Boll. Zool. agr. Bachic.
Ser. II, 21 (1989): 85-119

E. CHIAPPINI

Review of the European species of the genus *Anagrus* Haliday (Hymenoptera Chalcidoidea)

INTRODUCTION

Originally, the species concept was very clearly defined by Ray (1686) as a reproducing unit differing from others by clear-cut characters. This morphological definition was used by all the nineteenth-century taxonomists (Mayr et al., 1953).

Only in the twentieth century has the discovery of asexual and apomittic species, of cryptic species and of intermediate populations between distinct species brought about different concepts of species. *Anagrus* Haliday's species have been described since the end of the 18th century so that a new species has generally been based on the observation of qualitative morphological differences and, only recently also on biometric, electrophoretic, ecological and ethological differences.

The different authors who have described new species over the years, have based their descriptions on morphological characters that have varied from one description to another so that information on the various species described so far is far from homogeneous and usually not comparable.

To identify a species accurately it is therefore necessary to fall back on a critical examination of the types, which are often in a poor state of preservation or sometimes lost.

This study, like most taxonomic studies on *Chalcidoidea*, suffers from the fact that the types are generally the only specimens of the species, collected for the most part casually, so that the only information available is the place and date they were found.

The position I have adopted here is to avoid placing any species in synonymy which have even a small morphological difference, even if this is limited to just one character, in the hope that, in future, more material and biological information will be available that will make it possible to decide with certainty whether such species should or should not be considered synonymous of one another. Huber (1986) too believes that only by basing ourselves on series of fresh individuals coming from the type locality will it be possible to decide definitively on the identity and synonymies and re-describe the species.

Research supported by the Ministry of Public Instruction (40%).

But because the types are single specimens they could be exceptions from the norm of the populations they come from. And, because of intraspecific variability, the type specimens may represent morphological extremes of a single biological species.

Therefore morphological differences noted between the various species considered may in future be revealed to be only intraspecific variations or cases of abnormal morphology just as, in the same way, it is possible that some species may be found to include many others which are distinguished primarily by biological and ethological characters.

The only sure way to sort out some of the problems is to do crossing experiments between morphologically different populations.

Clearly, however, no such study can be carried out for the species thus far described, and it is therefore necessary, at least for an initial review such as the following one, to base the work on the morphology of the types. As Rosen and De Bach (1973) emphasized, morphology "is, and will probably continue to be, an essential part of every systematic investigation".

Future work will be needed on series of individuals so as to evaluate intraspecific variability and, as a consequence, the value of morphological characters used till now. Only methodical rearing will allow us to obtain series of specimens clearly conspecific and to investigate the biology of species.

HISTORIC REVIEW OF THE EUROPEAN SPECIES OF THE *ANAGRUS*

Haliday (1833) proposed the genus *Anagrus*. In it he placed the species described by Linneus as *Ichneumon atomus*, and 2 new species, *Anagrus incarnatus* and *A. ustulatus*.

Subsequently a further 6 species were described by Foerster (*A. debilis*, *A. flavus*, *A. pallidus*, *A. subfuscus* in 1847 and *A. obscurus*, *A. pallipes* in 1861), 1 by Schulz (*A. brocheri*, 1910) and 1 by Tullgren (*A. bartheli*, 1916).

Bakkendorf (1926), maintained that all the species of *Anagrus* described until then were just variants of 1 species and he synonymized them under *A. incarnatus*.

Soyka (1946) described *A. aegyptiacus*, *A. bakkendorfi* and *A. unilinearis*, the first and third of which were described from Egypt.

Menozzi (1942) instituted the new species *Anagrus minimus* but did not describe it.

Debauche (1948) described a new species *A. ensifer* and, in contrast to Bakkendorf, redescribed *A. atomus* as a valid species, distinct from *A. incarnatus*, which he divided into 2 subspecies *A. i. incarnatus* and *A. i. subfuscus*, without specifying whether or not he had examined Haliday's and Foerster's types. Regarding the other species described by Foerster, he placed *A. debilis* in questionable synonymy with *A. i. incarnatus*, and synonymized *A. pallidus* and *A. flavus*

under *A. atomus*. *A. ustulatus* Haliday was also considered to be a junior synonym of *A. atomus*.

Heqvist (1954) described *A. tullgreni*.

Soyka (1955) published a key in which only females were considered. In this key were included Haliday's 2 species (*A. ustulatus* and *A. incarnatus*), 5 of Foerster's 6 species (*A. debilis*, *A. flavus*, *A. obscurus*, *A. pallidus* and *A. subfuscus*) in contrast to what Debauche had done, 34 new species (*A. andreae*, *A. arcuatus*, *A. avalae*, *A. breviphragma*, *A. danicus*, *A. devius*, *A. dilatatus*, *A. diversicornis*, *A. fennicus*, *A. gabitzi*, *A. hundsheimensis*, *A. incarnatosimilis*, *A. kressbachi*, *A. latior*, *A. latipennis*, *A. lemonicolor*, *A. levis*, *A. longigaster*, *A. longus*, *A. neopallidus*, *A. obvius*, *A. ovipositor*, *A. pallidior*, *A. parvus*, *A. pulcher*, *A. pulcherrimus*, *A. similis*, *A. stammeri*, *A. supremosimilis*, *A. supremus*, *A. vacuipennis*, *A. valkenburgensis*, *A. varicolor*, *A. varius*) and 3 species he had described previously (1946) (*A. aegyptiacus*, *A. bakkendorfi* and *A. unilinearis*).

In his article Soyka stated that Foerster's types were by then quite unusable, and as a result he, on the basis of original descriptions and using specimens he had collected himself, established lectotypes (1). He did not establish a lectotype for *A. pallipes* because, on the basis of the author's description, he believed it to be a synonym of *A. obscurus*.

Bakkendorf (1962) described the species *mymaricorne*, which he ascribed to his new genus *Anagrella*, very close to *Anagrus*. Viggiani (1970b) subsequently placed it in synonymy with *Anagrus*.

Botoc (1963) described the new subspecies *A. incarnatus fuscus*.

Walker (1979) added 4 new species: *A. holci*, *A. mutans*, *A. silwoodensis*, *A. stenocrani*.

Graham (1982) transferred the *Litus nigriceps* Smits van Burgst to *Anagrus* and synonymized *A. tullgreni* Heqvist with *A. atomus* but he did not see the type material.

I (1987) synonymized *A. minimus* Menozzi with *A. atomus* and confirmed the synonymy supposed by Graham (1982) of *A. bartheli* with *A. atomus*.

MORPHOLOGICAL CHARACTERS

The first authors (Linnaeus, Haliday and Foerster) to describe species of *Anagrus* based their work on such criteria as colour and size, whereas later descriptions also took into account the relative length of the antennae segments.

---

(1) On the basis of the International Code of Zoological Nomenclature (1985), a lectotype should be a substitute for a type, established subsequently by another author but using the original material. In this case, as those which Soyka calls lectotypes had been collected by him and did not form part of the original specimens, they are simply invalid designation.

Debauche (1948) used the form of the digiti in male genitalia and the length of the ovipositor and presence of sensory ridges on the funicolar segments in females. Regarding this, it needs to be pointed out that, whereas the number of these sensilla on the club remains constant in individuals of a particular species, their presence on the first segments of the funicle is more likely to show exceptions. Debauche separated the subspecies *A. i. incarnatus* from *A. i. subfuscus* on the basis of the relative length of the segments of the hind tarsus. This character does not seem acceptable to me because tarsal segments sometimes are of decreasing length in one leg and equal in the other; probably because their length varies slightly depending on their position in slide preparations.

Soyka (1955) used principally the ratio between the length of the ovipositor and that of the mesophragma, the presence or absence of a hairless area on the disc of the wing, the ratio between length and maximum width of the forewing, and relative length of the various segments of the antenna. These characters are all good, even though the author, in using them, did not take into account the possibility of intraspecific variation.

Walker (1979) based her work essentially on the first 3 characters Soyka used, and added another: the length by which the ovipositor exceeds the gaster. However, both the length of the mesophragma and that of the forewing seem, from her drawings, to be measured incorrectly.

Graham (1982) also used the ratios between length of ovipositor and that of the fore tibia, and between length and width of the individual segments of the funicle and club. But this latter character does not seem easily usable in the case of *Anagrus* species because, depending on the presence, absence or different position of the sensory ridges on a segment, its width measurement can vary.

The ratio between length of the ovipositor and that of the fore tibia seems to me to be easier to use as a character than the ratio to the length of the mesophragma as this is very difficult to measure precisely and can vary, even if only to a very small extent, depending on the degree of crushing in the slide preparation.

Thus, for the European species of *Anagrus*, the morphological characters that seem most significant to me for sorting out the species morphologically are: the presence or absence of the stemmaticum; the length of the transverse-frontal trabecula; the relative length of the segments of the antenna; the presence and number of sensory ridges on the segments of the funicle and, even more importantly, of the club; the presence of setae on the mesoscutum; the form of the posterior scutellum; the form of the forewing (ratio between length and maximum width); the presence of the hairless area on the disc of the forewing; the relative length of the macrochaetae and the shape and proportions of the male and female genitalia (ratio between ovipositor length and fore tibia length).

METHODS

All the material I have examined was collected by myself or was borrowed from the following institutions: Naturhistorisches Museum, Vienna; Institut Royal des Sciences Naturelles de Belgique, Brussels; British Museum of Natural History, London; Muséum d'Histoire Naturelle, Genève; National Museum of Ireland, Dublin.

The specimens of my own collection are kept in the Istituto di Entomologia, Facoltà di Agraria, Piacenza.

Foerster's collection does not exist any more: there is no Foerster original material in the Naturhistorisches Museum in Vienna where this collection should be kept.

Soyka's "lectotypes", as already staded, are invalid designations; at the same time none of them represent a new species except for the "lectotype" of *A. obscurus* Foerster, which therefore I designate as neotype.

A. subfuscus Foerster was redescribed as a subspecies by Debauche and, as this represents a good species, I designate one of his specimens as neotype.

All other Foerster's species are not considered in this review.

Soyka (1955) has instituted 34 new species without describing them and without specifying which were the types. For this reason I assume that Soyka's specimens labelled "types" are holotypes when only 1 female labelled "type" by Soyka is present in Soyka's collection under a certain species name. In the case of more than one female labelled "type" standing under a certain species name in Soyka's collection, so that I cannot be sure which one of them should be considered the holotype, I designate a lectotype. In the case of both a female and a male, standing under the same species name, being labelled "type" I consider the female to be the holotype and the male to be the allotype as only females were considered by Soyka (1955) when he instituted his new species.

All the specimens I have examined were slide-mounted except for Haliday's ones and for Walker's holotypes (paratypes were slide-mounted).

All the measurements were taken from slide-mounted specimens at 200 x magnification.

Length of forewing is measured from the case of the costal cell to the distal margin.

The ovipositor is measured from the point the shaft curves inward till its apex.

Genus *ANAGRUS* Haliday

Anagrus Haliday, 1833: 346.
Anagrus Haliday; Westwood, 1840: 78.
Anagrus Haliday; Blanchard, 1840: 293.
Anagrus Haliday; Walker, 1846: 49-51.

Anagrus Haliday; Foerster, 1847: 213.
Anagrus Haliday; Dalla Torre, 1898: 422-423.
Paranagrus Perkins, 1905: 199.
Anagrus Haliday; Perkins, 1905: 197-198.
Anagrus Haliday; Schmiedeknecht, 1909: 499-500.
Anagrus Haliday; Gahan & Fagan, 1923: 11.
Anagrus Haliday; Bakkendorf, 1926: 258,268-270.
Anagrus Haliday; Soyka, 1946: 39.
Anagrus Haliday; Debauche, 1948: 128-131.
Anagrus Haliday; Debauche, 1949: 60-61.
Anagrus Haliday; Kryger, 1950: 36-39.
Anagrus Haliday; Soyka: 1955: 23-24.
Anagrella Bakkendorf, 1962: 372.
Anagrus Haliday ; Annecke & Doutt, 1961: 7-8.
Anagrus Haliday; Viggiani, 1970b: 139.
Anagrus Haliday; Gordh & Dunbar, 1977: 85-86.
Anagrus Haliday; Graham, 1982: 195-197.
Anagrus Haliday; Schauff, 1984: 49-50.
Anagrus Haliday; Sahad & Hirashima, 1984: 44.
Anagrus Haliday; Noyes & Valentine, 1989: 25-26.

