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ANTONIO PIETRO GARONNA
Department of Agricultural Entomology and Zoology,
University of Naples «Federico II», Portici, Italy

On the occurrence in Italy of *Aphytis acrenulatus* Rosen & DeBach (Hymenoptera: Aphelinidae) parasitic on *Rhizaspidiotus donacis* Leonardi (Homoptera: Diaspididae)

Aphytis acrenulatus Rosen & DeBach, described on specimens reared from *Aspidiella zingiberi* Mamet in Mauritius, is the only species of *Aphytis* Howard known to parasitize members of the subtribe Aspidiellina, tribe Targionini (*sensu* Borchsenius, 1965). This species is readily recognized since it lacks the propodeal crenulae, characteristic of all other *Aphytis* species. *A. acrenulatus* is regarded as associated with, but not a member, of the *proclia* group because of the absence of the typical cephalic pigmentation (Rosen & DeBach, 1979).

Recently, an interesting population of *Aphytis*, considered by the author as new, parasitic upon *Rhizaspidiotus donacis* Leonardi on *Arundo donax* L. and *A. phragmites* L., and differing from *A. acrenulatus* in some characters, was found in southern Italy. To confirm this status, some specimens were sent to Prof. David Rosen, The Hebrew University, Rehovot, Israel, who considered these as *A. acrenulatus* retaining the differences between the Italian and the African populations not valid enough to distinguish the former as a new species. In this paper these differences are briefly presented and biological aspects of the Italian population are reported.

MATERIALS AND METHODS

Regular sampling of the scale insect *R. donacis* was carried out in one locality of Campania (Capua) during 1991-1992. Other samples were collected occasionally in localities of southern Italy. In laboratory the scales were examined with a binocular microscope to point out number of host and parasitoid generations, degree of parasitization, morphology of larvae and pupae of the parasitoid and its sex ratio.

About 100 specimens of *A. acrenulatus* were mounted on slides: most of these in Canada balsam-phenol saturated alcohol (1:1); 20 females and 5 males were mounted in Hoyer's medium.

Other specimens were prepared for observations and photomicrographs under scanning electron microscope (S.E.M.).
Additional material of the numerous samples is preserved both dried and in alcohol (70%).

OBSERVATIONS

Aphytis acrenulatus Rosen & DeBach

Aphytis acrenulatus Rosen & DeBach, 1976. Ann. Entomol. Soc. Amer. *69*: 543.
Aphytis acrenulatus Rosen & DeBach, 1979. In: Species of *Aphytis* of the World. Dr. W. Junk, Series Entomologica *17*: 419.

A. acrenulatus is a peculiar species of the genus *Aphytis*. In addition to the absence of the propodeal crenulae (Fig. I, 5-7), this species has a stout antenna (Fig. I, 1), broadly joined pronotal plates, narrow wings, syntergum with elongate cauda (Fig. I, 8), a relative long ovipositor and male genitalia (Fig. II, 5), specialized sensilla on male antennal scape (Fig. II, 1-4).

These may be taxonomic characters to discriminate a group of species, if additional related species are discovered.

The Italian samples of *A. acrenulatus* differ from typical material in some characters; these differences are noticeable and summarized herein.

A. acrenulatus Rosen & DeBach	*A. acrenulatus* (Italian form)
1. Coloration of living adults unknown or overlooked.	Coloration of living female dark yellow, ochraceous with male uniformly light yellow.
2. Cleared specimens with uniformly greyish coloration, the male considerably darker as the female.	Cleared specimens gain a greyish shade with the male much paler as the female.
3. Antennal scape of the female 4-4.5 times as long as wide and about as long as the club.	Antennal scape of the female more expanded, 3.6-4 times as long as wide and a little longer than the club (Fig. I, 1).
4. Scutellum nearly as long as the mesoscutum; propodeum about 4-4.5 times as long as the metanotum.	Scutellum 3/4 to over 4/5 the median length of mesoscutum and propodeum usually 3-3.5 times as long as metanotum (Fig. I, 2-5).
5. Mesoscutum with 9-14 setae, usually 10-11.	Mesoscutum with 3-9 setae, usually 5-6 (Fig. I, 2-3).
6. Size range of known specimens: females: 0.86-1.25 mm (n=23) males: 0.62-0.74 mm (n=4).	Size range of measured specimens: females: 0.62-1.36 mm (n=68) males: 0.44-0.90 mm (n=21).
7. Spiculae on posterior abdominal sternites of the males unnoticed.	Spiculae on posterior abdominal sternites of the males visible under ×200 magnification (Fig. II, 6).

