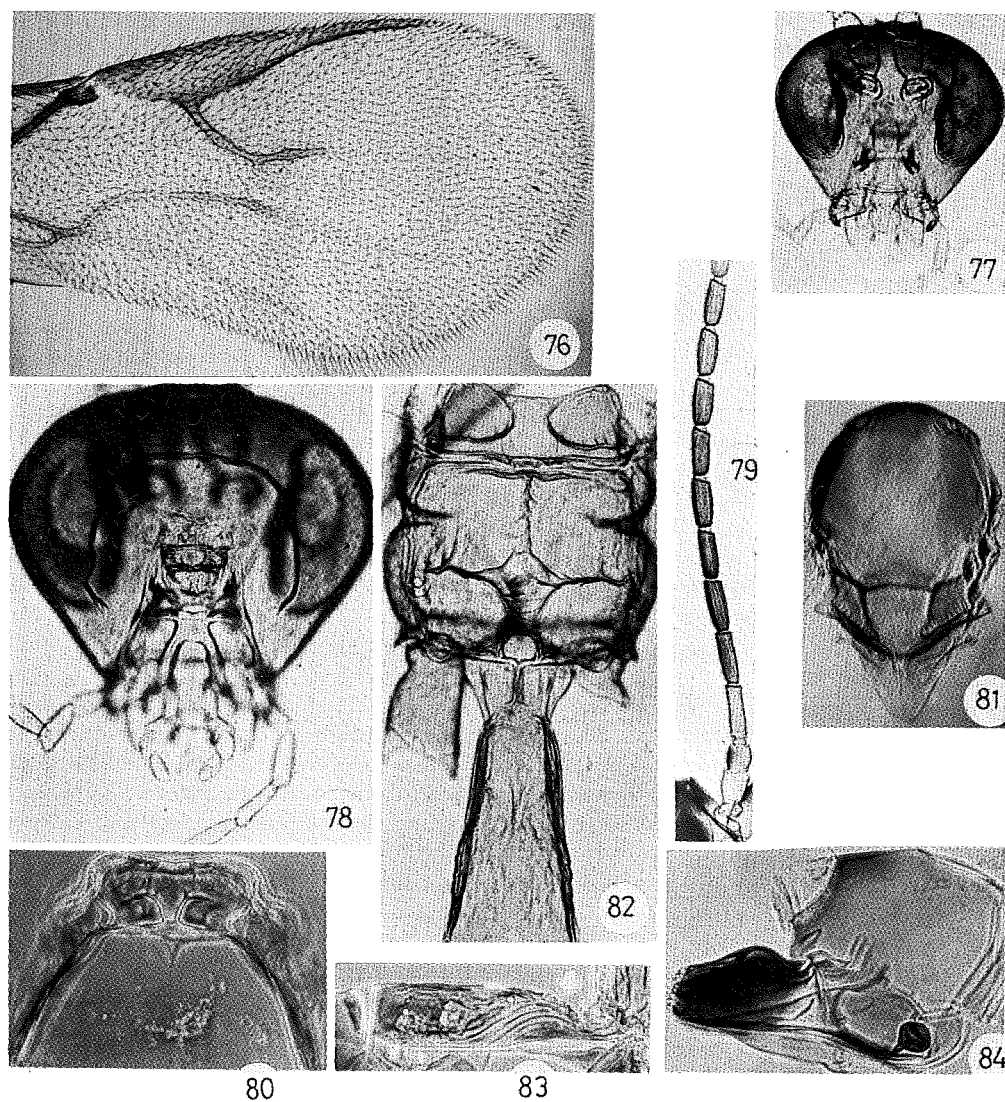
Female

Head: In dorsal view, transverse, slightly wider than thorax at tegulae, subquadrate, smooth, shiny, with sparse short setae. Transverse eye diameter about $\frac{1}{6}$ greater than width of temple. Ocellar triangle right to acute. In anterior view (Fig. 77), eyes oval with sparse short setae, slightly convergent toward clypeus, about 3.5 times width of gena. Clypeus with about 10 long setae. Maxillary palpi 4-segmented, labial palpi 3-segmented (Fig. 78); ligula with 8 apical, short, dagger-like setae and 2 long subapical setae extending beyond those of apex, each with 3 shorter accessory setae. Tentorial index 0.4–0.5. Occipital carina (Fig. 78) inversely U-shaped, slightly raised, ventral apices slightly convergent. Antenna (Fig. 79) 14–15 flagellar segments (rarely 13): F1 subequal to F2 about 3.5 times longer than wide; apical segment slightly longer than preapical segment.

