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Species of genus *Eurytoma* (Hym. Chalcidoidea) in Mediterranean olive grove

Abstract - In the Mediterranean area olive grove ecosystems host, other species of *Eurytoma* which colonise plants such as *Rosa* spp. (*E. rosae* L.), *Quercus* spp. (*E. brunniventris* Ratz.) and *Inula viscosa* (*E. inulae* n. sp.) besides *Eurytoma martellii* Dom. parasitoid of *Bactrocera oleae* (Gill). Between them, three species can be hardly distinguished from a morphological point of view, when the host plant or the victim are unknown. The new species (*Eurytoma inulae*) parasitoid of *Myopites stylata* Aiton presents instead characteristics which make it easily distinguishable from the previous ones. In this work some features for identifying the mentioned species are reported.

Riassunto - Le specie del genere *Eurytoma* (Hym. Chalcidoidea) nell'oliveto mediterraneo.

Nel Bacino del Mediterraneo l'ecosistema oliveto ospita, oltre all'*Eurytoma martellii* Dom. parassitoide di *Bactrocera oleae* (Gill), altre specie di *Eurytoma* infestate a piante ospiti quali *Rosa* spp. (*E. rosae* L.), *Quercus* spp. (*E. brunniventris* Ratz.) ed *Inula viscosa* (*E. inulae* n. sp.). Le prime tre specie sono tra loro morfologicamente distinguibili con difficoltà ove non sia disponibile l'informazione relativa alla pianta ospite o alla vittima. La specie nuova (*Eurytoma inulae*) parassitoide di *Myopites stylata* Aiton presenta invece caratteristiche che ne consentono agevolmente la differenziazione dalle precedenti. Sono espressi elementi relativi al riconoscimento delle specie menzionate.

Key words: Olive grove, Mediterranean area, wild plants, *Eurytoma* species.

Entomologists have been studying *Eurytoma* for some centuries row since these Chalcidoidea are widespread and have economic importance as phytophagous or parasitoids. Very important in the equilibrium of agrarian and forest ecosystems, the *Eurytoma* spp., affords stimulating incentives to researchers when they observe the life history involved in complicated biocenosis or when dealing with significant morphological structures for distinguishing the species. The Authors, who have spent in much time studying Chalcidoidea, pointed out the extraordinary difficulty of distinguishing many species only on the basis of morphological characteristics without any etholo-

gical or ecological information. In *Eurytoma* the black colour (which absorbs the light), the umbilicate puncturation of head and thorax, some parts of the body which are similar or of uncertain variability, often make specific identification difficult (Bugbee, 1951; Rosen, 1956; Claridge, 1959; Askew, 1961; Erdős, 1969; Szelenyi, 1975; Graham, 1984; Zerova & Seragina, 1996).

To classify the hundreds of species, "groups", "aggregates", "subspecies" and "subgenera" were established relating to morphological structures of often unknown variability. Dawah (1988) separates some entities and synonymizes others using esterase electrophoresis in the *appendigaster* Dalm. "group". No wonder that entomological bibliography has a lot of citations of the genus without mentioning the specific name.

The research carried out by the authors in olive groves cultivated in the Mediterranean area extended knowledge about parasitoids of *Bactrocera oleae* (Gmelin). *Eurytoma martellii* Dom. was accurately studied, covering morphological, biological and genomic factors. Knowledge about egg conformation, preimaginal stages, parasitism was gained and the differences between species of the same genus were explained. Delanoue (1964), Delanoue & Arambourg (1969) showed the relationships with the host, Roberti & Monaco (1967) illustrated the specific morpho-biological characteristics and Fenili & Pegazzano (1971) examined the impact of insecticide treatments on olive fly parasitoids.

The distribution and importance of various parasitoids of *Bactrocera*, including *E. martellii*, are considered by Monaco (1972) in Apulia, Arambourg & Prolavorio (1974) in the maritime Alps by Del Rio & Cavalloro (1977) and by Del Rio (1978) in Sardinia, by Neuneschwander *et al.* (1983) in Crete and by El-Hemeidy *et al.* (2001) in Egypt ⁽¹⁾.

From all the works it clearly emerges that *Eurytoma martellii* follows the olive fly in its diffusion. The species, of genus *Eurytoma*, whether phytofagous, spermatophagous or entomophagous are highly specific in their choice of host plants. Delanoue and Arambourg (op.cit.) rear *Eurytoma martellii*, in the laboratory withdrawing the eggs laid on the natural host, and putting them on the larvae of another fruit-fly, *Myopites stylata* F. which colonises *Inula viscosa* Aiton. It is another species of *Eurytoma*, that can easily be identified from a morphological point of view, a parasitoid of *Myopites*.

Our colleague Belcari ⁽²⁾, who also studied the olive grove ecosystem, kindly sent to me specimens of *Eurytoma* obtained respectively from *Bactrocera oleae*, from *Diplolepis* sp. on *Rosa* spp. and from *Myopites stylata* F. on *Inula viscosa* Ait. present in the area of Asciano (Tuscany).