Comment. The general coloration observed in living specimens of the Italian form is rather constant and distinctly different between the sexes. While clea-

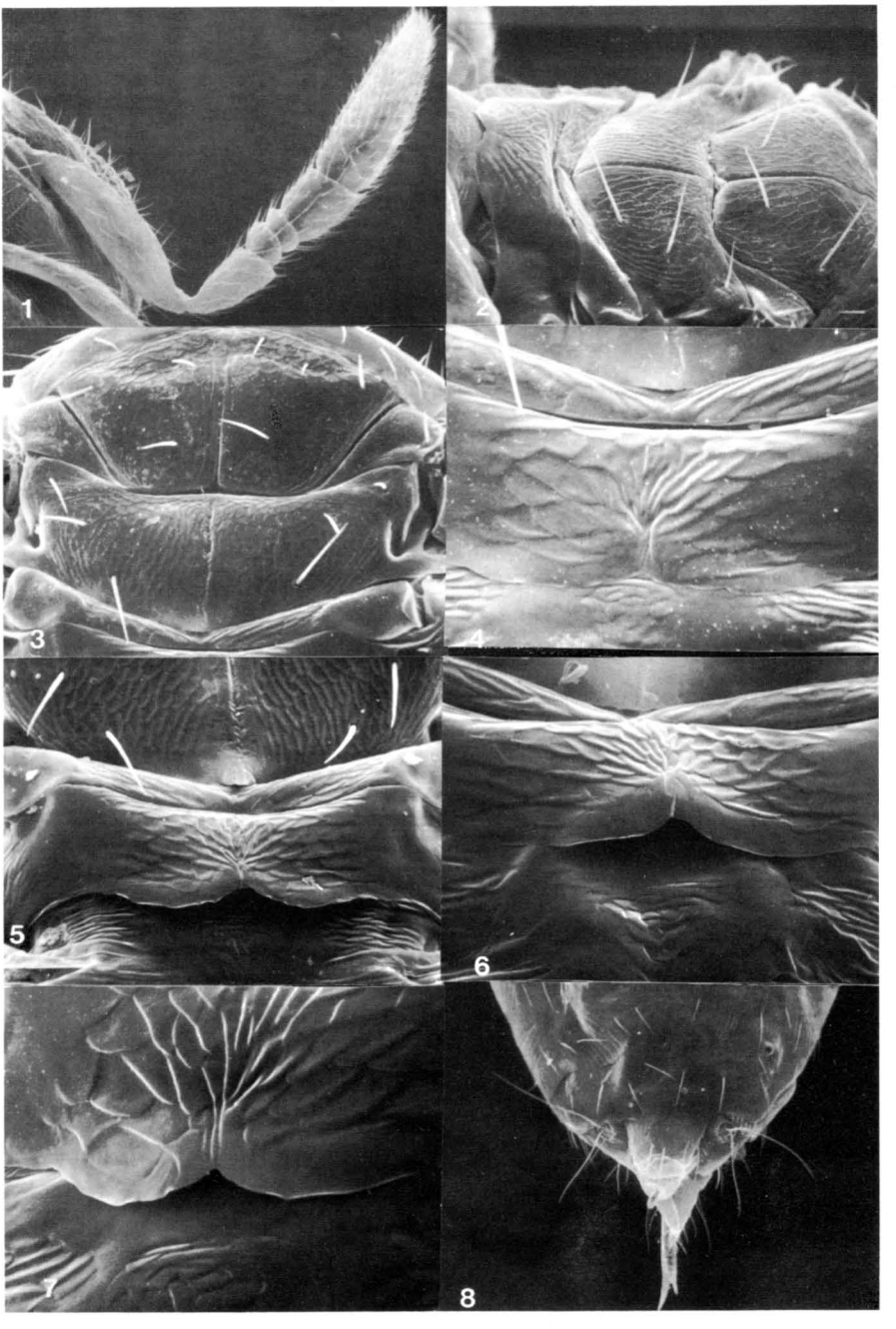

Fig. I - *Aphytis acrenulatus* Rosen & DeBach. - Female. 1. Antenna (SEM × 230). 2. Thorax, propodeum and base of gaster (SEM × 250). 3. Mesonotum and metanotum (SEM × 270). 4. Metanotum and propodeum (SEM × 700). 5. Posterior margin of propodeum with notched wavy ledge (SEM × 340). 6-7. Variations of the same structure in other specimens (SEM × 600; × 870). 8. Apex of abdomen, dorsal view (SEM × 40).