Thorax: Pronotum (Fig. 80) short anteriorly, with about 6 long setae scattered on each side, posteriorly impressed. Mesoscutum (Fig. 81) more or less smooth, notaulices moderately deep, crenulate, on ascending aspect only, wide rows of scattered, moderate-length setae follow along paths of erased notaulices dorsally. Forewing (Fig. 76): Pterostigma elongate, about 4 times longer than width of metacarp; first radial abscissa slightly arched, about 1.5 times longer than width of pterostigma, slightly longer than second abscissa; second intermedian vein anteriorly colored and distinct, colorless centrally till point of merger with median vein.

Abdomen: Propodeum (Fig. 82) with heavy and distinct carinae, central areola relatively wide, anterior areolae with about 5–7 long setae; posterior areolae with about 2 long setae. Petiole (Fig. 82) about 3 times longer than wide at spiracles; dorsum raised and rounded anteriorly, slightly impressed anterad and posterad of spiracles which are situated slightly before middle of segment; posteriorly rounded, irregularly rugose anteriorly with a short central keel posterad of the spiracles, apically rough with about 15 long setae, anterolaterally with about 6 costae (Fig. 83). Gaster lanceolate. Ovipositor sheaths (Fig. 84) of moderate length, ventrum almost straight, dorsum slightly convex; ovipositor straight.

Coloration: Predominantly brown. Head dark brown, face, gena and mouthparts light brown to yellow. Eyes black. Antenna: Scape, ventrum of pedicel and F1 light brown to yellow; dorsum of pedicel and remainder of funicle dark brown. Pronotum, mesoscutum (except for darker lateral



Figs. 76–84. *Aphidius magdae* n. sp. ♀. 76. Forewing. 77. Head, anterior view. 78. Head, posterior view; maxillary and mandibular palpi. 79. Antenna. 80. Pronotum. 81. Mesoscutum. 82. Propodeum and petiole. 83. Petiole, lateral view. 84. Ovipositor mechanism.

lobes), propodeum and petiole light brown. Middle segments of gaster brownish, posterior segments lighter, ovipositor sheaths black. Legs more or less evenly light brown, except for darker tarsi.

Length: 2–2.6 mm.

Male

Similar to female, with following notable differences: Antenna 16–17 flagellar segments; coloration slightly darker. Length 1.8–2.2 mm.

Mummy: Pale beige. Emergence hole at dorsum, slightly off-center, usually including one siphunculus on lid.

HOST RECORDS: From *Brachycaudus amygdalinus* (Schouteden) on *Amygdalus communis* (Rehovot, 4/76); from *Hyalopterus pruni* (Geoffroy) on *Phragmites australis* (Abu Ghosh, 7/76; Hammat Gader, 4/75; En Yahav, 3/75; Kefar Bilu, 8/76), and on *Amygdalus communis* (Giv'at Olga, 5/77; Merkaz Shapira, 4/74) and from *Melanaphis donacis* (Passerini) on *Arundo donax* (Bet Dagan, 2/77).

NOTES: *Aphidius magdae* belongs to the group of *Aphidius* species distinguished by costate ridges on the anterolateral aspect of the petiole. It is closely related to *A. colemani* Viereck and *Aphidius transcaspicus* Telenga. It can easily be separated from the former by its greater number of antennal flagellar segments (14–15), the entirely yellow-colored F1, the generally lighter body coloration and the usually 3-segmented labial palpi, from the latter mainly by the entirely yellow F1.