⁽¹⁾ The olive fly was recorded for the first time in California in 1998 and in 2002 Pickett *et al.* recorded two parasitoids "native" on it, *Pteromalus* sp. and *Eurytoma incerta* Full.. *E. incerta*, described by Fullaway in 1912, obtained by an unidentified gall of *Rosa* in California, was studied by Bugbee (1951) who couldn't trace the typical material; its description excludes affinities with the species present in the European olive grove.

⁽²⁾ I warmly thank Prof. Belcari for the accurate information referring the material he sent to me.

The result of the investigation that Belcari proposed to me shows that the olive grove, with the spontaneous vegetation which often surrounds it, can allow the development of at least four species of *Eurytoma*.

The species *martellii*, *rosae* L. and *brunniventris* Ratz. have many morphological affinities (figs. 2, 8) and present eggs which are structurally very different (Claridge & Askew; 1960; Roberti & Monaco, 1967). Well-known in all the Palearctic region are parasitoids of Cynipidae inhabitants of *Rosa* spp. galls (*rosae* L.) and of oak galls (*brunniventris* Ratz.). Information news about them is available in the literature, further information is presented here (Figs. 2, 6, 7, 8).

The species that seems new and that deserves a more accurate description is *Eurytoma* obtained from *Myopites stylata* F., probably referred to under the name *tristis* Mayr (recte *serratulae* Fabr.) by Fimiani & Digilio (1993).

The association of olive with *Inula viscosa* was recorded by Martelli (1910), Bua (1938), Silvestri (1940), Isaachides (1955, 1957), Ferron *et al.* (1961), etc.. The authors note an *Eurytoma* parasitoid of *Myopites stylata* F. throughout the Mediterranean area. Rivosecchi (1959) gives it the name *tristis* (according to the identification of Ferrière) and describes biology and preimaginal morphology. Rivosecchi sent specimens of *Eurytoma* to Claridge who, after a comparison with *serratulae* (F.) = *tristis* Mayr, misidentifies the specimens reared in Italy. Rivosecchi then reared this *Eurytoma* sp. on various species of *Myopites* (Rivosecchi, 1960) in the Marches, Abruzzo and Latium regions.

Like a lot of other species of the same genus, the new *Eurytoma* presents the head with the facial region having carinae irradiating from the adoral margin (Fig.1) to the inferior ocular line; the carinae are not always seen because of the head bristles, when the light is low, but a scanning electronic microscope shows them up well. This characteristic is recorded for various *Eurytoma* of Africa, such as *varicolor* Silv. obtained in Eritrea from the seed of fruits of *Olea chrysophylla*; *oleae* Silv. definitely developed on the seed of *Olea verrucosa* besides and on *O. chrysophylla*; *attiventris* Masi, also from Somalia; *caryedocida* Rasplus; *syleptae* Ferrière; *verbena* Ferrière; *orzyvora* Delv.; *crotalariae* Risbec; *apionidis* Risbec, and others from West Africa; as well as the common European species such as *robusta* Mayr, *compressa* F. (= *tibialis* Boh. = *curta* auctt. nec Walker), *serratulae* F. (= *tristis* Mayr), also parasitoids of Tephritidae (but distinguishable from the new species by other morphological features); analogously *nigrita* Boh., *strigifrons* Thoms., *aciculata* Ratz., *parvula* Thoms., *salicis* Walk. (= *salicis* Thoms. = *umeralis* Foerst.) and *saliciperdae* Mayr (= *afra* Ferrière) (Graham, 1970). Szeleny (1974) described *appetens* with such characteristics, Bouček (1970) *goidanichi*, and Graham (1984) *longicalcar*.

As once was the care for *Eurytoma martellii* this, parasitoid of *Myopites* also, remained unknown or incorrectly indicated. I prefer to name it even if the name may be a synonym, given the number of existing species, many of which from unknown plants or hosts.

Eurytoma inulae sp.n.

MATERIAL. Holotype 1♀, length mm 1,925, Asciano (Pisa), 8.II.1993, from *Myopites stylata* (leg. Belcari). Paratype 1♂, Asciano (Pisa), 7.III.1992, 1♀, 3.VII.1991; 1♀ 16.VIII.1993, same locality and same host.

Typical material deposited in the collection of the author in the Institute of Entomology, Università Cattolica del Sacro Cuore in Piacenza.

FEMALE. Body, antennae and legs brilliant black, with fore tibia and tarsus yellowish dorsally brownish black, second and hind tibia and tarsus yellow.

Antennae with short scape which doesn't reach fore ocellus; conical pedicel slightly longer than it is wide; a ring with a row of bristles as long as those of the pedicel; the first three articles of antenna about 1,3 times their width; fourth and fifth article as long as they are wide, bi-segmented club as long as the two articles which precede it.

Head, front view (Fig. 1), according to the proportional measures height 8, broad 11; eyes height 4,5, broad 1,5; distance of toruli from fore ocellus equal to that one from fore margin of clypeus; distance from the inferior margin of toruli to the clypeus margin, 3; toruli depth height 3, broad 2,3, bordered by rather protruding lateral carinae. Wide facial region, with carinae departing radially from the centre of clypeal margin to the median ocular line. Distance between eyes at the superior margin of the fore head 8,5; maximum width of head 11. Genalcarina present (*sensu* Claridge, 1959).