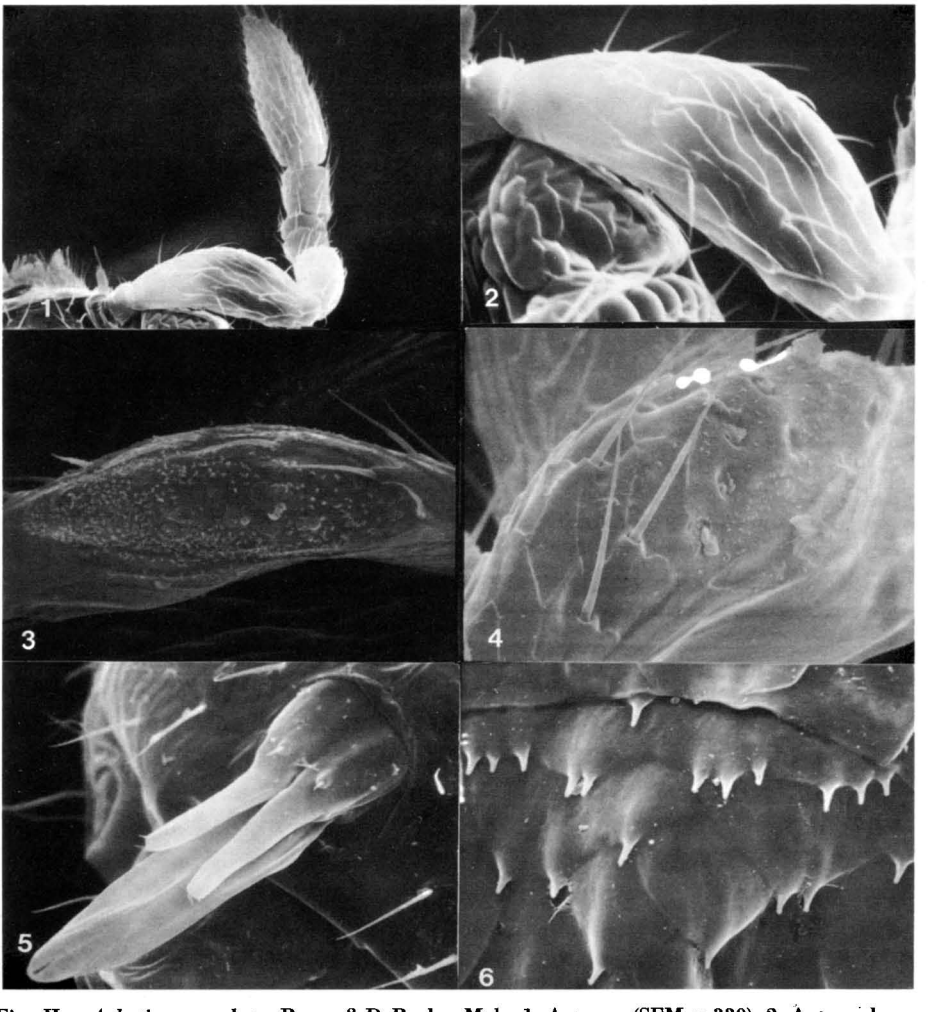

Fig. II - *Aphytis acrenulatus* Rosen & DeBach. - Male. 1. Antenna (SEM × 330). 2. Antennal scape, internal view (SEM × 800). 3. Antennal scape, antero-ventral surface (SEM × 1000). 4. Antennal scape, showing sensorial area (SEM × 1800). 5. Genitalia (SEM × 1000). 6. Spiculae on posterior abdominal sternites (SEM × 2000).

red females are greyish, like several species of the *proclia* group, corresponding with tipical *A. acrenulatus* in the pigmentation of the body and appendages, cleared males don't show at all the strongly infuscated pigmentation of the African form reported by Rosen & DeBach (1979).