It seems most probable that this is the species recorded by Bodenheimer and Swirski (1957) under the name *A. sonchi*. Whereas according to older criteria this species would run to *A. sonchi*, the costate markings on the petiole remove it to a different species group.

The holotype specimen, No.696 (♀, slide-mounted in balsam) and paratypes (16♀, 10♂ mounted in balsam and numerous dry specimens) are in the aphidiid collection of the Hebrew University of Jerusalem, Faculty of Agriculture, Rehovot.

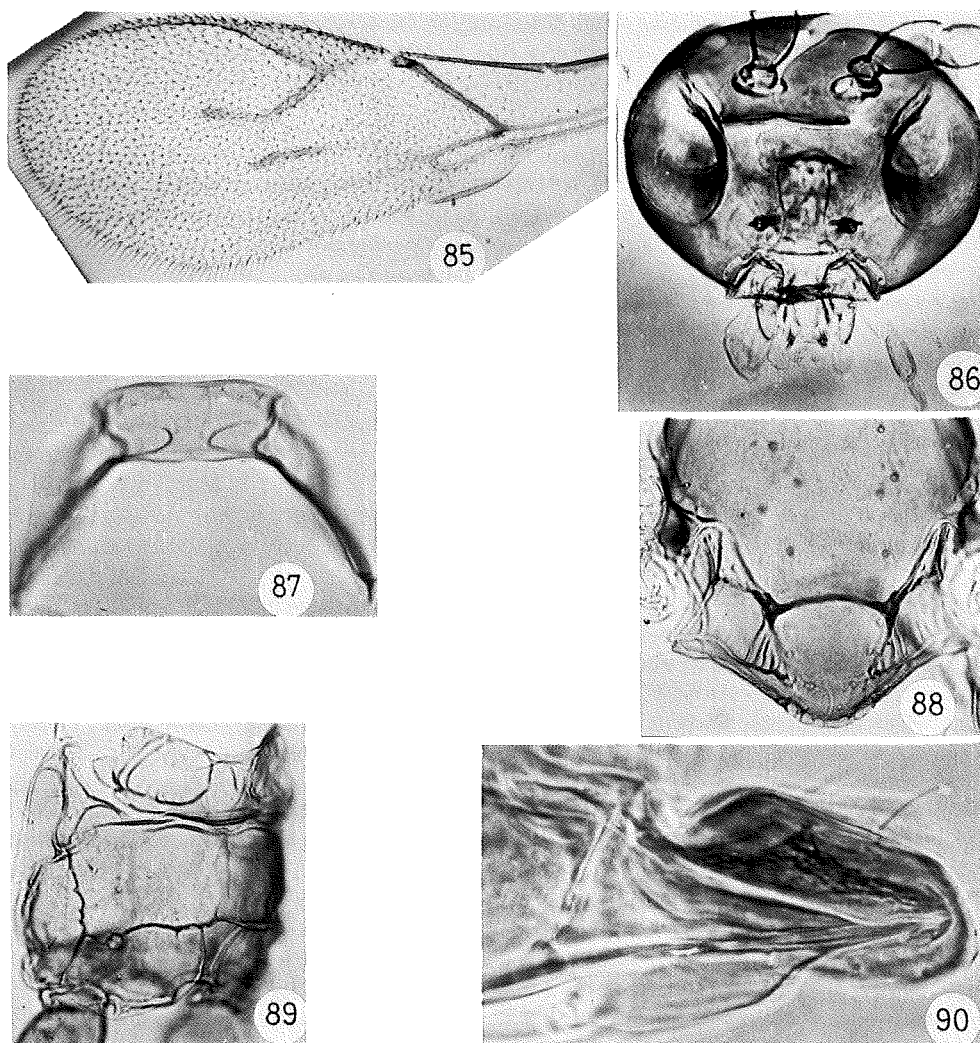
Aphidius myzocallidis Mescheloff and Rosen n. sp. (Figs. 85–90)