Maximum width of the prothorax 9, length (neck included) 4; length mesoscutum 4.

Roundish piliferous punctures regularly impressed on the top of the head and the thorax (Fig. 4). Scutellum particularly convex, with its hind third vertically protruding over metanotum and propodeum with which it forms a right angle. Metanotum and propodeum as in Fig. 4.

Forewings, at rest, extend to the end of abdomen; marginal, stigmal and postmarginal vein length according to the proportional ratio 4:6:7; marginal vein thick, twice as wide or more as the width of postmarginal vein (Fig. 6).

Legs: fore coxae with an ovoidal convex lamina (Fig. 1), on the anterior surface, concave at the back. Tibial spur of the second legs $\frac{3}{4}$ of the length of the first tarsomere; mid-coxa with the inferior proximal margin having a row of 7-8 long bristles and a little lamella.

Gaster a little compressed, narrower than the thorax, as long as head and thorax together, with apex of ovipositor placed along the longitudinal axis of the body or slightly upwards, with short petiole, broader than it is long. The fourth visible tergite of gaster (sixth morphological) covers most of the abdomen; it is more than twice as long as the previous tergite; the fifth visible tergite is dorsally shorter, about half of the following one (eighth morphological) (Fig. 8).

MALE. Length of the body mm 1,350. Brilliant black, black legs with yellow-hued fore and middle tibiae, yellowish at the top; yellow tarsi, the hind ones white, black apical tarsomeres.

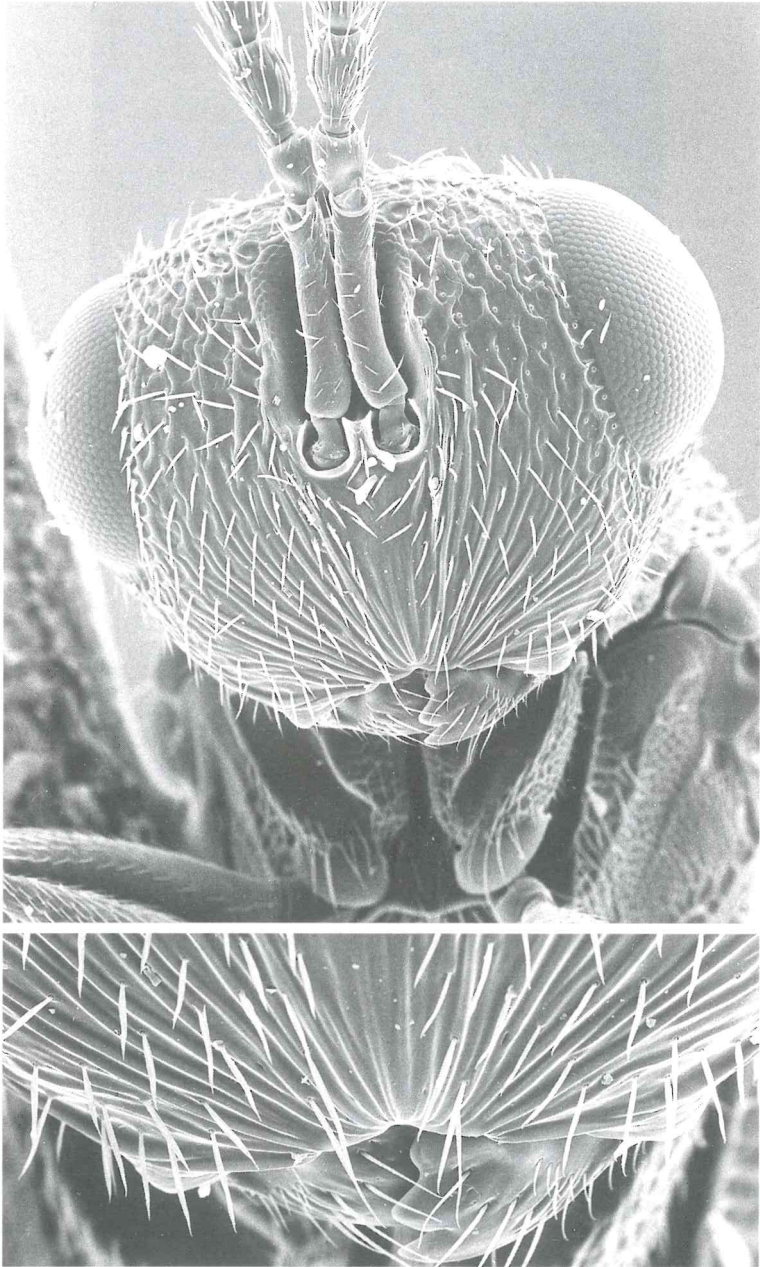


Fig. 1 - *Eurytoma inulae* n. sp., female: head, front view, with part of the mandibles, antennae and coxae front view (at the top); inferior part of the head, front view (at the bottom).