Haliday defined the genus as characterized by "antennae with 13 articles in the male and 9 articles with an undivided club in the female; tarsi with 4 articles; sharp conical sessile abdomen". In the description that follows he adds that the vertex is linear and that, in the female, the third segment of the antenna is very short.

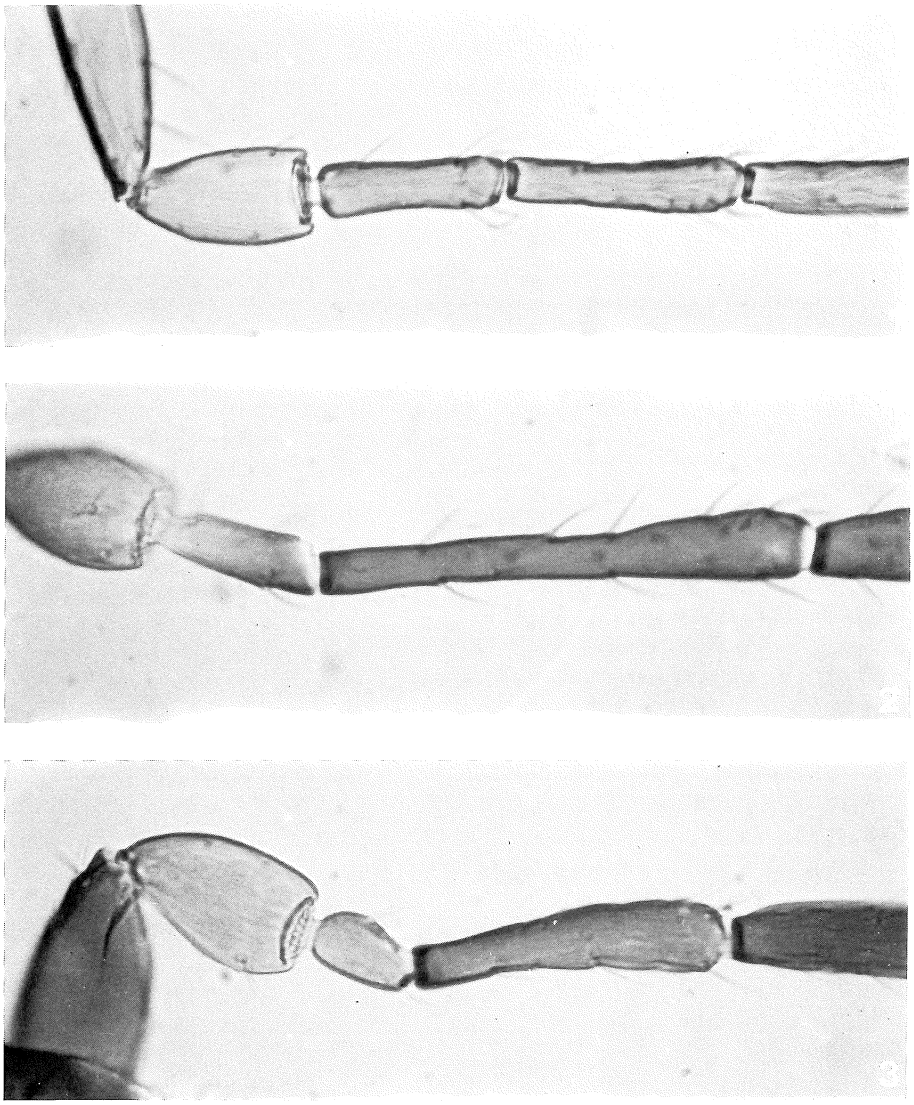
These latter characters are not, however, present in all the species so far ascribed to *Anagrus*, as they are lacking in those originally described as *Paranagrus*.

Therefore I concur with Graham (1982), after studying the European and non-European material, that, in the present state of knowledge, it is useful to distinguish the subgenera *Anagrus* Haliday (1833) s.s., *Paranagrus* Perkins (1905) and *Anagrella* Bakkendorf (1962).

The following distinguishing characters can, in my opinion, be added to those listed by Haliday: mandible 3-toothed (Gordh & Dunbar, 1977), radicle fused with the scape (Chiappini, 1987) [2]; torax with axillae advanced into side lobes of mesoscutum (Schauff, 1984); basal macrochaetae distal to the hypochaeta (Debauche, 1949); posterior scutellum divided medially by a longitudinal groove (Debauche, 1948); phragma projecting beyond hindcoxae (Schauff, 1984).

---

[2] Debauche (1949) states that, in *Anagrus*, the radicle is short but I have never observed it in the species of the genus.



Figg. 1-3 - First and second funicolar segments: *Anagrus (Paranagrus) optabilis* Perkins ♀ (fig. 1); *Anagrus (Anagrella) mymaricornis* Bakkendorf ♀ (fig. 2); *Anagrus incarnatus* Haliday ♀ (fig. 3).

I would not add that the ocelli are on a triangular stemmaticum (Schauff, 1984) because this character does not occur in the subgenus *Anagrella* (Chiappini, 1987).

KEY TO THE SUBGENERA OF *ANAGRUS*

1. Stemmaticum present 2
— Stemmaticum absent; second segment of funicle much longer than the others ..... subg. *Anagrella* Bakkendorf

2. First segment of funicle about as long as the pedicel; posterior scutellum divided by longitudinal groove into 2 widely-separated parts ..... subg. *Paranagrus* Perkins
— First segment of funicle much shorter than the pedicel; posterior scutellum divided by longitudinal groove into 2 parts very close to each other ..... subg. *Anagrus* Haliday s.s.

Subg. *PARANAGRUS* Perkins

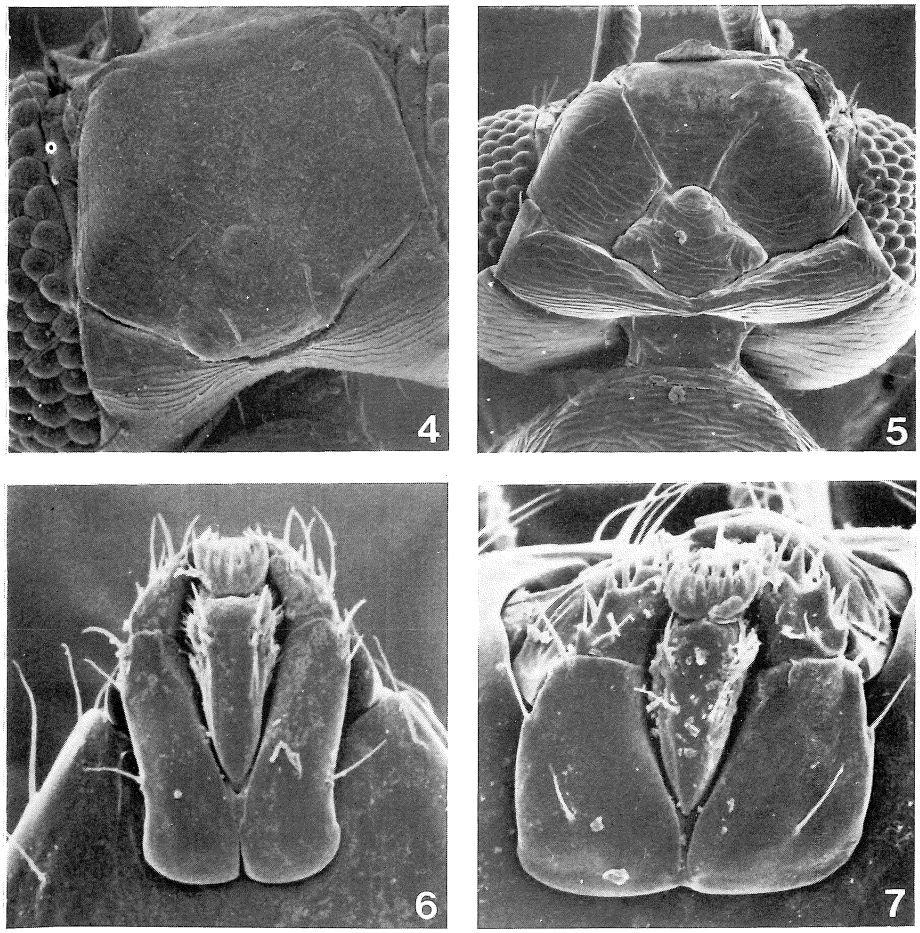
Paranagrus Perkins, 1905: 199.
Paranagrus Perkins; Girault, 1912: 159.
Paranagrus Perkins; Annecke & Doutt, 1961: 7-8.
Anagrus (*Paranagrus*) Perkins; Graham, 1982: 197.

This subgenus is characterized in both sexes as follows: vertex prominent; stemmaticum; transverse-frontal trabecula as long as distance between the toruli; very narrow long mandibles (fig. 6); length of first segment of the funicle equal to that of the pedicel and a little less than that of the next segment (fig. 1); posterior scutellum divided into 2 widely-separated parts (fig. 8); and propodeum unusually long.

The subgenus *Paranagrus* includes species from Queensland, Fiji and Japan and later introduced intentionally into Hawaii and incidentally into the United States (Huber, 1986) but, so far, the subgenus has not been found in Europe, with the possible exception of an undescribed species from the United Kingdom.

By kind permission of Prof. M.F. Claridge I was able to consult Abdul-Baki's thesis (1979), presented at the Department of Zoology of the University of Wales-Cardiff, in which an *Anagrus* sp. (raised from eggs of *Muellerianella* spp. on *Juncus* spp. at Brecon Beacons National Park, Brecknockshire, and at Magor site, Newport) is described and drawn. It is characterized by the first article of the funicle which is as long as the pedicel and the transverse-frontal trabecula as long as the distance between the toruli. On this basis it should be ascribed to the sub-

genus *Paranagrus*. A better identification is not possible as the original specimens do not exist any more.



Figg. 4-7 - *Anagrus (Anagrella) mymaricornis* Bakkendorf ♀: vertex (fig. 4); *Anagrus* sp. ♀: stemmaticum (fig. 5); *Anagrus (Paranagrus) optabilis* Perkins ♀: mandibles (fig. 6); *Anagrus ustulatus* Haliday ♀: mandibles (fig. 7).

Subg. *ANAGRELLA* (Bakkendorf)

Anagrella Bakkendorf, 1962: 372.
Anagrella Bakkendorf; Viggiani, 1970b: 139.
Anagrus (*Anagrella*) Bakkendorf; Graham, 1982: 195, 197.

This subgenus is distinguished as follows: vertex linear; no stemmaticum (fig. 4); squared mandibles; second segment of funicle longer than all the others in the male and at the least as long as the club in the female (fig. 2) and by the posterior scutellum divided into 2 parts close to each other.

The subgenus *Anagrella* thus far includes only the species *Anagrus (Anagrella) mymaricornis* (Bakkendorf).

Anagrus (Anagrella) mymaricornis (Bakkendorf)

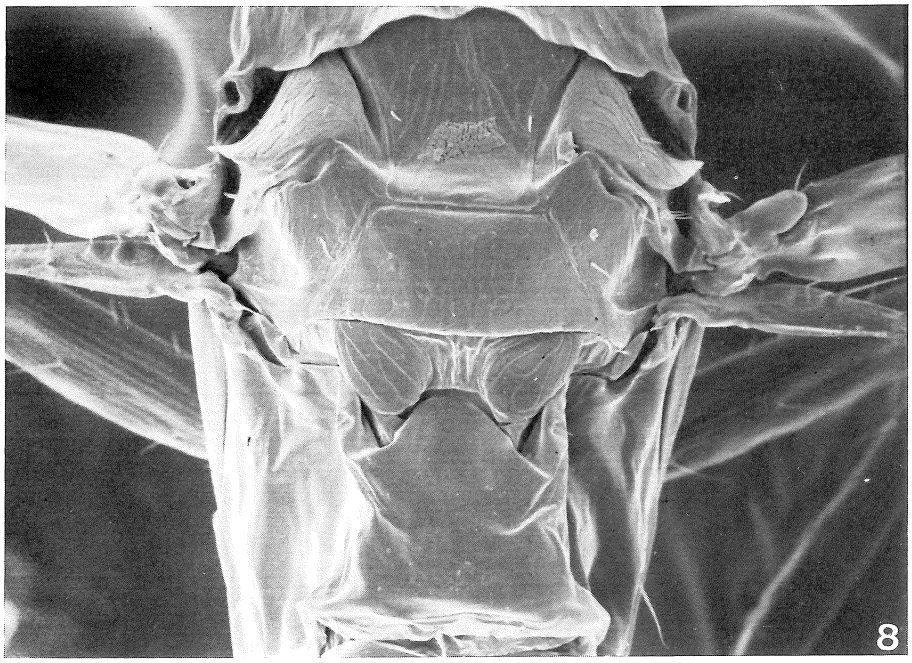
Anagrella mymaricorne Bakkendorf, 1962: 372-376, ♂ ♀.
Anagrus mymaricornis (Bakkendorf); Viggiani, 1970b: 139.