Female

Head: In dorsal view, transverse, wider than thorax at tegulae, smooth, shiny, with sparse short setae. Transverse eye diameter about equal to width of temple. Ocellar triangle right-angled. In anterior view (Fig. 86), eyes oval, strongly convergent toward clypeus, vertical diameter about 4 times wider than genae. Clypeus rounded with about 6 scattered long setae. Labrum bluntly triangular with about 8 long setae near periphery; maxillary palpi 3-segmented, labial palpi 2-segmented; ligula with 6 short dagger-like apical setae and 2 long preapical setae, each with one shorter accessory seta. Tentorial index about 0.5. Face with sparsely scattered long setae, slightly denser near orbits; center-line of face hairless. Occiput margined by a raised, almost circular carina. Antenna 12–13 flagellar segments; F1 about equal to F2, about 3 times longer than wide.

Thorax: Prothorax (Fig. 87) short. Mesoscutum gibbous; notaulices shallow, distinct on ascendent parts of mesoscutum only, continued dorsally by rows of irregularly spaced, sparse, medium length setae (Fig. 88). Forewing (Fig. 85): Pterostigma 4.5 times longer than wide; metacarp subequal to pterostigma; radial vein distinctly arcuate, first and second abscissae about equally long, combined length shorter than that of pterostigma; fused intermedian–median vein colorless beneath proximal half of pterostigma.

Abdomen: Propodeum (Fig. 89) carinated with narrow central areola; anterior areolae with 3 long laterally-situated setae, posterior areolae with 2 long setae. Petiole about 3 times longer than



Figs. 85–90. *Aphidius myzocallidis* n. sp. ♀. 85. Forewing. 86. Head, anterior view. 87. Pronotum. 88. Mesoscutum. 89. Propodeum, oblique view. 90. Ovipositor mechanism.

width at spiracles; almost parallel-sided, slightly wider apically; dorsum irregularly rugose on anterior $\frac{2}{3}$, posterior $\frac{1}{3}$ becoming more or less smooth centrally and slightly wavy laterally; anterolaterally with about 8 costulae beneath the spiracles. Gaster lanceolate. Ovipositor sheaths (Fig. 90) short, apically blunt, with 3 long setae on ventral surface. Ovipositor straight.

Coloration: Head and eyes black. Antennal scape and pedicel ventrally yellow, dorsally brown; F1 basally yellow becoming brown about midway to apex; remainder of flagellum brown; prothorax brown; mesoscutum dark brown; thorax brown laterally, as propodeum. Forewing whitish-hyaline, venation greyish brown. Petiole light brown; gaster brown. Ovipositor sheaths dark brown to black. Legs: Coxae, trochanters and femora yellowish, tibiae and tarsi darker.

Male Unknown.

HOST RECORDS: From *Myzocallis glandulosus* Hille Ris Lambers on *Quercus* sp. (Merkaz Shapira, 4-5/82).

The holotype specimen, (No. 1138, ♀, mounted on card point) and a paratype (♀, slide-mounted in balsam) are in the aphidiid collection of the Hebrew University of Jerusalem, Faculty of Agriculture, Rehovot.

Genus *Diaeretiella* Starý 1960

Diaeretiella Starý, 1960, Cas. Cesk. Spol., Entomol. 57: 242-243.

Head: Transverse, as wide as or wider than thorax at tegulae, with sparsely scattered, moderately long setae. Occiput strongly margined. Antenna filiform, with 10-16 flagellar segments. Maxillary palpi 3-4-segmented, labial palpi 2-segmented. **Thorax:** Pronotum short, mesonotum gibbous; notaulices distinct anterolaterally only. Forewing: Pterostigma triangular; metacarp longer than width of pterostigma; venation reduced; distad of basal cell, only arcuate radial vein distinctly present, not reaching wing apex. **Abdomen:** Propodeum areolated, central areola very narrow. Petiole elongate, laterally costulate, with dorsal carinae. Gaster lanceolate. Ovipositor sheaths short, apically blunt; ovipositor straight or slightly curved upwards.

The genus *Diaeretiella* was erected by Starý (1960), who showed that several poorly-related genera had been incorrectly grouped together in the genus *Diaeretus* Foerster. Though similar in wing venation, other important morphological traits differed greatly. Parasite-host relations provided further evidence that supported the division of *Diaeretus* into separate genera.