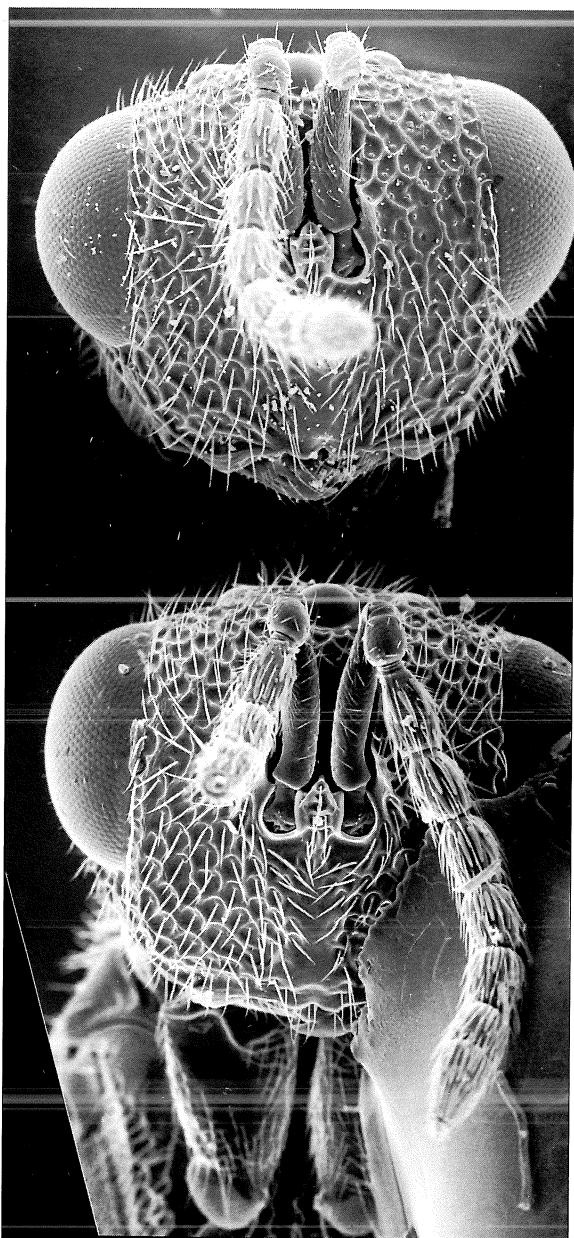


Fig. 2 - *Eurytoma rosae* Nees, female: head, front view, with antennal funiculus removed (at the top). *Eurytoma martellii* Dom. female: head, front view, with part of left antenna removed (at the bottom).