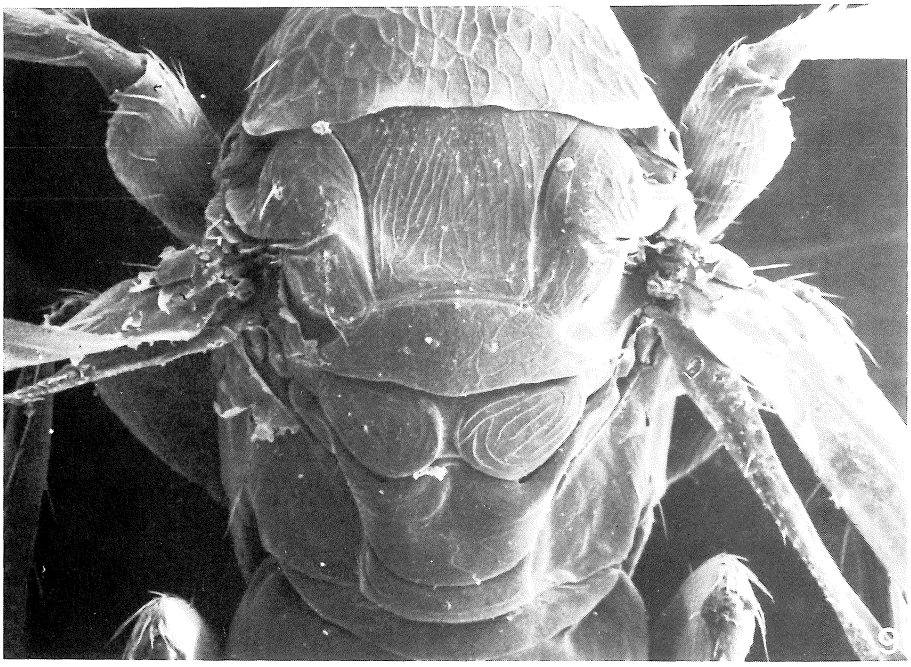
This species, in addition to the features typical of the subgenus is characterized by: second and third articles of funicle without sensory ridges; 5 sensory ridges on club; 2 setae on mesoscutum; forewing with almost parallel margins and very reduced in size (fig. 20); length/maximum width about 14.7 ([3]); hindwing much shorter than the fore one; ovipositor projecting from gaster by a little less than half its length; ovipositor/fore tibia ratio about 3.2; 1 or 2 setae on external plates of ovipositor.

I consider the female labelled *Anagrella mymaricorne* Bakkendorf "type" by Bakkendorf himself to be the holotype of the species.

Specimens examined: *Anagrella mymaricorne* Bakkendorf holotype ♀, La London Genève (Switzerland), 24-IX-1960 and allotype ♂, Ain (France), 12-VII-1961; 1 ♀, Genève (Switzerland), 24-IX-1960; 1 ♀, Canton de Genève (Switzerland), 14-IX-1968; 1 ♀, Canton de Berne, 29-IX-1967; 2 ♀♀ Canton de Tessin (Switzerland), 17-IX-1965; 2 ♀♀, same locality, 7-IX-1965; 3 ♀♀, same locality, 2-VI-1969; 5 ♀♀, same locality, 3-VI-1969; 2 ♀♀, same locality, 4-VI-1969; 4 ♀♀, same locality, 5-VI-1969; 4 ♀♀ 1 ♂, same locality, 6-VI-1969; 2 ♀♀, same locality, 3-VII-1969; 5 ♀♀, Canton du Valais (Switzerland), 11-VII-1966; 1 ♀, Dept. Hte Savoie (France), 19-VI-1965; 2 ♀♀ prov. of Novara (Italy); 3 ♀♀, Vallombrosa (Italy) (Muséum d'Histoire Naturelle, Genève).

([3]) The allotype and the other male studied, however, have a far more developed forewing, in both length and breadth (ratio between length and maximum breadth about 9.8).





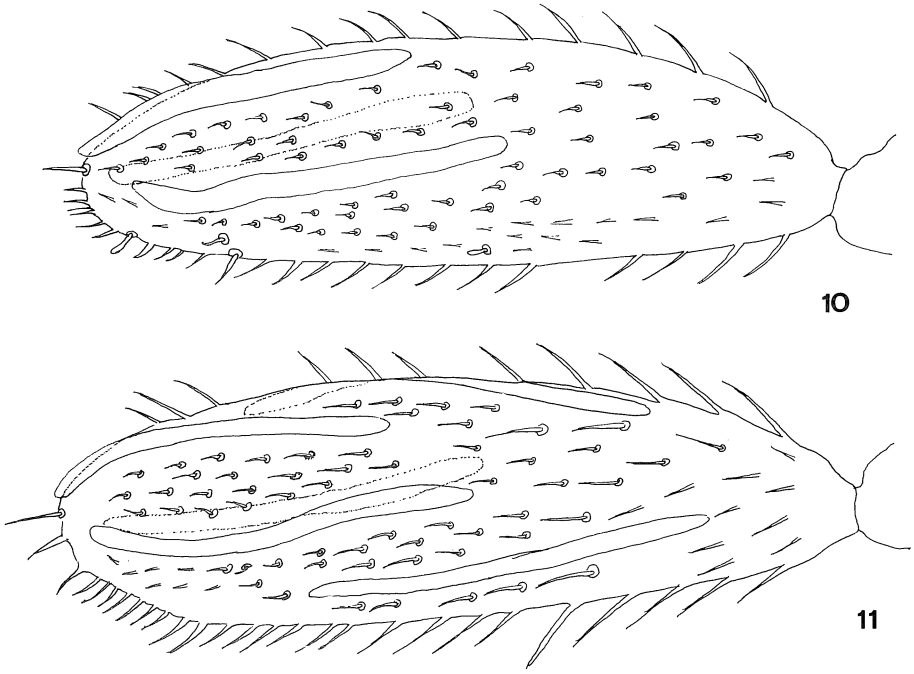
Figg. 8-9 - Torax: *Anagrus (Paranagrus) optabilis* Perkins ♀ (fig. 8); *Anagrus* sp. ♀ (fig. 9).

Subg. *ANAGRUS* Haliday s.s.

This subgenus is distinguished as follows: vertex linear; stemmaticum (fig. 5); squared mandibles (fig. 7); first segment of funicle much shorter than the others (fig. 3) and never as long as the pedicel; posterior scutellum divided into 2 parts very close to each other (fig. 9).

The subgenus *Anagrus* is definitely the most common of the 3 subgenera in Europe.

Through study of the types of the European species I have been able to separate them into 2 groups defined by a series of morphological traits in common: the "*atomus*" group, already proposed by Graham (1982) and the "*incarnatus*" group.

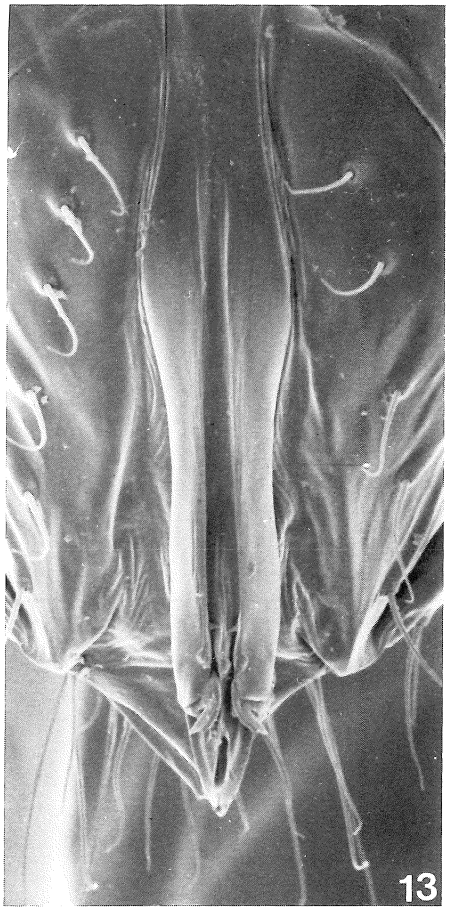


Figg. 10-11 - Club: *Anagrus atomus* (L.) ♀ (fig. 10); *Anagrus incarnatus* Haliday ♀ (fig. 11).

The species of the "*atomus*" group are distinguished from those of the "*incarnatus*" group principally by the number of sensory ridges on the female club and by the structure of the genitalia, in both males and females.

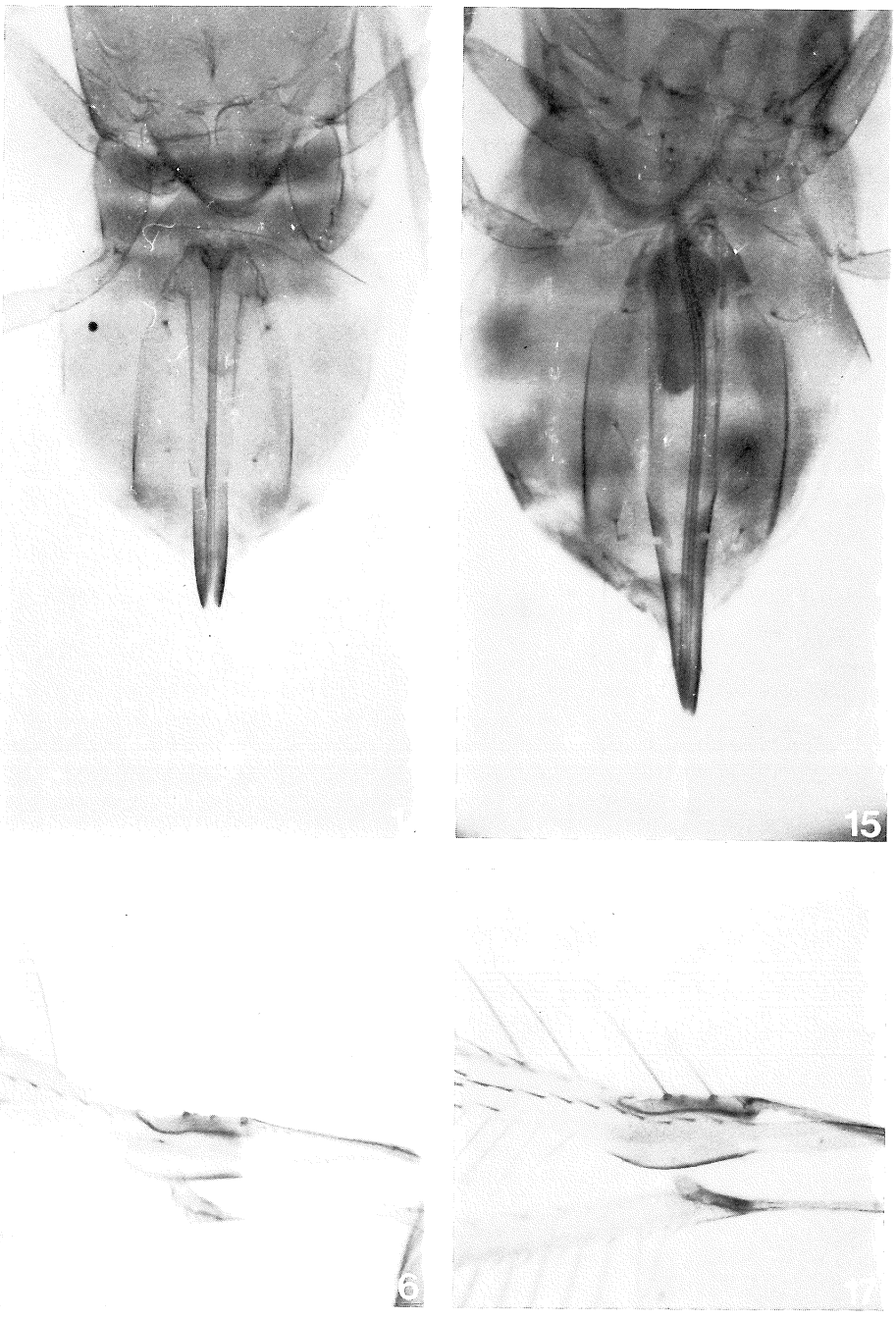
The number of sensory ridges on the club goes from 3 in females of the

"*atomus*" group to 5 in females of the "*incarnatus*" group (Chiappini, 1987) (4). The position of these sensory ridges also differs: in females of the "*atomus*" group they are all on the apex of the club, whereas those of the "*incarnatus*" group generally bear 2 of them on the middle part of the segment (figs. 10, 11).