Diaeretiella is closely related to *Aphidius* Nees, and were it not for the gross differences in wing venation, would undoubtedly be included in the same genus. Starý (1961) placed 9 species as synonyms of *D. rapae* (M'intosh). Mackauer (1964a) accepted Starý's conclusions, adding two more species to the list. Since then, *Diaeretiella* has been generally accepted as a monotypic genus (Mackauer and Starý, 1967).

Diaeretiella rapae (M'intosh) 1855

(Figs. 91-97)

Aphidius rapae M'intosh, 1855, Book of the Garden. 2: 194.

?*Aphidius vulgaris* Bouché, 1834, Naturgesch. Ins. 1: 161-162.

Aphidius (*Trionyx*) *rapae* Curtis, 1860, Farm Ins. 73-74.

Misaphidius haliticae Rondani, 1877, Boll. Soc. Entomol. Italy. 9: 186.

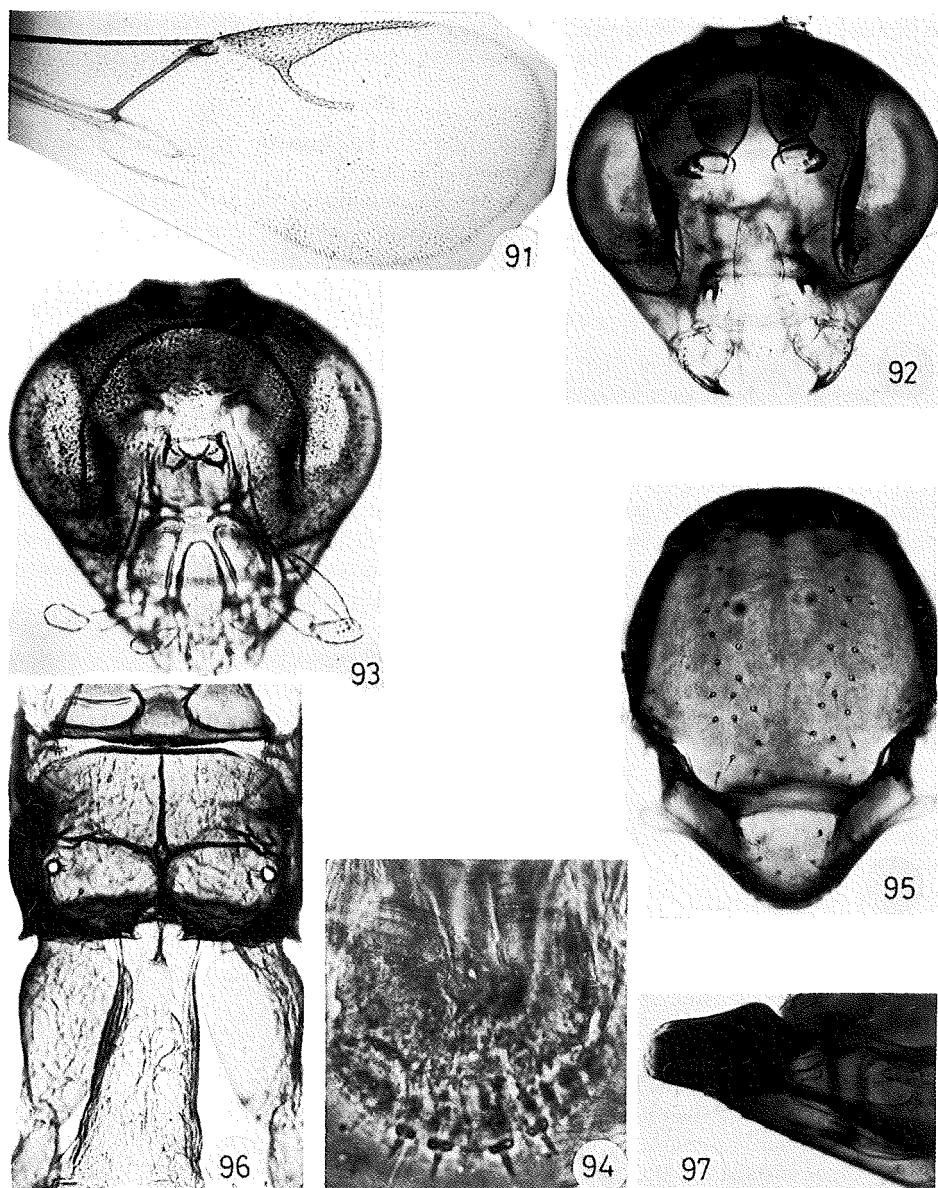
Trioxys piceus Cresson, 1880, in Rep. Commis. Agric. 1879: 260.