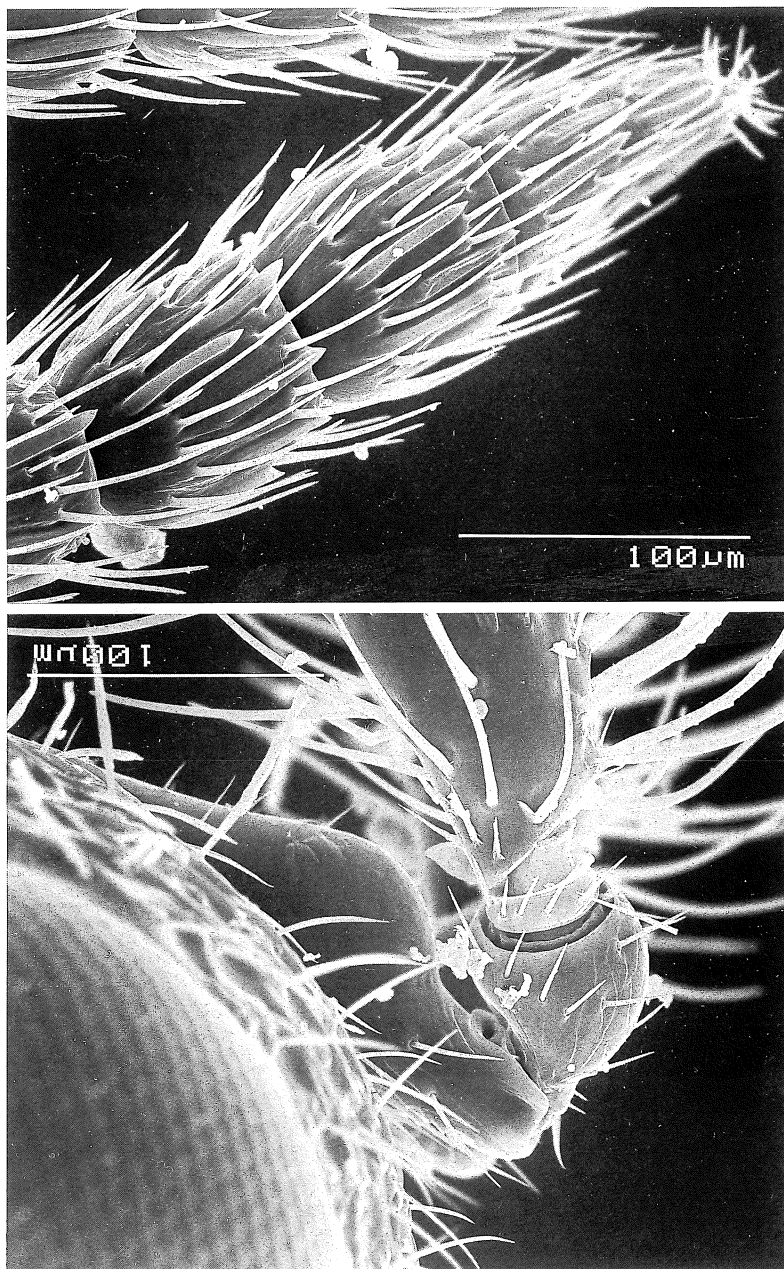


Fig. 3 - *Eurytoma inulae* n. sp., female: the last antennal article and club (at the top); scape, pedicel and part of the first antennal article of the male (at the bottom).

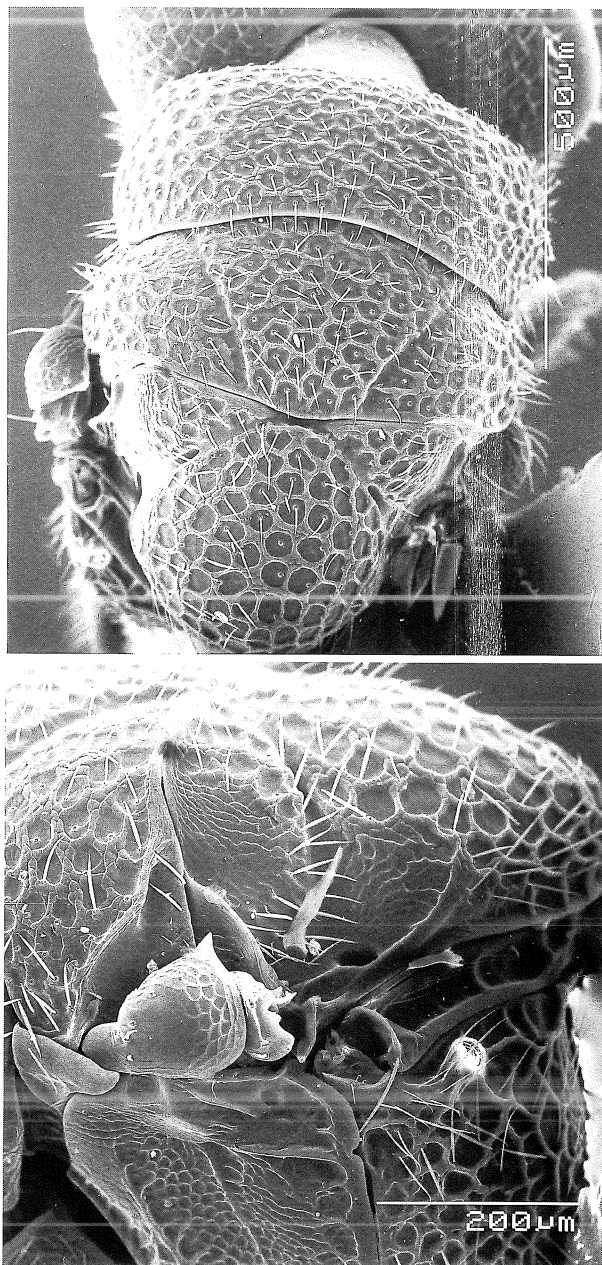


Fig. 4 - *Eurytoma inulae* n. sp., female: part of the head and of the thorax back viewed (at the top); male: mesothorax and propodeum seen in profile (at the bottom).