Figg. 12-13 - Aedeagus: *Anagrus atomus* (L.) ♂: (fig. 12); *Anagrus incarnatus* Haliday ♂ (fig. 13).

(4) I have never observed 4 sensory ridges on the club in *Anagrus* females.



Figg. 14-17 - *Anagrus atomus* (L.) ♀: ovipositor (fig. 14); macrochetae (fig. 16); *Anagrus incarnatus* Haliday ♂: ovipositor (fig. 15); macrochetae (fig. 17).

In the males of the "*atomus*" group the digiti are cone-shaped and straight (fig. 12) whereas in the "*incarnatus*" group they end in a hook (fig. 13). The shape of the whole copulatory apparatus is also different: more compact in the "*atomus*" group and longer in the "*incarnatus*" group.

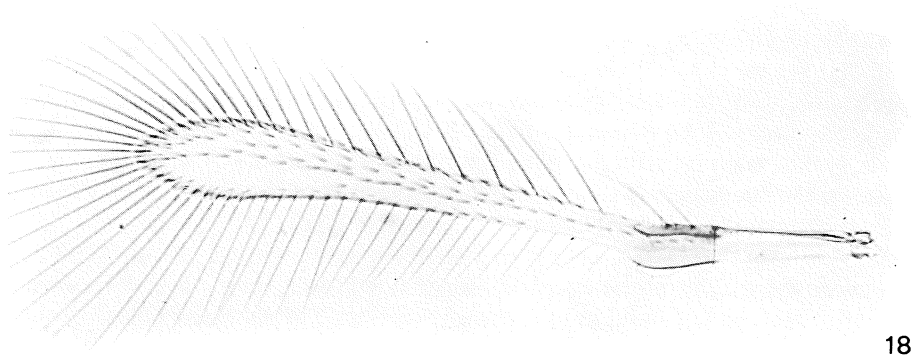
In females of the "*atomus*" group the laminae at the sides of the second valvifers or external plates of the ovipositor (King & Copland, 1969) bear 1 seta each and there is another seta on each side of the seventh sternite (fig. 14) (Chiappini, 1987): females of the "*incarnatus*" group always have 2 setae on the seventh sternite but the external plates of the ovipositor each bear 2 or 3 (fig. 15).

Another, less precise, character that is different between the 2 groups is the ratio between the lengths of the 2 macrochaetae: it is greater than 2 in the "*atomus*" group (fig. 16) and less than, or at the most equal to, 2 in the "*incarnatus*" group (fig. 17).

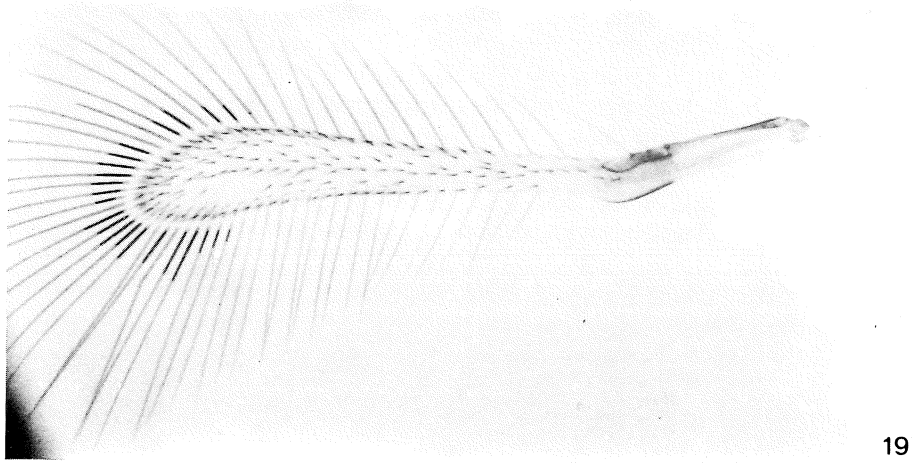
The "*atomus*" group presently includes *A. atomus* (L.), the unnamed species I described as a parasitoid of leafhoppers' eggs on bramble and rose leaves (Chiappini, 1987) and which is seen to correspond to *A. ustulatus* Haliday and an unnamed species keyed by Graham (1982).

The "*incarnatus*" group presently includes: *A. breviphragma* Soyka, *A. ensifer* Debauche, *A. bakkendorfi* Soyka, *A. valkenburgensis* Soyka, *A. arcuatus* Soyka, *A. avalae* Soyka, *A. subfuscus* Foerster sensu Debauche, *A. supremosimilis* Soyka, *A. dilatatus* Soyka, *A. obvius* Soyka, *A. brocheri* Schultz, *A. similis* Soyka, *A. obscurus* Foerster sensu Soyka, *A. fennicus* Soyka, *A. incarnatus* Haliday, *A. incarnatosimilis* Soyka and, according to Graham (1982), *A. nigriceps* (Smits van Burgst) the type of which I have not been able to examine and which I therefore have not included in the key to species ([5]).

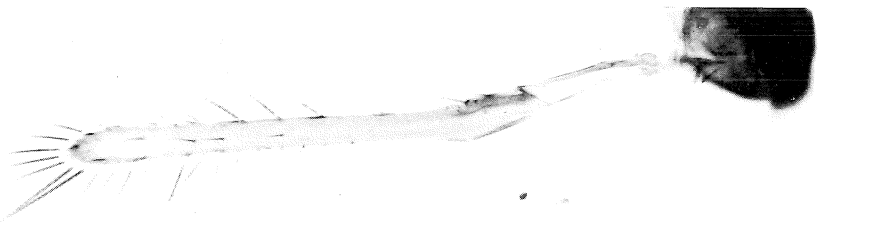
([5]) I have not been able to study the type *Anagrus incarnatus fuscus* Botoc (1963) either, so it is not included in this review.



18



19



20

Figg. 18-20 - Forewing: *Anagrus breviphagma* Soyka ♀: (fig. 18); *Anagrus atomus* (L.) ♀ (fig. 19); *Anagrus (Anagrella) mymaricornis* Bakkendorf ♀ (fig. 20).

KEY TO THE EUROPEAN SPECIES (FEMALES) OF *ANAGRUS* S.S.

1. Club with 3 sensory ridges; external plate of the ovipositor each with 1 seta ..... "*atomus*" group 2

— Club with 5 sensory ridges; external plate of the ovipositor each with 2 or 3 setae ..... "*incarnatus*" group 3

2. Fourth segment of funicle with 1 sensory ridge ..... *A. atomus* (Linnaeus)

— Fourth segment of funicle without sensory ridges ..... *A. ustulatus* Haliday

3. Disc of the forewing with a hairless area ..... *A. breviphragma* Soyka

— Disc of the forewing without a hairless area 4

4. External plate of the ovipositor each with 3 setae 9

— External plate of the ovipositor each with 2 setae 5

5. Ovipositor projecting from the gaster by about one third of its length ..... *A. ensifer* Debauche

— Ovipositor not projecting from the gaster or, if it does, by less than 1 third of its length 6

6. Ovipositor slightly projecting from gaster ..... *A. bakkendorfi* Soyka

— Ovipositor not projecting from gaster 7

7. Third segment of funicle with 1 sensory ridge ..... *A. valkenburgensis* Soyka

— Third segment of funicle without sensory ridges 8

8. Fifth segment of the funicle with 1 sensory ridge ..... *A. arcuatus* Soyka

— Fifth segment of the funicle without sensory ridges ..... *A. avalae* Soyka

9. Mesoscutum with 2 setae 10

— Mesoscutum without setae 17

10. Ovipositor projecting from gaster by about 1 sixth of its length; ovipositor/fore tibia ratio about 3-3.2 11

— Ovipositor projecting less than one sixth of its length or not at all from the gaster; ovipositor/fore tibia ratio less than 3 12

11. Body dark brown ..... *A. subfuscus* Foerster sensu Debauche

— Body light yellow ..... *A. supremosimilis* Soyka

12. Ovipositor not projecting from gaster 13
— Ovipositor projecting from gaster by about one ninth or one tenth of its length; ovipositor/fore tibia ratio about 2.5 14

13. Third segment of funicle with 1 sensory ridge ..... *A. dilatatus* Soyka
— Third segment of funicle with 2 sensory ridges ..... *A. obvius* Soyka

14. Third segment of funicle without sensory ridges ..... *A. brocheri* Schultz
— Third segment of funicle with sensory ridges 15

15. Body dark 16
— Body light yellow ..... *A. similis* Soyka

16. Third and fourth segments of funicle with 1 sensory ridge ..... *A. obscurus* Foerster sensu Soyka
— Third and fourth segments of funicle with 2 sensory ridges ..... *A. fennicus* Soyka

17. Body yellow-reddish ..... *A. incarnatus* Haliday
— Body brown ..... *A. incarnatosimilis* Soyka

Anagrus (Anagrus) atomus (Linnaeus)

Ichneumon atomus Linnaeus, 1767: 941.
Anagrus atomus (L.) Haliday, 1833: 347, ♀.
Anagrus bartheli Tullgren, 1916: 8-11, ♂ ♀.
Anagrus atomus (L.); MacGill 1934: 57-63.
Anagrus minimus Menozzi, 1942: 38-39, ♀.
Anagrus ustulatus Haliday; Soyka, 1946: 40, ♀ misidentified.
Anagrus atomus (L.); Debauche, 1948: 137-139, ♂ ♀.
Anagrus tullgreni Heqvist, 1954: 272-273, ♀.
Anagrus devius Soyka, 1955: 25, ♀, syn.n.
Anagrus gabitzi Soyka, 1955: 25, ♀, syn.n.
Anagrus hundsheimensis Soyka, 1955: 24, ♀, syn.n.
Anagrus kressbachi Soyka, 1955: 25, ♀, syn.n.
Anagrus lemonicolor Soyka, 1955: 24, ♀, syn.n.
Anagrus levis Soyka, 1955: 25, ♀, syn.n.
Anagrus stammeri Soyka, 1955: 24, ♀, syn.n.
Anagrus subfuscus Foerster; Soyka, 1955: 25, ♀, misidentified.
Anagrus varius Soyka, 1955: 24, ♀, syn.n.
Anagrus atomus (L.); Viggiani, 1970b: 14-15,16.
Anagrus atomus (L.); Graham, 1982: 197, 199-200.
Anagrus atomus (L.); Chiappini, 1987: 73-90, ♂ ♀.

In addition to the typical features of the group, this species is characterized by: third segment of funicle without sensory ridges; hairless mesoscutum; hairless area on disc of forewing; forewing length/maximum width about 8-10; ovipositor/fore tibia ratio about 2.

I consider the following specimens of the Soyka's collection to be the holotypes of the species they represent: the female, n° 358 standing under the name *Anagrus devius* Soyka, labelled "type" by Soyka and collected at Kroessbach (Austria), 5-IX-1946; the female, n° 373 standinding under the name *Anagrus hundsheimensis* Soyka, labelled "type" by Soyka and collected at Hundsheim (Austria), 24-IX-1953; the female, n° 406 standing under the name *Anagrus kressbachi* Soyka, labelled "type" by Soyka and collected at Kroessbach, 2-X-1949; the female, n° 422 standing under the name *Anagrus lemonicolor* Soyka, labelled "type" by Soyka and collected at Domatschine (Breslau, Germany), VII-1934; the female, n° 497 standing under the name *Anagrus varius* Soyka, labelled "type" by Soyka and collected at Ickchens Hof (Malchin, Germany), VIII-1935. I consider the male n° 407 labelled "type" by Soyka and collected at Kroessbach, 15-X-1949, to be the allotype of *Anagrus hundsheimensis* Soyka.

I designate as lectotypes the female, n° 424 standing under the name *Anagrus levis* Soyka (collected at Kroessbach, 26-IX-1949) and labelled "type" by Soyka together with another one n° 425 (collected at Kroessbach, 26-IX-1949) which I consider to be a paralectotype and the female, n° 370 standing under the name *Anagrus gabitzi* Soyka (collected at Breslau, VIII-1933) and labelled "type" by Soyka together with another one n° 372 (collected at Breslau, VIII-1933) which I consider to be a paralectotype.