Lipolexis chenopodiaphidis Ashmead, 1889, Proc. U.S. Natn. Mus. 11: 671.

Aphidius brassicae Marshall, 1896, in E. André, Espèce Hyménoptères d'Europe et d'Algérie 5: 597-598.

Diaeretus californicus Baker, 1909, Pomona Coll. J. Entomol. 1: 25.

Lysiphlebus crawfordi Rohwer, 1909, Trans. Am. Entomol. Soc. 35: 135-136.



Figs. 91–97. *Diaeretiella rapae* (M'Intosh). ♀. 91. Forewing. 92. Head, anterior view. 93. Head, posterior view. 94. Ligula. 95. Mesoscutum. 96. Propodeum and petiole. 97. Ovipositor mechanism.

- Diaeretus nipponensis* Viereck, 1911, Proc. U.S. Natn. Mus. 40: 182.
Diaeretus (Aphidius) obsoletus Kurdjumov, 1913, Entomol. Obozr. 13: 25–26.
Diaeretus napus Quilis, 1931, Eos. 7: 71–72.
Diaeretus croaticus Quilis, 1934, Eos. 10: 8–9.
Diaeretus plesiorapae Blanchard, 1940, Rev. Chil. Hist. Nat. 44: 45–48.
Diaeretus aphidum Mukerjee & Chatterjee, 1950, Proc. 36. Ind. Sci. Congr. 3: 193.

Female

Head: In dorsal view, vertex and genae with moderately long, sparsely scattered setae. Compound eyes with isolated short hairs located at anterior corners of head, transverse eye diameter about equal to width of temple. Ocellar triangle right. In anterior view (Fig. 92), eyes oval, of moderate size, slightly convergent toward clypeus, vertical diameter 3–5 times width of gena. Short setae distributed over face. Tentorial index about 0.4. Clypeus with 13–30 long setae. Labrum with about 12 long setae; apex of ligula (Fig. 94) lined by a row of about 10 short dagger-like setae, the medial ones being longest, becoming shorter laterally; two long subapical setae near center-line of ligula extend beyond apical setae. Occiput (Fig. 93) delineated by a distinct inversely U-shaped carina. Antenna 11–13 flagellar segments; scape and pedicel short, oval; F1 somewhat shorter than F2, more or less straight, parallel-sided; remaining segments basally narrower, with linear sensoria.

Thorax: Pronotum short, not covered by mesoscutum, with about 4 short setae on each side. Mesoscutum (Fig. 95) gibbous; notaulices distinct anterolaterally, erased dorsally, their outline marked by 2–3 rows of setae that continue to the posterior part of the segment. Forewing (Fig. 91) with reduced venation: Pterostigma triangular, about 3 times longer than wide; metacarp about 0.6–0.7 times length of pterostigma.

Abdomen: Propodeum (Fig. 96) with distinct carinae dividing it into two anterior, two posterior and one very narrow, elongate central areolae; sometimes, the carinae forming the central areola so closely situated that they seem to be touching and the areola absent. Petiole (Fig. 96) elongate, 3.0–3.5 times longer than width at spiracles, narrowing somewhat initially, then gradually widening apically; spiracles almost even with surface and situated slightly anterad of middle of segment; anterad of spiracles, the dorsum is slightly rugose, near spiracles the rugosities merge to form a single central carina which disappears in the last quarter of the petiole; laterally, the segment is lined by 12–20 costulae. Ovipositor sheaths (Fig. 97) short, wide, with a strong dorsal proximal convexity. Apices of sheaths rounded, with several short setae; ovipositor straight.