In *Aphytis*, characters as the proportion of the antennal segments and the number of setae on the body are considered variable with the size of the speci-

mens and may be unreliable from a taxonomic point of view (ROSEN & DEBACH, 1979). In this case, the differences between the two forms are observed on specimens whose size range overlaps completely and, in spite of that, a real difference remains.

Moreover, the spiculae (the minute stout spines on the margins of the sternal reticulae) on posterior abdominal segments of the male are unnoticed in species of the *proclia* group, nevertheless these are visible in Italian specimens of *A. acrenulatus* (the spiculae in the genus *Aphytis* are often present in males of the *lignanensis* and *funicularis* group).

Finally, it appears clear that additional data on the two forms of *A. acrenulatus* (host preferences, geographical distribution and biological behaviour) may give the possibility to resolve if the Italian form may be a bona species or not.

Note. Because of the great number of individuals which may develop on a single host, in some cases, few very small anomalous individuals of *A. acrenulatus* were observed.

In 2 males, some antennal and forewing structures are abnormally reduced. Funicular segment I and II of 1 antenna in 1 specimen are fused (Fig. III, 1); funicular segment III is not completely divided from club on both antennae in another specimen (Fig. III, 2). Both these males show the forewing with a sparse or incomplete marginal fringe which is rather long, about 2/3 of disk width, the delta with 10-12 setae only (Fig. III, 3), tarsal segment IV and V partially fused.

Biology. According to biological observations, *A. acrenulatus* is a gregarious and multivoltine species with at least 3-4 generations per year. The adults emerge from end of March – beginning April until the mid of May, in June – beginning of July and from mid September until the end of October. It overwinters mostly in the last larval stage from November until beginning March.

In most cases 5 larvae or pupae, rarely more (6-8), were found on a single host, and usually all of them developed into adults. The mature female pupa (Fig. III, 4) is uniformly dark yellow, with infuscated head and thorax while the gaster is paler. The apex of antennal, forewing and leg cases are distinctly darker. The male pupa is immaculate.

Since the host *R. donacis* lives under leaf sheaths and forms colonies near leaf buds, emergence of the parasites from the host is effected through a very large round hole (or two narrower holes) both in the thick scale cover and in the leaf sheath. Emergence of adults developing on the same host is synchronized. Ovipositing females too may parasitize hosts through leaf sheats. The oviposition sequence is typical of the species of *Aphytis* although it lasts 7-25 minutes. First and second instar nymphs of *R. donacis* are not parasitized, probably because of their small size. The preferred host stage is the mature female present in the field from August until June (in late spring as ovipositing