In the Soyka collection of the Naturhistorisches Museum in Vienna there is only 1 specimen n° 479 (collected at Wolfshuhlen, Budberg, Germany, 12-V-1959) labelled *A. stammeri* by Soyka himself, which I designate here as lectotype.

The females n° 488 and 490 labelled *Anagrus ustulatus* Haliday respectively "type" and "paratype", even though they were collected by Soyka in 1931 and 1935, are invalid designations.

The female n° 480 labelled *Anagrus subfuscus* Foerster "lectotype" by Soyka is an invalid designation.

Specimens examined: *Anagrus devius* Soyka holotype n°358 ♀, *Anagrus gabitzi* Soyka lectotype n°370 ♀ and paralectotypes n° 371 ♀, Breslau, VIII-1933 and n° 372 ♀; *Anagrus hundsheimensis* holotype n°373 ♀ and paratypes n°5 ♀, Hundsheim, 20-IX-1953, n° 374 ♀, Breslau, VIII-1933, n° 375 ♀, Breslau, VIII-1933, n°376 ♀, Hundsheim, 22-IX-1954, n°377 ♀, Hundsheim, 22-IX-1954, n°378 ♀, Hundsheim, 22-IX-1954; *Anagrus lemonicolor* Soyka holotype n°422 ♀; *Anagrus levis* Soyka lectotype n°424 ♀ and paralectotype n°425 ♀; *Anagrus stammeri* Soyka lectotype n° 479 ♀; *Anagrus ustulatus* Haliday sensu Soyka specimen n° 488 and 490 ♀♀ and n° 489 ♂; *Anagrus varius* Soyka holotype n° 497 ♀; *Anagrus subfuscus* Foerster sensu Soyka specimen n° 480 ♀; *Anagrus kressbachi* Soyka holotype n°406 ♀, allotype n°407 ♂ (Naturhistorisches Museum, Vienna); *Anagrus kress-*

bachi Soyka paratype of the collection of the Institut Royal des Sciences Naturelles de Belgique ♀, Kroessbach, 2-X-1949; all the other material examined in my previous study on *A. atomus* (Chiappini, 1987) (Istituto di Entomologia, Piacenza).

Anagrus (Anagrus) ustulatus Haliday

Anagrus ustulatus Haliday, 1833: 346, ♂,
Anagrus debilis Foerster; Soyka, 1955: 25, ♀, syn. n. (6).
Anagrus parvus Soyka, 1955: 24, ♀, syn.n.
Anagrus sp. Chiappini, 1987: 90-91, ♂ ♀.

This species is very similar to *A. atomus* but differs from it by: fourth segment of funicle without sensory ridges; forewing length/maximum width about 7-9 (6.8 in the lectotype); ovipositor/fore tibia ratio about 1.8-1.9.

I have examined the lectotype (♂) of *A. ustulatus* Haliday and the genitalia are typical of the "*atomus*" group (7); the forewing has a hairless area on the disc and macrochaetae as in *A. atomus* but is very wide in comparison with that of the *A. atomus* while it is the same as in the species I found on bramble and rose (1987) and in the specimens indicated by Soyka as "lectotype" of *A. debilis* Foerster and "type" of *A. parvus* Soyka.

I consider the female, n° 455, standing under the name *Anagrus parvus* Soyka, labelled "type" by Soyka and collected at Valkenburg (Holland), 7-X-1931 to be the holotype of the species.

The female n° 355 labelled *Anagrus debilis* Foerster "lectotype" by Soyka is an invalid designation.

Specimens examined: *Anagrus ustulatus* Haliday lectotype n° 70 ♂ (National Museum of Ireland, Dublin); *Anagrus debilis* Foerster sensu Soyka specimens n° 355 and n° 356 ♀♀ (8); *Anagrus parvus* Soyka holotype n° 455 ♀ (Naturhistorisches Museum, Vienna); 2 ♀♀, prov. of Pavia (Italy), 20-III-1987; 3 ♀♀, same locality, 30-V-1984; 1 ♀, same locality, 15-IV-1985; 1 ♀, same locality, 10-X-1984; 1 ♀, same locality, 15-V-1984; 1 ♀, prov. of Piacenza (Italy), 11-IX-1985; 3 ♀♀, same locality, 30-IV-1986; 1 ♀, same locality, 3-VII-1986; 4 ♀♀ 8 ♂♂, same locality, 14-VII-1986; 2 ♀♀, same locality, 27-X-1986; 6 ♀♀, same locality, 20-IV-1987; 4 ♀♀, same locality, 10-V-1987 (Istituto di Entomologia, Piacenza).

---

(6) Soyka (1955) places this species among those which do not have a hairless area on disc of forewing but (as can be seen on "lectotype") this is not true.

(7) According to Graham, the second male, which I have not seen, has genitalia like those of the "*atomus*" group, which suggests to me that it is conspecific with the lectotype.

(8) The specimen (n° 356) labelled by Soyka *A. debilis* Foerster does not belong to this species but to *A. obscurus*.

Anagrus (Anagrus) breviphragma Soyka

Anagrus breviphragma Soyka, 1955: 25, ♀.
Anagrus ovipositor Soyka, 1955: 25, ♀, syn.n.
Anagrus supremus Soyka, 1955: 25, ♀, syn.n.
Anagrus vacuipennis Soyka, 1955: 25, ♀, syn.n.
Anagrus longigaster Soyka, 1955: 25, ♀, syn.n. ([9])
Anagrus silwoodensis Walker, 1979: 200, ♂ ♀, syn.n.

This species, in addition to the features typical of the "*incarnatus*" group is characterized by: first segment of the funicle about 1 third as long as the second, usually longer than the third; hairless area on the forewing disc ([10]); forewing length/maximum width about 9-10.5; ovipositor projecting from the gaster for about 1 seventh of its length; ovipositor/fore tibia ratio about 2.7-3.

Male with characteristic arrangement of setae on forewing and genitalia typical of the "*incarnatus*" group.

The specimens I collected in spring from eggs of *Cicadella viridis* L. on *Carex* sp. in Piacenza (Chiappini & Curto, 1987) belong to this species. These specimens have a yellowish-brown colour whereas some others I collected in spring from eggs of *Cicadella viridis* L. on *Carex paniculata* L. in Dijon have a more orange colour. Walker (1979) stated that females of *A. silwoodensis* are a yellowish or brownish-orange colour and that males are darker.

One of the species described by Abdul-Baki (named by him as *Anagrus* form a.), which attacks the eggs of *C. viridis* through the leaf epidermis, appears to correspond to this species.

I consider the following specimens of Soyka's collection to be the holotypes of the species they represent: the female n° 347 standing under the name *Anagrus breviphragma* Soyka and labelled "type" by Soyka (locality and date not specified); the female n° 426 standing under the name *Anagrus longigaster* Soyka, labelled "type" by Soyka and collected at Kroessbach (Austria), 7-VII-1945; the female n° 451 standing under the name *Anagrus ovipositor* Soyka, labelled "type" by Soyka and collected at Ickchens Hof (Malchin, Germany), VIII-1936; the female n° 485 standind under the name *Anagrus supremus* Soyka, labelled "type" by Soyka and collected at Hundsheim (Hainburg, Austria), 2-VII-1944; the female n° 491 standing under the name *Anagrus vacuipennis* Soyka, labelled "type" by

([9]) In both the holotype and the paratype of *A. longigaster* Soyka the hairless area is slightly less evident, but Graham, when treating of *A. silwoodendis* Walker, states that this character may be more or less accentuated.

([10]) In this case almost the whole posterior half of the forewing blade is completely hairless (fig. 18), whereas in *A. atomus* and *A. ustulatus* the hairless area is limited to an oval portion on the distal third of the posterior half of the disc (fig. 19).

Soyka and collected at Hundsheim, 21-IX-1953. I consider to be the allotype of *Anagrus breviphragma* Soyka the male n°348 labelled "type" by Soyka (locality and date not specified).

Specimens examined: *Anagrus breviphragma* Soyka holotype n° 347 ♀ and allotype n° 348 ♂; *Anagrus longigaster* Soyka holotype n° 426 ♀ and paratype n° 427 ♀, Guetersloh (Germany), 30-04-1959; *Anagrus ovipositor* Soyka holotype n° 451 ♀; *Anagrus supremus* Soyka holotype n° 485 ♀; *Anagrus vacuipennis* Soyka holotype n° 491 ♀ (Naturhistorisches Museum, Vienna); *Anagrus silwoodensis* Walker holotype and paratypes MIIOI/3,4 ♀♀ and MIIOI/2 ♂ (British Museum of Natural History, London); 13 ♀♀ 9 ♂♂, prov. of Piacenza (Italy), 30-X-1985, in eggs of *Cicadella viridis* L. in *Carex* spp.; 7 ♀♀ 7 ♂♂, same locality, 14-II-1984, same host and plant; 1 ♀ 1 ♂, Dijon (France), 22-IV-1989, same host on *Carex paniculata* L. (Istituto di Entomologia, Piacenza).

Anagrus (Anagrus) ensifer Debauche

Anagrus ensifer Debauche, 1948: 136-137, ♀.
Anagrus incarnatus Haliday; Bakkendorf (part.), 1926: 249-270.
Anagrus ensifer Debauche; Walker, 1979: 200, ♂ ♀.

This species, in addition to the features typical of the "*incarnatus*" group, is characterized by: third segment of the funicle without sensory ridges; 2 setae on mesoscutum; forewing uniformly covered with hairs; forewing length/maximum width about 10; 2 setae on each of the external plates of the ovipositor; extraordinarily long ovipositor, projecting from gaster by about 1 third of its length; ovipositor/fore tibia ratio about 3.9-4.

On the basis of Walker's (1979) and Abdul-Baki's (1979) observations, this species probably includes biologically distinct forms.

Specimens examined: *Anagrus ensifer* Debauche holotype n°137 ♀, Vossem (Belgium), 18-V-1941; 1 ♀, Schliffkopf (Germany), 27-VIII-1959 (Institut Royal des Sciences Naturelles de Belgique, Brussels).

Anagrus (Anagrus) bakkendorfi Soyka

Anagrus bakkendorfi Soyka, 1946: 40, ♀.
Anagrus latipennis Soyka, 1955: 24, ♀, syn.n.

This species, in addition to the features typical of the "*incarnatus*" group, is characterized by: third segment of funicle without sensory ridges and shorter than the second and all the following ones; club longer than the sixth and fifth funicle

segments together; 2 setae on the mesoscutum; very wide forewing uniformly covered with hairs; forewing length/maximum width about 7 ([11]); 2 setae on the external plates of the ovipositor; ovipositor projecting from gaster by about 1 seventh-eighth of its length; ovipositor/fore tibia ratio about 2.8.

I consider the following specimens of the Soyka's collection to be the holotypes of the species they represent: the female, n° 340, standing under the name *Anagrus bakkendorfi* Soyka, labelled "type" by Soyka and collected at Valkenburg (Holland), 7-X-1931; the female, n° 417, standing under the name *Anagrus latipennis* Soyka, labelled "type" by Soyka and collected at Ickchens Hof (Malchin, Germany), VIII-1935. I consider to be the allotype of *Anagrus latipennis* Soyka the male n°418 labelled "type" by Soyka and collected at Breslau (Germany), 26-X-1933.

Specimens examined: *Anagrus bakkendorfi* Soyka holotype n° 340 ♀ and paratypes n°342 and n° 343 ♀♀, Valkenburg, 7-X-1931; *Anagrus latipennis* Soyka holotype n° 417 ♀, allotype n° 418 ♂ and paratype n° 420 ♀, Valkenburg, 7-X-1931 (Naturhistorisches Museum, Vienna); *Anagrus bakkendorfi* Soyka paratype ♀, Valkenburg (Holland), 7-X-1931 (Institut Royal des Sciences Naturelles de Belgique, Brussels) ([12]).

Anagrus (Anagrus) valkenburgensis Soyka

Anagrus valkenburgensis Soyka, 1955: 24, ♀.

This species is very similar to *A. bakkendorfi* but differs from it by: third segment of funicle with 1 sensory ridge and as long as the second one; ovipositor not projecting from gaster.