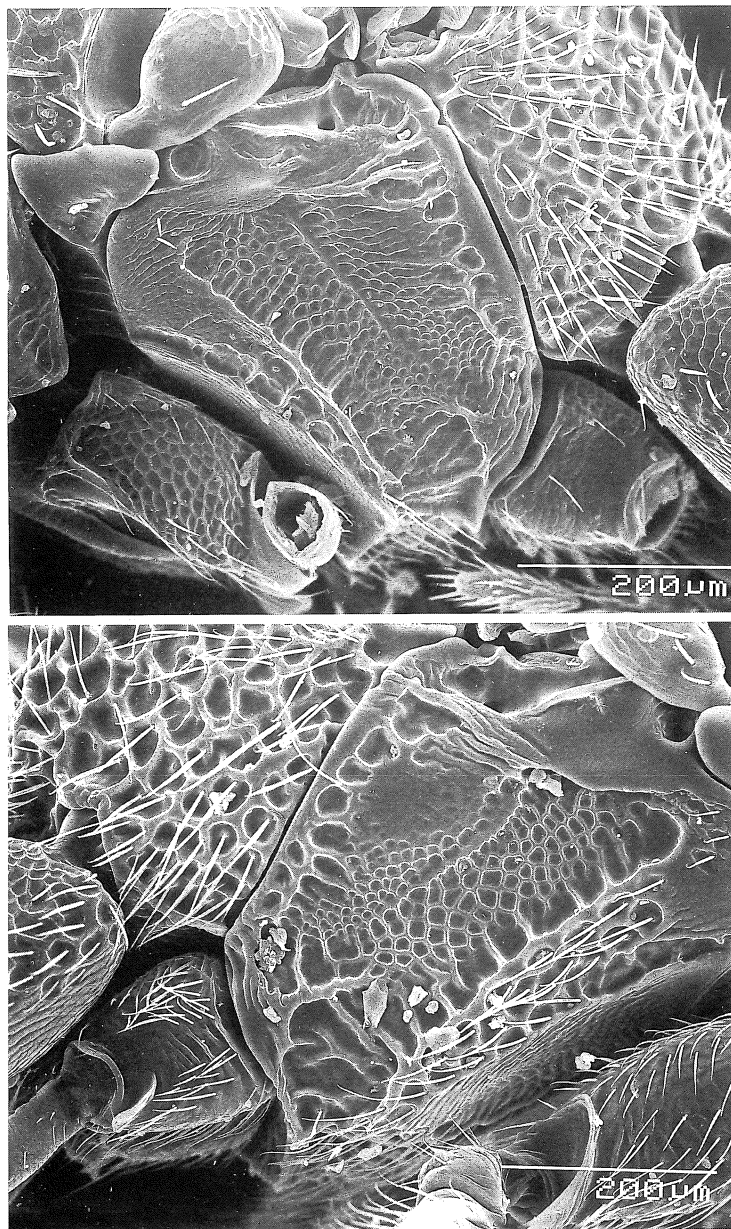


Fig. 5 - *Eurytoma inulae* n. sp., male: mesopleura and part of the propodeum side viewed anterior-posterior, with part of coxae (at the top). *Eurytoma martellii* Dom., male: as previously but viewed posterior-anteriorly.

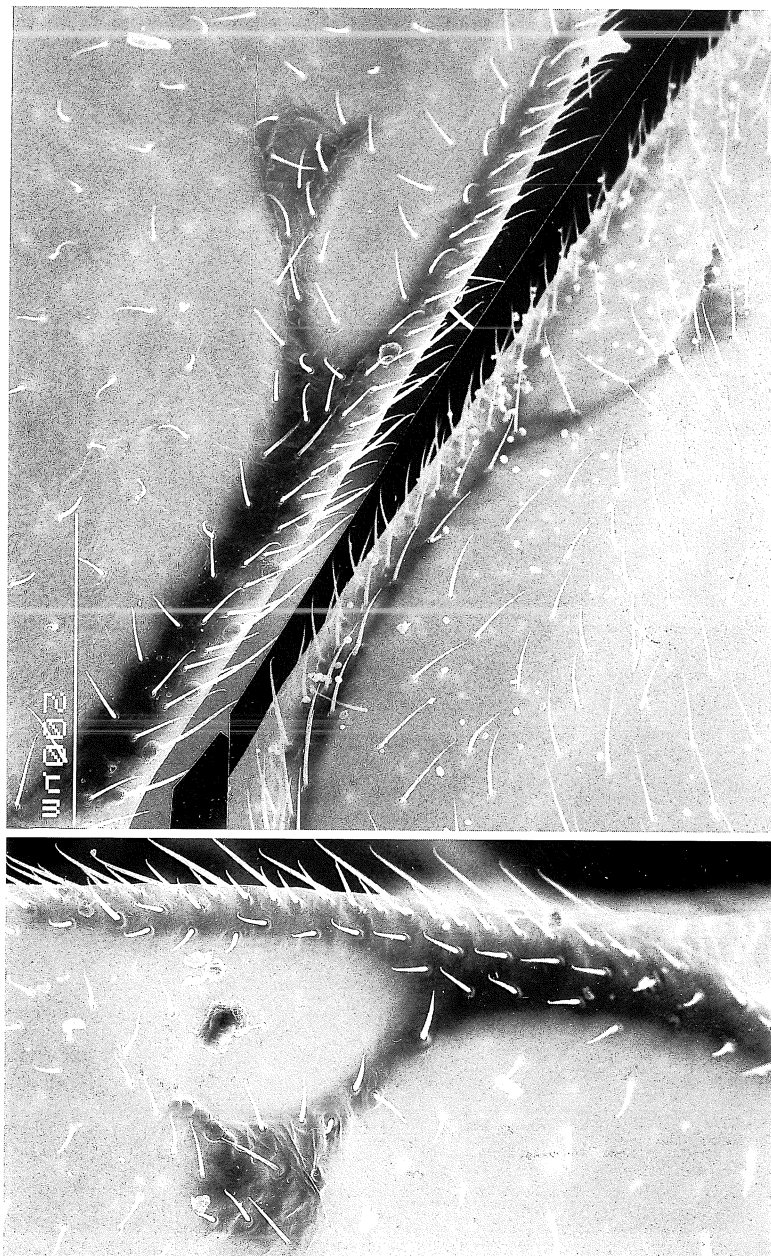


Fig. 6 - Wing vein marginal, postmarginal and stigmal of *Eurytoma martellii* Dom. (at the top on the left), *Eurytoma rosae* Nees (at the top on the right), *Eurytoma inulae* n. sp. (at the bottom).