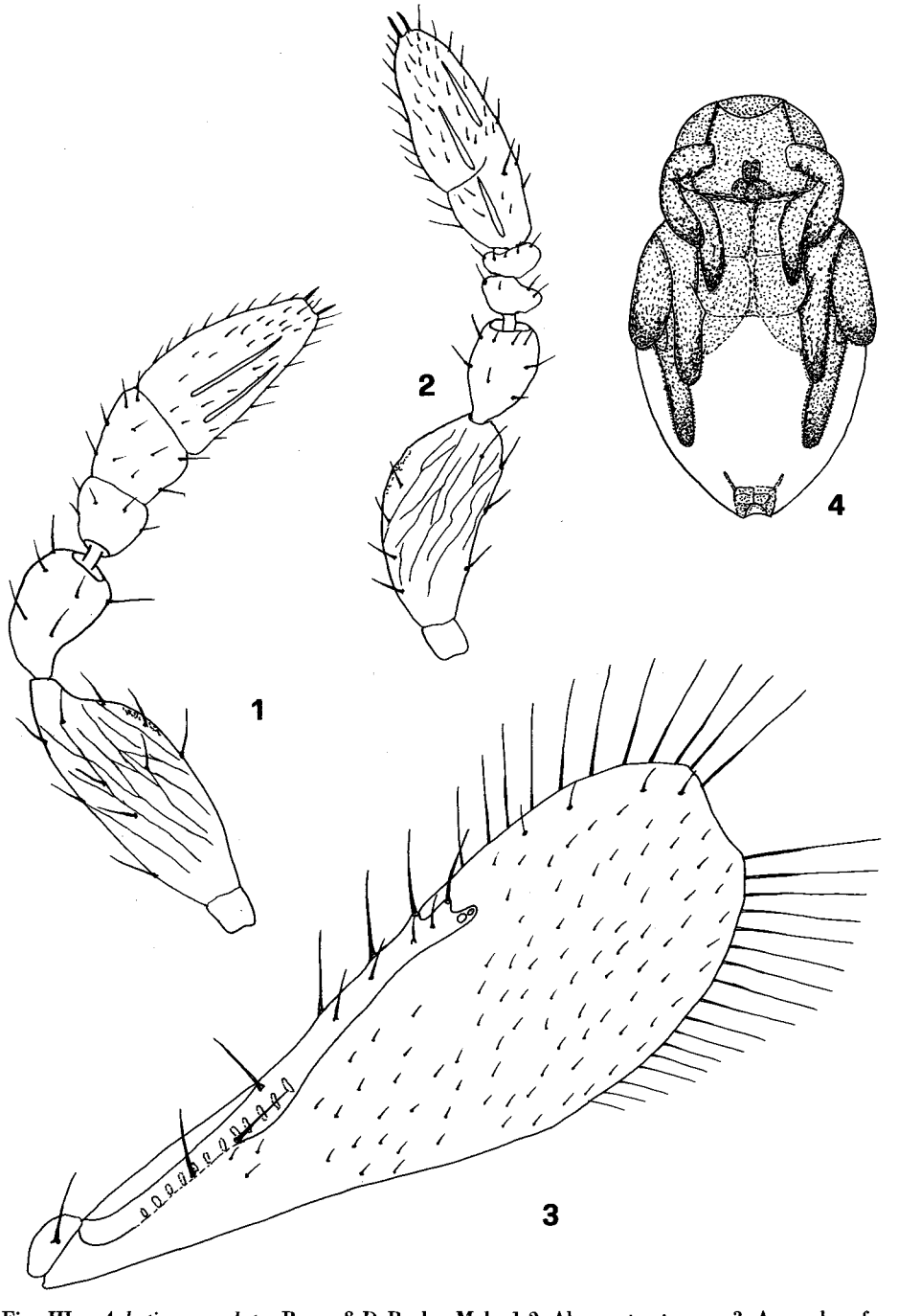

Fig. III - *Aphytis acrenulatus* Rosen & DeBach. - Male. 1-2. Aberrant antennae. 3. Anomalous forewing. - Female. 4. Mature pupa.

female). The scale host has only 1 generation per year, starting in the first half of May.

A. acrenulatus females usually are more than 75% of the observed parasite population with sex ratio near 4:1. This character is very easy to evaluate in the mature pupal stage since the pigmentation is quite different (see above). The rate of parasitization attained by this species was on average 35-40%, with peaks of more than 60% on the adult female host population in early spring. During summer, the activity of *A. acrenulatus* falls because of lack of suitable host stages while in September-October the parasite population again reaches higher levels.

CONCLUSIONS

A. acrenulatus is the first parasitoid reared from *R. donacis*; this armored scale is broadly present in the Mediterranean Area on *Arundineae*. The parasitoid was considered as a possible Oriental or Etiopian element, in relation to the distribution of its previous known scale insect host (Rosen & DeBach, 1979). In the light of the new data, *A. acrenulatus* seems to be a more widespread species, present in different forms in more biogeographic realms.

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SUMMARY

Aphytis acrenulatus Rosen & DeBach (Hymenoptera: Aphelinidae), parasitic on *Rhizaspidiotus donacis* Leonardi (Homoptera: Diaspididae) in southern Italy, is recorded. Differences between Italian specimens and the typical African ones are illustrated. Moreover, biological information on the species in Italy is given.

RIASSUNTO

Aphytis acrenulatus Rosen & DeBach (Hymenoptera: Aphelinidae), parassitoide di *Rhizaspidiotus donacis* Leonardi (Homoptera: Diaspididae) è stato ritrovato nell'Italia meridionale. Sono evidenziate alcune differenze tra il materiale italiano e quello africano tipico. Inoltre, vengono fornite alcune informazioni biologiche riguardanti la specie in Italia.

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