I consider the female, n° 494, standing under the name *Anagrus valkenburgensis* Soyka, labelled "type" by Soyka and collected at Valkenburg, 7-X-1931 to be the holotype of the species. I consider the male n° 492 labelled "type" by Soyka, collected at Valkenburg (Holland), 15-X-1931 to be the allotype of *Anagrus valkenburgensis* Soyka.

Specimens examined: *Anagrus valkenburgensis* Soyka holotype n° 494 ♀, allotype n° 492 ♂ and paratype n° 493 ♀, Valkenburg, 15-X-1931 (Naturhistorisches Museum, Vienna).

([11]) In his description of the species Soyka (1946) stated that "the forewings are only 6 times as long as wide", whereas in his key (1955) he mentions the same species as having a forewing 8 times as long as wide.

([12]) This specimen and the paratype n°342 do not belong to the species *A. bakkendorfi* but to *A. arcuatus*.

Anagrus (Anagrus) arcuatus Soyka

Anagrus arcuatus Soyka, 1955: 24, ♀.

This species is very similar to *A. bakkendorfi* but differs from it by: ovipositor not projecting from gaster; ovipositor/fore tibia ratio about 1.8-2.

I consider the female n° 355 labelled *Anagrus arcuatus* Soyka "type" by Soyka (locality not specified, 19-VI-1942) to be the holotype of the species.

Specimens examined: *Anagrus arcuatus* Soyka holotype n° 335 ♀ (Naturhistorisches Museum, Vienna); 10 ♀♀ Exlangen (Great Britain) (Muséum d'Histoire Naturelle, Genève).

Anagrus (Anagrus) avalae Soyka

Anagrus avalae Soyka, 1955: 24, ♀.
Anagrus diversicornis Soyka, 1955: 24, ♀, syn.n

This species is very similar to *A. bakkendorfi* but differs from it by: fifth segment of the funicle without sensory ridges; ovipositor not projecting from gaster.

I consider the following specimens of the Soyka's collection to be the holotypes of the species they represent: the female, n° 338 standing under the name *Anagrus avalae* Soyka, labelled "type" by Soyka and collected at Avala-Berg (Belgrade, Yugoslavia), 28-VIII-1934; the female, n° 362 standing under the name *Anagrus diversicornis* Soyka, labelled "type" by Soyka and collected at Valkenburg (Holland), 7-X-1931.

Specimens examined: *Anagrus avalae* Soyka holotype n° 338 ♀; *Anagrus diversicornis* Soyka holotype n° 362 ♀ (Naturhistorisches Museum, Vienna).

Anagrus (Anagrus) subfuscus Foerster sensu Debauche

Anagrus subfuscus Foerster, 1847: 214, ♂.
Anagrus subfuscus Foerster; Heymons, 1908: 137-150, ♀.
Anagrus subfuscus Foerster; Martin, 1912: 595-598.
Anagrus subfuscus Foerster; Ruschka & Thienemann, 1913: 82-83.
Anagrus subfuscus Foerster; Thienemann, 1916: 49.
Anagrus subfuscus Foerster; Henriksen, 1918-19: 150-155.
Anagrus incarnatus subfuscus Foerster; Debauche, 1948: 135, ♂ ♀.
Anagrus subfuscus Foerster; Sahad & Hirashima, 1984: 63,64-65.

This species is characterized, apart from the typical features of the group, by: third segment of funicle with 1 sensory ridge and shorter than the second as long

as twice the first one; club shorter than the sixth and fifth funicle segments together; 2 setae on the mesoscutum; forewing without hairless area on the disc; forewing length/maximum width about 8-8.5; 3 setae on the external plates of the ovipositor; ovipositor projecting from gaster by about 1 sixth of its length; ovipositor/fore tibia ratio about 3-3.2.

Foerster's material, as already stated, does not exist any more so that a neotype ought to be designated on the bases of Foerster's description, which is in fact very poor.

For these reasons I consider Debauche's interpretation of the species to be the valid one even though he does not specify if he had examined Foerster's types.

The specimens in Debauche's collection labelled "*Anagrus incarnatus subfuscus* Foerster 1847" are all males except for slide n° 181, collected at Eegenhoven on the 18-5-1942. This is the one which corresponds to Debauche's description and drawings, and which I designate as neotype.

This specimen corresponds, in almost all the characters considered, to Heymons's description, except for the arrangement of the sensory ridges on the segments of the funicle and the club. Heymons stated that these sensory ridges are 1 on the seventh segment of the antenna, 2 on the eighth and 4 on the club, whereas the neotype has sensory ridges also on the fifth and sixth segments of the antenna and 5 of them on the club.

The drawings of *A. subfuscus* by Sahad & Hirashima (1984) do not report the 2 setae on mesoscutum, so it would seem that 2 different species are involved, even though all the other features considered are the same.

A. subfuscus is a much larger species than the others of the genus. I myself recently collected a female specimen belonging to this species from eggs of leafhoppers on *Carex paniculata* L. in France which seems, as Debauche had already pointed out, to be quite rare.

Specimens examined: *Anagrus incarnatus subfuscus* Foerster sensu Debauche specimens of the Debauche collection (Institut Royal des Sciences Naturelles de Belgique, Brussels); 1 ♀, Dijon (France), on *Cicadella viridis* L., 22-IV-1989 (Istituto di Entomologia, Piacenza).

Anagrus (Anagrus) supremosimilis Soyka

Anagrus supremosimilis Soyka, 1955: 26, ♀.

This species is very similar to the previous one, but it is light yellow, and not brown like *A. subfuscus*.

I consider the female n°484 labelled *Anagrus supremosimilis* Soyka "type" by Soyka, collected at Weidenhof (Breslau, Germany), VII-1934 to be the holotype of the species.

Specimens examined: *Anagrus supremosimilis* Soyka holotype n° 484 ♀ (Naturhistorisches Museum, Vienna).

Anagrus (Anagrus) dilatatus Soyka

Anagrus dilatatus Soyka, 1955: 25, ♀.

This species, in addition to the features typical of the "*incarnatus*" group is characterized by: 1 sensory ridge on the third segment of the funicle; 2 setae on the mesoscutum; forewing without hairless area; forewing length/maximum width about 8.5; short ovipositor not projecting at all from gaster; ovipositor/fore tibia ratio about 1.9.

I consider the female n°359 labelled *Anagrus dilatatus* Soyka "type" by Soyka, collected at Valkenburg (Holland), 7-X-1931 to be the holotype of the species.

Specimens examined: *Anagrus dilatatus* Soyka holotype n° 359 ♀ (Naturhistorisches Museum, Vienna).

Anagrus (Anagrus) obvius Soyka

Anagrus obvius Soyka, 1955: 26, ♀.
Anagrus longus Soyka, 1955: 26, ♀, syn.n.

This species is distinguished from *A. dilatatus* in having 2 sensory ridges, rather than 1, on the third segment of the funicle.

I consider the following specimens of the Soyka's collection to be the holotypes of the species they represent: the female, n° 444 standing under the name *Anagrus obvius* Soyka, labelled "type" by Soyka and collected at Kroessbach (Austria), 20-IX-1945; the female, n° 429 standing under the name *Anagrus longus* Soyka, labelled "type" by Soyka and collected at Gschnitz Tal (Austria), 16-IX-1944.

Specimens examined: *Anagrus obvius* Soyka holotype n° 444 ♀, *Anagrus longus* Soyka holotype n°429 ♀ (Naturhistorisches Museum, Vienna).

Anagrus (Anagrus) brocheri Schulz

Anagrus brocheri Schulz, 1910: 192-193, ♂ ♀.
Anagrus andrease Soyka, 1955: 26, ♀, syn.n.
Anagrus latior Soyka, 1955: 25, ♀, syn.n.

This species, in addition to the features typical of the "*incarnatus*" group is characterized by: third segment of funicle without sensory ridges; 2 setae on mesoscutum; forewing without hairless area; forewing length/maximum width about 8.5-9; ovipositor projecting from gaster 1 ninth or tenth of its length; ovipositor/fore tibia ratio about 2.0-2.4.

I consider the following specimens of the Soyka's collection to be the holotypes of the species they represent: the female, n° 334 standing under the name *Anagrus andreae* Soyka, labelled "type" by Soyka and collected at Neusiedler See (Austria), 11-VIII-1942; the female, n° 414 standing under the name *Anagrus latior* Soyka, labelled "type" by Soyka and collected at Neusiedler See, 11-VIII-1942.

I consider the female and the male mounted on the same slide, labelled *A. brocheri* Schulz "types" by Schulz and collected at Vandoeuvres (Genève, Switzerland), IX-1906 to be respectively the holotype and the allotype.

Specimens examined: *Anagrus brocheri* Schulz holotype ♀ and allotype ♂ (Muséum d'Histoire Naturelle, Genève); *Anagrus andreae* Soyka holotype n° 334 ♀, *Anagrus latior* Soyka holotype n°414 ♀ (Naturhistorisches Museum, Vienna).

Anagrus (Anagrus) similis Soyka

Anagrus similis Soyka, 1955: 26, ♀.
Anagrus flavus Foerster; Soyka, 1955: 25, ♀.
Anagrus holci Walker, 1979: 198, ♂ ♀.

This species is identical to *A. brocheri* except that the third segment of the funicle bears 1 sensory ridge and the body colour is light yellow.

I consider the female, n° 478 standing under the name *Anagrus similis* Soyka, labelled "type" by Soyka and collected at Ickchens Hof (Malchin, Germany), VIII-1935 to be the holotype of the species.

The female n°368 labelled *Anagrus flavus* Foerster "lectotype" by Soyka is an invalid designation.

Specimens examined: *Anagrus similis* Soyka holotype n° 478 ♀; *Anagrus flavus* Foerster sensu Soyka ♀ (Naturhistorisches Museum, Vienna); *Anagrus holci* Walker holotype and paratypes n° MIIOO /3,4 ♀♀ and n° MIIOO/5 ♂ (British Museum of Natural History, London).

Anagrus (Anagrus) obscurus Foerster sensu Soyka

Anagrus obscurus Foerster, 1861: 43, ♀.
Anagrus obscurus Foerster; Soyka, 1955: 25, ♀.

This species is identical to *A. brocheri* except that the third segment of the funicle bears 1 sensory ridge. Fourth segment of the funicle with 1 sensory ridge.

Foerster's material, as already stated, does not exist any more so that a neotype ought to be designated on the bases of Foerster's description, which is, in fact, very poor.

Anyway, as Soyka's interpretation of the species concords, as far as is possible,

with Foerster's description and as the examination of Soyka's specimen proved it to be a valid species, I designate the female n° 442, collected at Kroessbach (Austria) and labelled *Anagrus obscurus* Foerster "lectotype" by Soyka (invalid designation) as neotype.

The specimen n° 443 labelled *Anagrus obscurus,* Foerster "lectotype" by Soyka is an invalid designation.

The specimens reared from leafhoppers eggs laid individually along the venation of *Carex* sp. leaves (Chiappini, 1987) belong to *A. obscurus.*

Specimens examined: *Anagrus obscurus* Foerster sensu Soyka neotype n° 442 ♀ and specimen n° 443 ♂ (Naturhistorisches Museum, Vienna); 22 ♀♀ 30 ♂♂, prov. of Piacenza (Italy), in leafhopper eggs in *Juncus* leaves, 15-II-1984 (Istituto di Entomologia, Piacenza).

Anagrus (Anagrus) fennicus Soyka

Anagrus fennicus Soyka, 1955: 26, ♀.

This species differs from *A. obscurus* in having 2 sensory ridges on the third and fourth segment of the funicle instead of 1.

I consider the female, n° 4 standing under the name *Anagrus fennicus* Soyka, labelled "paratype" by Soyka and collected in Finland (28° lat., 68°10' long.), 29-VIII-1938 to be the holotype of the species as it is the only specimen under this name in Soyka's collection.

Specimens examined: *Anagrus fennicus* Soyka holotype n° 4 ♀ (Naturhistorisches Museum, Vienna).

Anagrus (Anagrus) incarnatus Haliday

Anagrus incarnatus Haliday, 1833: 347, ♀.
Anagrus incarnatus Haliday; Foerster, 1847: 215.
Anagrus incarnatus Haliday; Bakkendorf (part.), 1926: 249-270.
Anagrus incarnatus incarnatus Haliday; Debauche, 1948: 132-135, ♂ ♀.
Anagrus pallidus Foerster; Soyka, 1955: 26, ♀, syn. n.
Anagrus neopallidus Soyka, 1955: 26, ♀, syn.n.
Anagrus pallidior Soyka, 1955: 26, ♀, syn.n.
? *Anagrus atomus* (L.); Maillet, 1960, ♀, 197-208, misidentified.
? *Anagrus incarnatus* Haliday; Radu & Botoc: 1960: 321-323.
Anagrus incarnatus Haliday; Graham, 1982: 197-200.
? *Anagrus incarnatus* Haliday; Sahad & Hirashima, 1984: 46-50, ♀.