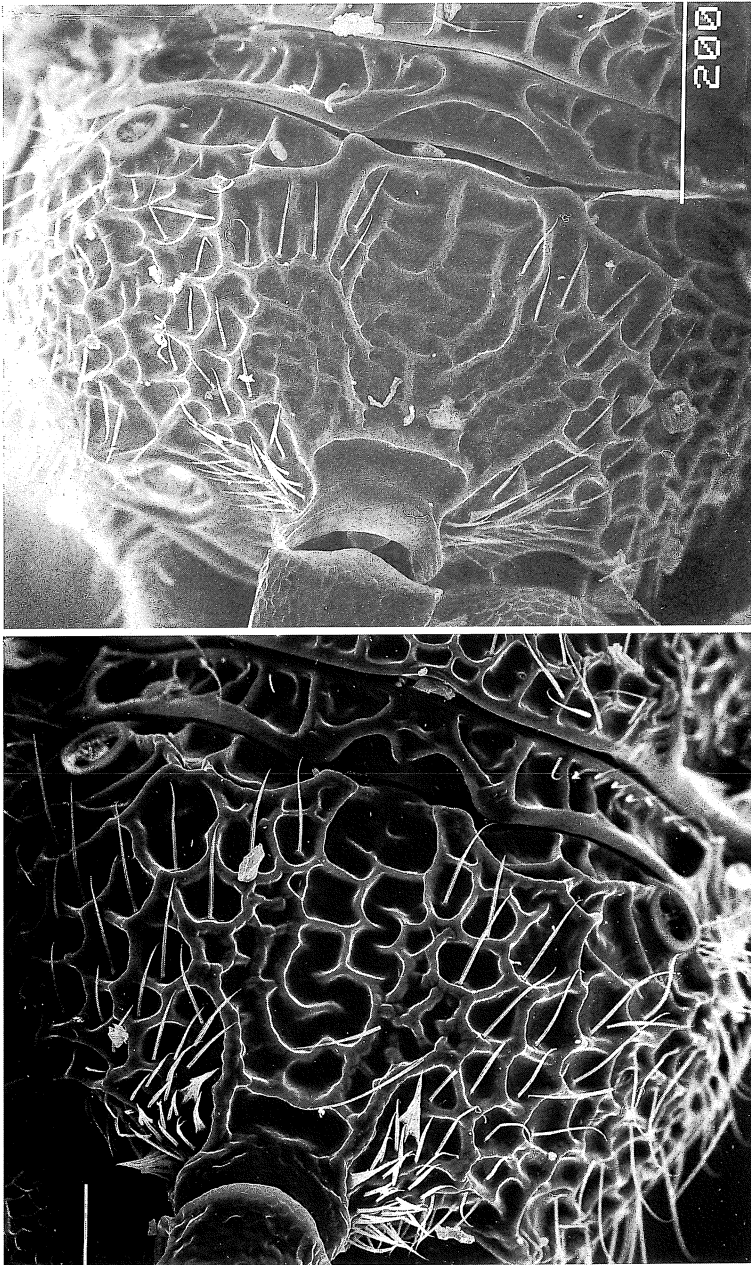


Fig. 7 - *Eurytoma inulae* n. sp., male: metanotum and propodeum back viewed (at the top).
Eurytoma martellii Dom., male: as above (at the bottom).