Coloration: Somewhat variable. Eyes black; antenna black, except for yellowish bases of scape and pedicel; clypeus, mouthparts and petiole light brown. Gaster brown to dark brown. Ovipositor sheaths dark brown to black. Legs yellow to brown, middle of femora, tibiae and pretarsi generally darker.

Length: 1.8–2.9 mm.

Male

Similar to female, with following notable differences: Antenna 13–16 flagellar segments; F1 with linear sensoria; coloration darker. Length 1.4–2.0 mm.

Mummy: Straw-colored, emergence hole usually located slightly lateral to center of host's posterior dorsum so that only one siphunculus is included in it. Most often the adult wasp does not completely cut out its "exit-door", which closes after it emerges, giving the impression that the parasite is still inside its host.

HOST RECORDS: From *Aphis craccivora* Koch on *Asparagus stipularis* (Gedera, 5/76); from *Aspidaphis adjuvans* (Walker) on *Polygonum equisetiforme* (Mashmia Shalom, 5/74); from *Brachycaudus amygdalinus* (Schouteden) on *Polygonum equisetiforme* (Gannot Hadar, 3/77; Rehovot, 3/75), on *Prunus amygdalus* (Newe Ativ, 5/77); from *Brevicoryne brassicae* (L.) on

various cruciferous plants, wild and cultivated (Amirim, 3/77; Ahuzzam, 12/75; Banias, 2/79; En Yahav, 3/75; Gannot Hadar, 3/76; Hafez Hayyim, 5/76; Jericho, 2/75; Jerusalem, 12/75, 2/76; Lakhish, 4/74; Merkaz Shapira, 2/73, 1/75; Ra'ananna, 2/77; Rehovot, 3,5,6/74, 4/75, 2/76, 3/77; Sede Eliyahu, 3/77; Sha'alvim, 5/80; Shafir, 2/76; Tel haShomer, 4/77), from *Capitophorus inulae* (Passerini) on *Inula viscosa* (Nazareth, 4/75) from *Hayhurstia atriplicis* (L.) on *Sueda* sp. (En Zuqim, 2/76); and from *Myzus persicae* (Sulzer) on various cruciferous plants, wild and cultivated (Merkaz Shapira, 4/75; Ra'ananna, 11/75; Yavne'el, 2/74).

NOTES: *D. rapae* has long been known in Israel (Bodenheimer 1930. In addition to an erroneous record of this species as a parasite of the imported cabbage worm, it had three known aphid hosts (Mescheloff and Rosen, 1988). However, this is the first record of this parasite from its most common host, the cabbage aphid, *Brevicoryne brassicae* (L.).

During the winter and spring months this wasp is very common, particularly in colonies of the cabbage aphid. It is often difficult to find colonies of this aphid that are not heavily parasitized by *D. rapae*. Large numbers of mummified aphids, affixed along the extended racemes of numerous wild Cruciferae, are fairly common. However, they are equally well attacked on the undersides of leaves, even those resting on the ground.

In spite of the presence of this parasite, *B. brassicae* often develops large colonies. However, many authors are of the opinion that properly managed campaigns of augmentation could use *D. rapae* successfully to control several of its hosts (Biliotti and Sharma, 1965; Starý, 1966; Lyon, 1968; Simpson et al., 1975).

In Israel, *D. rapae* has been collected from November through June in most areas of the country, from the northern border (Newe Ativ, Banias) to the central Arava in the south (En Yahav), from the coastal plain (Ra'ananna), to the Jordan Valley (Jericho) and the Dead Sea (En Zuqim). Populations reach their peak from February through May. *Aphis craccivora* Koch is recorded as host for *D. rapae* for the first time in the Middle East. The records of *Aspidaphis adjvans* (Walker) and *Capitophorus inulae* (Passerini) as hosts of *D. rapae* are new world records.

Samples of field-collected material generally show females to be more numerous than males, composing 54–72% of the populations.

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