This species is characterized, apart from the typical features of the group, by: third segment of funicle with 1 sensory ridge and as long as 1 third of the second

one; hairless mesoscutum; forewing without hairless area; forewing length/maximum width about 8-10; ovipositor projecting about 1 eighth of its length or even not at all from gaster; ovipositor/fore tibia ratio about 2.2-2.8.

Referring to the specimens of *A. incarnatus* they studied, Sahad & Hirashima (1984) stated that there were only 4 sensory ridges on the club, so it would seem that 2 different species are involved, even though all the other features considered are the same.

I consider the following specimens of Soyka's collection to be the holotypes of the species they represent: the female, n° 435 standing under the name *Anagrus neopallidus* Soyka, labelled "type" by Soyka and collected at Hundsheim (Hainburg, Austria), 22-IX-1954; the female, n° 452 standing under the name *Anagrus pallidior* Soyka, labelled "type" by Soyka and collected at Hundsheim, 10-VIII-1942.

The female n° 453 labelled *Anagrus pallidus* Foerster "lectotype" by Soyka is an invalid designation.

Specimens examined: *Anagrus incarnatus* Haliday lectotype ♀ (National Museum of Irelad, Dublin); *Anagrus incarnatus incarnatus* Haliday sensu Debauche specimens of the Debauche collection (Institut Royal des Sciences Naturelles de Belgique, Brussels), *Anagrus pallidus* Foerster sensu Soyka specimen n° 453 ♀, Valkenburg (Holland), 7-X-1931; *Anagrus neopallidus* Soyka holotype n° 435 ♀, *Anagrus pallidior* Soyka holotype n° 452 ♀ (Naturhistorisches Museum, Vienna).

Anagrus (Anagrus) incarnatosimilis Soyka

Anagrus incarnatosimilis Soyka, 1955: 25, ♀.
Anagrus danicus Soyka, 1955: 26, ♀, syn.n.
Anagrus pulcher Soyka, 1955: 25, ♀, syn.n. ([13])
Anagrus pulcherrimus Soyka, 1955: 26, ♀, syn. n.
Anagrus varicolor Soyka, 1955: 26, ♀, syn.n.
Anagrus mutans Walker, 1979: 199, ♂ ♀, syn.n.
? *Anagrus stenocrani* Walker, 1979: 198, ♂ ♀.
Anagrus mutans Walker; Graham, 1982: 197-199.

This species differs from the previous one in being darker in colour ([14]). Walker

([13]) Soyka (1955) placed *A. pulcher* among the species characterized by the presence of a hairless area on the disc of the forewing, but examination of the holotype revealed that the wing is uniformly covered with hairs.

([14]) Graham distinguished the species *Anagrus incarnatus* Haliday from the species *Anagrus mutans* Walker on the basis of the difference in colour: the first paler and the other darker. Sahad and Hirashima (1984), also treating of *A. incarnatus*, stated that it could vary from a yellow colour to brown depending on whether it developed in eggs of *Niliparvata lugens* or *Nephotettix cincticeps*. The latter authors, however, did not specify the reasons that made them believe both these populations belonged to the same species.

stated that the females may have a colour varying from light brownish-orange to dark brown.

This species includes forms that differ slightly in morphology but which could be distinguished only through examination of series of individuals of well-defined populations. In particular, there are individuals of larger dimensions which have a longer ovipositor slightly projecting from gaster (ovipositor/fore tibia ratio about 2.4-3.2) whereas others have an ovipositor which does not project from gaster and is of reduced length compared with the larger specimens (ovipositor/fore tibia ratio about 1.9-2.1).

This distinction may correspond, on the basis of Walker's (1979) description to that existing between the species *A. mutans* and *A. stenocrani* even though the paratype of this latter species, examined by me, does not correspond to the description regarding the ovipositor and gaster, but is the same as the paratypes of *A. mutans*.

The specimens of *A. stenocrani* were obtained by Walker (1979) from eggs of *Stenocranus minutus* (Fabricius) in *Dactylis glomerata* L., while the specimens of *A. mutans* were obtained by Walker from eggs of *Mullerianella fairmairei* (Perris) and of *C. viridis*. Again from eggs of *Mullerianella fairmairei* (Perris) and of *C. viridis* in *Juncus* sp. Abdul-Baki (1979) obtained 2 distinct populations, called *Anagrus* form f. and *Anagrus* form g. respectively.

According to the data given by Abdul-Baki the 2 species he recognized differ not only in their host species but also in their manner of depositing the eggs: *Anagrus* form f. lays its eggs through the opening in the plant tissues caused by the leafhoppers, whereas *Anagrus* form g. makes its own hole in the plant tissue, and therefore it is probable that *A. mutans* itself may include at least 2 distinct species.

Males have genitalia typical of the "*incarnatus*" group. I consider the following specimens of the Soyka's collection to be the holotypes of the species they represent: the female, n° 383, standing under the name *Anagrus incarnatosimlis* Soyka, labelled "type" by Soyka and collected at Hundsheim (Hainburg, Austria), 21-IX-1953; the female, n° 354, standing under the name *Anagrus danicus* Soyka, labelled "type" by Soyka and collected near Kopenhagen (Denmark), 21-III-1945; the female, n° 462, standing under the name *Anagrus pulcher* Soyka, labelled "type" by Soyka and collected at Domatschine (Breslau, Germany), VII-1934; the female, n° 473, standing under the name *Anagrus pulcherrimus* Soyka, labelled "type" by Soyka and collected at Hundsheim, 22-IX-1954; the female, n° 496 standing under the name *Anagrus varicolor* Soyka, labelled "type" by Soyka and collected at Hundsheim, 8-IX-1940. I consider the male n°353 labelled "type" by Soyka and collected near Kopenhagen, 21-III-1945 to be the allotype of *Anagrus danicus* Soyka.

The specimen labelled *A. pulcherrimus* Soyka n°472 ♂ "type" and collected and collected at Hundsheim, 22-IX-1954 does not belong to this species as it bears 2 setae on the mesoscutum and therefore cannot be considered the allotype.

Specimens examined: *Anagrus incarnatosimilis* Soyka holotype n° 383 ♀, paratypes n° 6 ♀, Hundsheim, 26-IX-1953 and 382 ♀, Neustadt (Breslau, Germany), V-1934; *Anagrus danicus* Soyka holotype n° 354 ♀ and allotype n°353 ♂; *Anagrus pulcher* Soyka holotype n° 462 ♀, *Anagrus pulcherrimus* Soyka holotype n° 473 ♀ and specimen n°472 ♀; *Anagrus varicolor* Soyka holotype n° 496 ♀ (Naturhistorisches Museum, Vienna); *Anagrus mutans* Walker holotype and paratypes MIIOI/1, MIIOO/8 ♀♀ and MIIOO/7 ♂; *Anagrus stenocrani* Walker holotype and paratype MIIOO/6 ♀ (British Museum of Natural History, London); 5 ♀♀ 3 ♂♂, prov. of Piacenza (Italy), in eggs of *C. viridis*, 30-X-1985; 16 ♀♀ 1 ♂, same locality, 29-IX-1984 (Istituto di Entomologia, Piacenza).

ACKNOWLEDGMENTS

I wish to thank Prof. G. Domenichini and Dr. J. Huber for their helpful comments on the manuscript.

I am also grateful to Dr. M. Fischer of the Naturhistorisches Museum of Vienna for his kindness in lending me the Soyka collection of *Anagrus*, to Dr. P. Dessart of the Institut Royal des Sciences Naturelles de Belgique of Brussels for the loan of the Debauche collection of *Anagrus* and all the other specimens of *Anagrus* kept in the museum and for his useful suggestions, to Dr. S. Noyes and all the staff of the Department of Entomology of the British Museum (Natural History) of London for all the help they gave me when I was studying the Walker collection and other material related to my work, to Dr. C. Besuchet of the Muséum d'Histoire Naturelle of Genève for the loan of the types kept in his museum, Dr. J. P. O'Connor of the National Museum of Ireland for the loan of the Haliday types and to Prof. M. F. Claridge and his collaborators for lending me Abdul-Baki's thesis, and for valuable discussion on species concept.

SUMMARY

The author has reviewed the European species of *Anagrus* Haliday genus.

The specimens of the Debauche, Soyka and Walker collections were examined together with other specimens collected by the author. *A. nigriceps* (Smits van Burgst), *A. incarnatus fuscus* Botoc and an unnamed species keyed by Graham (1982) were not studied and therefore not included in this review.

The genus is subdivided into 3 subgenera: *Paranagrus* Perkins, *Anagrella* Bakkendorf and *Anagrus* Haliday s. str.. This last subgenus is itself subdivided in 2 groups: the "*atomus*" and "*incarnatus*" species group.

The characters used in species descriptions are discussed.

The following species are considered to occur in Europe: *A. arcuatus* Soyka, *A. avalae* Soyka, *A. bakkendorfi* Soyka, *A. breviphragma* Soyka, *A. brocheri* Schultz, *A. dilatatus* Soyka, *A. ensifer* Debauche, *A. fennicus* Soyka, *A. incarnatus* Haliday, *A. incarnatosimilis*

Soyka, *A. obscurus* Foerster sensu Soyka, *A. obvius* Soyka, *A. similis* Soyka, *A. subfuscus* Foerster sensu Debauche, *A. supremosimilis* Soyka, *A. ustulatus* Haliday, *A. valkenburgensis* Soyka.

A key to females and descriptions of the species are given.

The following species have been placed in synonymy: *Anagrus devius* Soyka, *Anagrus gabitzi* Soyka, *Anagrus hundsheimensis* Soyka, *Anagrus kressbachi* Soyka, *Anagrus lemonicolor* Soyka, *Anagrus levis* Soyka, *Anagrus stammeri* Soyka and *Anagrus varius* Soyka with *Anagrus atomus* (L.); *Anagrus parvus* Soyka with *Anagrus ustulatus* Haliday; *Anagrus ovipositor* Soyka, *Anagrus supremus* Soyka, *Anagrus vacuipennis* Soyka and *Anagrus longigaster* Soyka with *Anagrus breviphragma* Soyka; *Anagrus latipennis* Soyka with *Anagrus bakkendorfi* Soyka; *Anagrus diversicornis* Soyka with *Anagrus avalae* Soyka; *Anagrus longus* Soyka with *Anagrus obvius* Soyka; *Anagrus latior* Soyka and *Anagrus andreae* Soyka with *Anagrus brocheri* Schulz; *Anagrus holci* Walker with *Anagrus similis* Soyka; *Anagrus neopallidus* Soyka and *Anagrus pallidior* Soyka with *Anagrus incarnatus* Haliday; *Anagrus danicus* Soyka, *Anagrus pulcher* Soyka, *Anagrus pulcherrimus* Soyka, *Anagrus varicolor* Soyka, *Anagrus mutans* Walker and *Anagrus stenocrani* Walker with *Anagrus incarnatosimilis* Soyka.

RIASSUNTO

Revisione delle specie europee del genere Anagrus *Haliday (Hymenoptera Chalcidoidea).*

L'autore ha revisionato le specie europee del genere *Anagrus* Haliday.

Sono stati esaminati gli esamplari delle collezioni Debauche, Soyka e Walker oltre ad altri esemplari raccolti dall'autore stesso. Non sono state studiate e quindi non sono state inserite nella revisione: *A. nigriceps* (Smits van Burgst), *A. incarnatus fuscus* Botoc e la specie indeterminata inserita da Graham (1982) nella sua chiave delle specie.

Il genere viene suddiviso nei sottogeneri *Paranagrus* Perkins, *Anagrella* Bakkendorf e *Anagrus* Haliday s. str.. Quest'ultimo sottogenere viene a sua volta distinto in 2 gruppi di specie: l' "*atomus*" e l' "*incarnatus*".

I caratteri utilizzati nelle descrizioni delle specie vengono discussi.