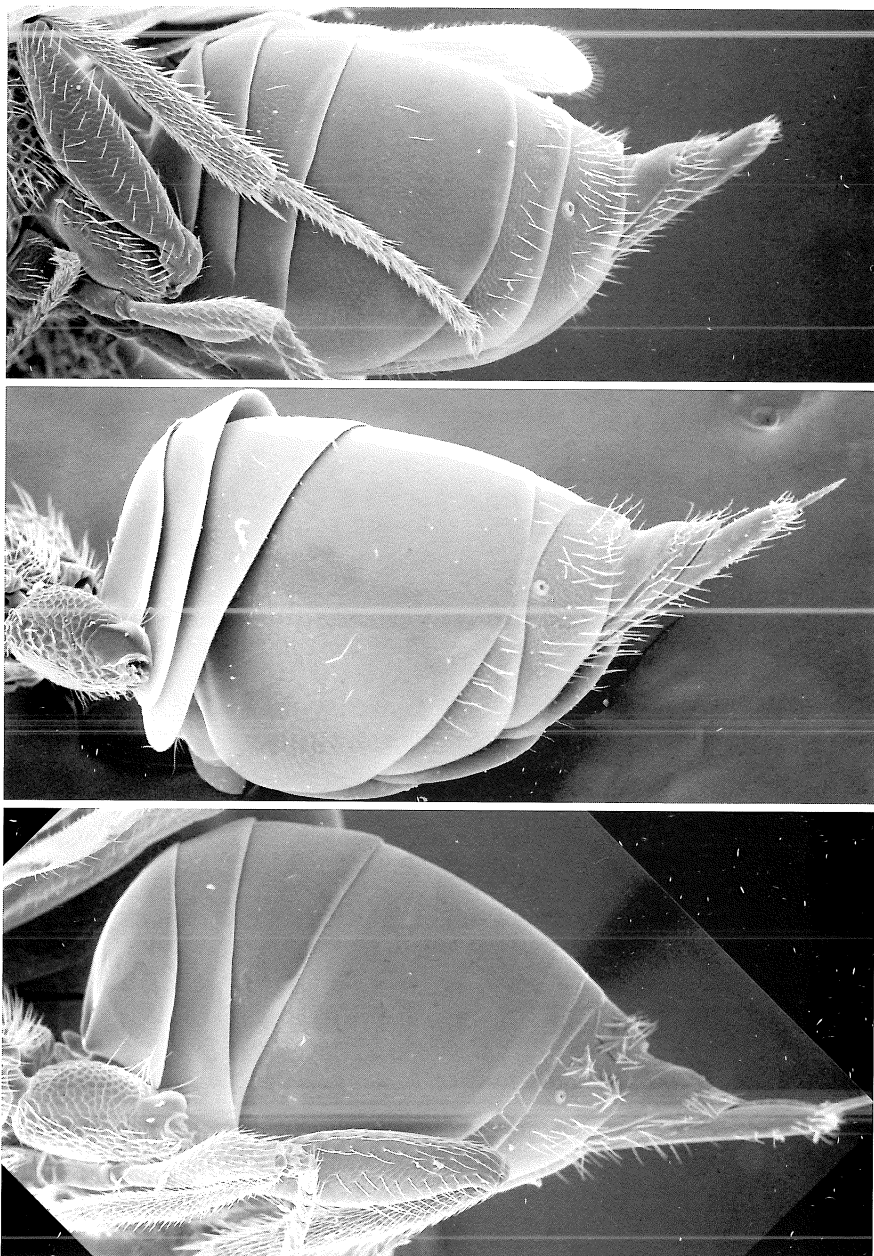


Fig. 8 - Female gastrum seen in profile of *Eurytoma rosae* L. (at the top), *inulae* n. sp. (in the middle), *martellii* Dom. (at the bottom).

Antennae with rather extended scape on the inferior margin (Fig. 3), length about 4,3 times its maximum width, with the first article of funiculus almost twice as long as it is wide; segments of antenna from the second to the fifth 1,5 times longer than they are broad; club of two segments, about as long as the previous article; verticils of white bristles on the antenna (Fig. 3), a little bit shorter than the respective article, club bristles rather shorter than club itself.

Head with distinct postgenal carina. Pronotum totally sculptured also on the inferior sides, with a groove in front of the curved margin.

Mesopleure as in Fig. 5.

Wing at rest much longer than abdomen.

Propodeum and petiole as in Fig. 7.

Petiole twice as long as it is wide, as long as the remaining gastrum; its sculpture is roundish, similar to that of hind coxae.

The specimens (24 ♀♀, 6 ♂♂) collected by Rivosecchi on *Inula viscosa* and on *Diotis maritima* Sm. at Grottammare (Ascoli Piceno) sent me, belong to this species. Rivosecchi established (1959, 1960) that the new species is an endophagous parasitoid, facultively iperparasitoid, of *Myopites* spp. and of *Tephritis stictica* Loew.

The new species differs from *robusta* Mayr and *compressa* (Fab.) (= *tibialis* Boh. = *atra* Ns) in having the gastrum of the ovoidal female elongated and not spheroidal, with ovipositor placed horizontally and not vertically as in the two previous species.

Unlike *serratulae* (Fab.) (= *tristis* Mayr) the female presents the articles of funiculus proportionally shorter and the fourth tergite of gaster (sixth morphological) over twice as long as the previous one and with the hind margin very rounded ventrolaterally (Fig. 8).

Regarding the species *nigrita* Boh., Ferrière (1950), who points out the characteristic of carinae radiating around clypeus, claims to identify in this species some specimens already identified as *E. rosae*, obtained from *Bactrocera* (= *Dacus oleae*). Erdős (1960) in Fauna Hungariae, (52) Hymenoptera II. Chalcidoidea, Akadémiai Kiadó, Budapest (in Hungarian) questionably quotes *nigrita* parasitoid of *Bactrocera oleae* in the Mediterranean area. Perhaps the species here described as new can also develop on the olive fly. Compared with the description of *nigrita* made by Ferrière, the new species differs in the proportional measurements of wing vein, in the colour of body parts (scape and legs reddish in *nigrita*), in the shorter articles of flagellum 2-5 and in the bisegmented club (Fig. 3, above), not of three segments as in *nigrita*.

Other *Eurytoma* spp. are known as parasitoids of Diptera Tephritidae in North America. Repeatedly recorded there is *E. vernonia* Goeden, parasitoid of *Procecidochares blanci* Goeden and Norrbom from *Isocoma sonidania* (Green) (Asteraceae) and on *Tephritis joanae* Goeden on *Ericameria pinifolia* (Gray); as well as from these last hosts *obtusiventris* Gahan, *gigantea* and *bigloviae* Goeden; *E. tephritidis* Fullaway from *Tephritis conura* and other Tephritidae is also recorded for Hawaii.

Although a great deal of work has been done regarding these Chalcidoidea, there is still a lot to do concerning taxonomic knowledge and the biological order.

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