Sono considerate presenti in Europa le seguenti specie: *A. arcuatus* Soyka, *A. avalae* Soyka, *A. bakkendorfi* Soyka, *A. breviphragma* Soyka, *A. brocheri* Schultz, *A. dilatatus* Soyka, *A. ensifer* Debauche, *A. fennicus* Soyka, *A. incarnatus* Haliday, *A. incarnatosimilis* Soyka, *A. obscurus* Foerster sensu Soyka, *A. obvius* Soyka, *A. similis* Soyka, *A. subfuscus* Foerster sensu Debauche, *A. supremosimilis* Soyka, *A. ustulatus* Haliday, *A. valkenburgensis* Soyka.

Viene fornita una chiave di classificazione delle femmine e una descrizione delle specie.

Le specie seguenti sono state messe in sinonimia: *Anagrus devius* Soyka, *Anagrus gabitzi* Soyka, *Anagrus hundsheimensis* Soyka, *Anagrus kressbachi* Soyka, *Anagrus lemonicolor* Soyka, *Anagrus levis* Soyka, *Anagrus stammeri* Soyka e *Anagrus varius* Soyka con *Anagrus atomus* (L.); *Anagrus parvus* Soyka con *Anagrus ustulatus* Haliday; *Anagrus ovipositor* Soyka, *Anagrus supremus* Soyka, *Anagrus vacuipennis* Soyka e *Anagrus longigaster* Soyka con *Anagrus breviphragma* Soyka; *Anagrus latipennis* Soyka con *Anagrus bakkendorfi* Soyka; *Anagrus diversicornis* Soyka con *Anagrus avalae* Soyka; *Anagrus longus* Soyka con *Anagrus obvius* Soyka; *Anagrus latior* Soyka e *Anagrus andreae* Soyka

con *Anagrus brocheri* Schulz; *Anagrus holci* Walker con *Anagrus similis* Soyka; *Anagrus neopallidus* Soyka e *Anagrus pallidior* Soyka con *Anagrus incarnatus* Haliday; *Anagrus danicus* Soyka, *Anagrus pulcher* Soyka, *Anagrus pulcherrimus* Soyka, *Anagrus varicolor* Soyka, *Anagrus mutans* Walker e *Anagrus stenocrani* Walker con *Anagrus incarnatosimilis* Soyka.

Key words: Mymaridae, *Anagrus*, taxonomy.

REFERENCES

ABDUL-BAKI M.H.A., 1979 - Biological investigations on the entomophagous parasites of insect eggs associated with juncus species. - Thesis, Department of Zoology, University College, Cardiff: 1-206.

ANNECKE D.P., DOUTT R.L., 1961 - The genera of the Mymaridae - Hymenoptera: Chalcidoidea. - Dep. Agr. Tech. Serv. Ent. Mem. 5: 1-71.

ASHMEAD W.H., 1905 - Two New Mymaridae from Russian Turkestan. - Entom. News 16: 213-214.

BAKKENDORF O., 1926 - Recherches sur la Biologie de l'*Anagrus incarnatus* Haliday. - Ann. Biol. lac. 14: 249-270.

BAKKENDORF O., 1962 - Descriptions of a New Subterranean Genus of *Mymaridae* (Hymen.). - Mitt. Schweiz. Ent. Ges. 34 (4): 372-376.

BLANCHARD E., 1840 - Histoire naturelle des insectes 3. - Paris: 1- 672 (cfr. 293).

BOTOC M., 1963 - Noi contributii la studiul Calcidoidelor di R.P.R. (VIII). - Studia Univ. Babes Bolyai (Biol.) 1: 95-109.

CHIAPPINI E., 1987 - Ricerche sulla variabilità di *Anagrus atomus* (L.) (Hymenoptera Mymaridae) e di una specie affine presente sul rovo. - Boll. Zool. agr. Bachic., Ser. II, 19 (1986-87): 71-97.

CHIAPPINI E., CURTO O., 1987 - Biosystematics and morphometry of some italian species of *Anagrus* (Hymenoptera: Mymaridae). - Advances in Parasitic Hymenoptera Research, Proceedings of the II Conference on the Taxonomy and Biology of Parasitic Hymenoptera, University of Florida (Gainesville, Florida), 19-21 novembre 1987: 65-77.

DALLA TORRE C.G., 1898 - Catalogus Hymenopterorum hucusque descriptorum systematicus et synonymicus. 5, Chalcidiae et Proctotrupidae. - Leipzig: 1-568 (cfr. 422-423).

DEBAUCHE H.R., 1948 - Etude sur les Mymarommidae et les Mymaridae de la Belgique. - Mem. Mus. Hist. Nat. Belgique 108: 1-248 (cfr. 128-139).

DEBAUCHE H.R., 1949 - Mymaridae (Hymenoptera Chalcidoidea). - Exploration du Parc National Albert. Mission G.F. de Witte. 49: 1-105 (cfr. 60-61).

FOERSTER A., 1847 - Über die Familie der Mymariden. - Linnaea Ent. 2: 195-233.

FOERSTER A., 1861 - Ein Tag in den Hoch-Alpen. - Prog. Realsch. Aachen (1860-61): 1-44.

GAHAN A.B., FAGAN M.M., 1923 - The type species of the genera of Chalcidoidea or chalcidflies. - Bull. U.S. natn. Mus. 124 (11): 1-173.

GIRAULT A.A., 1912 - Australian Hymenoptera Chalcidoidea. II. The family Mymaridae with descriptions of new species. - Mem. Queensland Museum 1: 117-175 (cfr. 154-160).

GORDH G., DUNBAR D.M., 1977 - A new *Anagrus* important in the biological control of *Stephanitis takeyai*, and a key to the north american species. - Florida Ent. 60 (2): 85-97.

GRAHAM M.W.R. DE V., 1982 - The Haliday collection on Mymaridae (Insecta, Hymenoptera, Chalcidoidea) with taxonomic notes on some material in other collections. - Proceedings of the Royal Irish Acad. B 82 (12): 189-243.

HALIDAY A.H., 1833 - An essay of the classification of the parasites Hymenoptera of Britain, which correspond with the Ichneumones minuti of Linnaeus. - Ent. Mag. 1: 333-350 (cfr. 346-347).

HENRIKSEN K.L., 1918-19 - The aquatic Hymenoptera of Europe and their biology. - Entom. Medel. 12 (2): 146-155.

HEQVIST K.J., 1954 - Zwei neue Mymariden (Hym.) aus Schweden. - Ent. Tidsker. 75: 272-275.

HEYMONS R., 1908 - Süsswasser-Hymenopteren aus der Umgebund Berlins. - Deut. Ent. Zeit.: 137-150.

HUBER J.T., 1986 - Systematics, biology, and hosts of the *Mymaridae* and *Mymarommatidae* (Insecta: Hymenoptera): 1758-1984. - Entomography 4: 185-243.

HUBER J.T., RAJAKULENDRAN S.V., 1988 - Redescription of and host-induced antennal variation in *Anaphes iole* Girault (Hymenoptera: Mymaridae), an egg parasite of Miridae (Hemiptera) in North America. - Can. Ent. 120: 893-901.

KING P.E., COPLAND M.J.W., 1969 - The structure of the female reproductive system in the Mymaridae (Chalcidoidea: Hymenoptera). - J. nat. Hist. 3: 349-365.

KRYGER J.P., 1950 - The European Mymaridae comprising the genera known up to c. 1930. - Ent. Medd. 26: 1-97.

INTERNATIONAL CODE OF ZOOLOGICAL NOMENCLATURE, 1985 - International trust for zoological nomenclature. - London: 1-338.

LINNAEUS C., 1767 - Systema Naturae. Editio duodecima reformata. 1 (2). - Holmiae (cfr. 940-941).

MAC GILL E.I., 1934 - On the biology of *Anagrus atomus* (L.) Hal.: an egg parasite of the leaf-hopper *Erythroneura pallidifrons* Edwards. - Parasitology 26: 57-63.

MAILLET P.L., 1960 - Sur le parasitisme d'oeufs de la Cicadelle verte (*Cicadella viridis* L.) par un Hyménoptère Mymaridae: *Anagrus atomus* (L.) forme *incarnatus* Hal. - Rev. Path. vég. Ent. agric. France 34 (4): 197-208.

MARTIN F., 1912 - *Anagrus subfuscus* Foerster aus der Umgebung von Leipzig (Hym.). - Deut. Ent. Zeit.: 595-598.

MAYR E., LINSEY E.G., USINGER R.L., 1953 - Methods and principles of systematic zoology. - McGraw-Hill Book Co., New York: 1-328 (cfr. 24-25).

MENOZZI C., 1942 - Animali e vegetali dannosi alla barbabietola da zucchero e mezzi per combatterli. - Genova: (cfr. 38-39).

NOYES J.S., VALENTINE E.W., 1989 - Mymaridae (Insecta: Hymenoptera) - introduction, and review of genera. - Fauna of New Zealand 17: (cfr. 25-26).

PERKINS R., 1905 - Leaf-hoppers and their natural ennemies. VI. (Mymaridae, Platygasteridae). - Bull. Hawaiian Sugar P1. Assoc. Div. Ent. 1 (6): 187-205.

RADU V.V., BOTOC M., 1960 - Noi contributi la studiul Calcidoidelor din jurul clujului. - Comm. Acad. R.P.R. 10 (4): 321-329.

RAY J., 1686-1704 - Historia plantarum. London, 3 vols.
ROSS H.H., 1973 - Biological systematics. - Addison-Wesley Publishing Co., Reading, Massachussetts: 1-345 (cfr. 57).
ROSEN D., DEBACH P., 1973 - Systematics, Morphology and Biological Control. - Entomophaga 18 (3): 215-222.
RUSCHKA F., THIENEMANN A., 1913 - Zur Kenntnis der Wasser - Hymenopteren. - Zeit. Wiss. Insektenbiol. 9: 82-83.
SAHAD K.A., HIRASHIMA Y., 1984 - Taxonomic studies on the genera *Gonatocerus* Nees and *Anagrus* Haliday of Japan and adjacent regions, with notes on their biology (Hymenoptera, Mymaridae). - Bull. Inst. Trop. Agr. Kyushu Univ. 7: 1-78.
SCHAUFF M.E., 1984 - The Holarctic genera of Mymaridae (Hymenoptera: Chalcidoidea). - Mem. Ent. Soc. Washington 12: 1-67.
SCHMIEDEKNECHT O., 1909 - Hymenoptera, Fam. Calcididae (in: WYTSMAN P., Genera Insectorum. 97), Brussels: 1-550 (cfr. 499-500).
SCHULZ W.A., 1910 - Neuer Beitrag zur Kenntnis der Wasserimmen. - Ann. Biol. Lac. 4: 187-193.
SOYKA W., 1946 - Revision einiger Mymaridengattungen. - Zbl.-GesamtGeb. Ent. 1: 33-40.
SOYKA W., 1955 - Ueberblick das genus *Anagrus* Haliday (Alaptidae, Mymaridae, Chalcidoidea, Hymenoptera). - Ent. NachrBl. 7: 23-26.
THIENEMANN A., 1916 - Ueber Wasserhymenopteren. - Zeit. Wiss. Insektenbiol. 12: 49.
TULLGREN A., 1916 - Rosenstriten (*Typhlocyba rosae* L.) och en ny äggparasit pådensamma. - Medd. Centrans. för Försöks. Jordbr. 132 (Ent. Avd.) 24: 3-13.
VIGGIANI G., 1970a - Ricerche sugli *Hymenoptera Chalcidoidea* XXIV. Sul valore tassinomico dell'organo copulatore nei Mimaridi del genere *Anagrus* Hal. - Boll. Lab. Ent. Agr. "Filippo Silvestri" Portici 25: 10-18.
VIGGIANI G., 1970b - Description of the male of *Eustochus atripennis* Hal., 1833, and of new terricolous species of *Cleruchus* Enock, with remarks on *Anagrella* Bkdf. (Hym. Mymaridae). - Bull. Soc. Ent. Suisse 43 (2): 135-142.
WALKER F., 1846 - Descriptions of the Mymaridae. - Ann. Mag. nat. Hist. 18: 49-54.
WALKER I., 1979 - Some British species of *Anagrus* (Hymenoptera: Mymaridae). - Zool. J. Linn. Soc. Lond. 67: 181-202.
WESTWOOD J.O., 1840 - Introd. mod. Classif. Insect. II. Synopsis of the genera of British insects: 49-80 (cfr. 78-79).

DR ELISABETTA CHIAPPINI - Istituto di Entomologia, Università Cattolica del Sacro Cuore, Via Emilia Parmense 84, I - 29100 Piacenza

Ricevuto il 15 giugno 1989; pubblicato l'11 settembre 1989.