

The genus *Methocha* in Europe: a discussion on taxonomy, distribution and likely origin of its known species and subspecies (Hymenoptera Tiphidae Methochinae)

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Abstract

An overview of the genus *Methocha* Latreille, 1804 in Europe is given, with a particular attention to the widespread species *Methocha articulata* (Latreille, 1792), to the problematic history of its scientific name and to its geographical distribution, producing a preliminary sketch map of presence. A review of the other taxa described from Europe and of the known biotopes of *Methocha* in Europe is provided. Then, the discovery of *Methocha latronum* (Guichard, 1972) on the shores of the Lake Baratz, the only natural basin of Sardinia, Italy, is reported. After its description as a Corsican endemite, *M. latronum* turns out to be a Corsican-Sardinian endemite and the genus *Methocha* is represented in Italy, as well as in France, by the continental species *M. articulata* and the insular species *M. latronum*. A morphological comparison between *M. latronum* and *M. articulata* is performed, in order to verify the validity of the former species. *M. latronum* shows relevant morphological differences from *M. articulata*: denser punctuation, longer pubescence, coarser surface sculpture, not shining and not polished general appearance, clypeus without any tubercle, pronotum with long depression, hidden propodeal spiracles, reddish gastral metamere I and wider gastral metamere VI. Such differences let us consider *M. latronum* as a valid distinct species and an isolated vicariant of *M. articulata*. A proposition to throw light on the names of *M. articulata* and discussions on its supposed rarity, on the likely origin of *M. latronum* and on the European distribution of *M. articulata* are also given.

Key words: *Methocha articulata*, *Methocha ichneumonides*, *Methocha latronum*, Europe, Italy, Sardinia.

Introduction

With the present note we start to investigate the status of *Methocha* Latreille, 1804 in Europe, and, in particular, of the widespread species *M. articulata* (Latreille, 1792), producing an interim sketch map of its European distribution. The presence of the species in the different administrative divisions of Italy is also taken into account. Then, we deal with some biological aspects of the species in Europe, like the known biotopes, the phenology and the sampling techniques.

Additionally, we report the discovery of a female *M. latronum* (Guichard, 1972) at Lake Baratz near Alghero (Sassari prov., NW Sardinia). This finding enriches the Italian fauna with a most interesting species, previously known from Corsica (France) only, and the genus *Methocha* turns out to be present in Italy, as well as in France, with *M. articulata* in the continent and *M. latronum* in the Tyrrhenian island.

A morphological comparison between *M. latronum* and *M. articulata* is provided, in order to verify the entity of the morphological differences. Some notes on the likely hosts of *M. latronum* are also presented.

Discussions on some open problems, on the taxonomic validity of *M. latronum* and on its likely origin are also given.

Materials and methods

The first part of our research has a bibliographical connotation, performed in order to throw light on the problematic history of the taxonomical names (*formicaria*,

articulata, *ichneumonides*) used for the widespread European species of *Methocha*. Then, the geographical distribution of the species is examined, through the analysis of the Literature data and of the data drawn from public and private collections. The following acronyms are used for the public collections (in alphabetical order): CUB - Comenius University, Bratislava; DISTA - Department of Agroenvironmental Sciences and Technologies, Bologna; EMLU - Entomological Museum of Lund University; FSPUO - Faculty of Science, Palacky University, Olomouc; IEVU - Institute of Ecology of Vilnius University; MBS - Museum Bruckenthal, Sibiu; MCSNG - Museo Civico di Storia Naturale, Genova; MCSNM - Museo Civico di Storia Naturale, Milano; MNCNM - Museo Nacional de Ciencias Naturales, Madrid; MNHN - Muséum National d'Histoire Naturelle, Paris; MZUR - Museo di Zoologia dell'Università, Roma; MZW - Museum of Zoology, Warsaw; NHMB - Natural History Museum, Bucharest; NHML - Natural History Museum, London; OLLD - Oberoesterreichische Landesmuseen, Linz/Dornach; PMSL - Prirodoslovni Muzej Slovenije, Ljubljana; ZISP - Zoological Institute, St. Petersburg; ZMUC - Zoological Museum, University of Copenhagen.

The second part of the study is centered on the morphological comparison between *M. latronum* and *M. articulata*. A stereoscopic microscope has been used for the exploration of *M. latronum* female and of 20 *M. articulata* females from Estonia (Männikvälia, Pugestu and Vagula, coll. V. Soon), Germany (Rheinland-Pfalz and Baden-Württemberg, coll. C. Schmid-Egger), Czech Republic ("Bohemia", coll. J. Straka), and Italy (Piedmont, coll. G. Pagliano, and Emilia-Romagna, A.'s coll.).

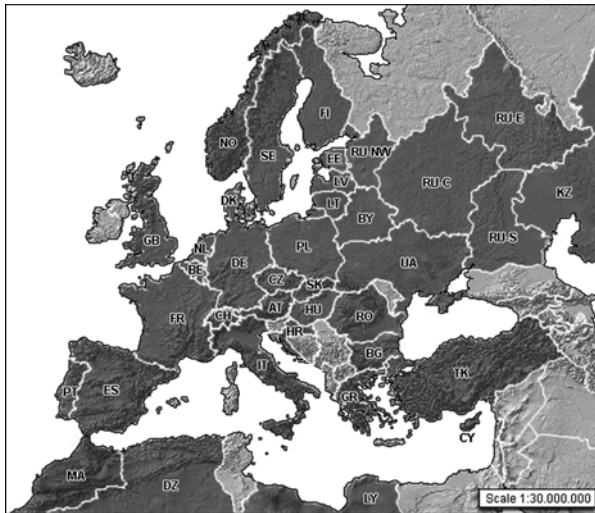


Figure 1. Interim sketch map of the western distribution of *Methocha articulata* (Latreille).

The following abbreviations are used: F-I, F-II, etc. = antennal flagellomeres beyond the pedicel; MOD = median ocellus diameter; S-I, S-II, etc. = gastral sterna; T-I, T-II, etc. = gastral terga. The visible thorax, composed by the true thorax and the propodeum, is conventionally named mesosoma; the visible abdomen, apart from the propodeum, is named metasoma.

Results

Overview of the genus *Methocha* Latreille, 1804 in Europe

The small Aculeate wasps of the genus *Methocha* (Family Tiphiidae, subfamily Methochinae), are slender animals with wingless, antlike females and winged males. They are well known worldwide to be specialized ectoparasitoids on larval tiger beetles (Coleoptera Cicindelidae) and their biology is known for the field observations of many Authors (Adlerz, 1903, 1905; Bouwman, 1908, 1909; Reuter, 1913; Champion and Champion, 1914; Champion, 1915; Champion, 1916; Trautmann, 1920; Bischoff, 1927; Pagden, 1925, 1926, 1932; Main, 1927, 1931; Hoffer, 1936; Iwata, 1936; Budrick and Wasbauer, 1959; Grandi, 1961; Krombein, 1982, *inter alia*).

Among the subfamily Methochinae, the genus *Methocha*, subgenus *Methocha*, is the only one present in the Old World, with three species and two subspecies described so far from Europe:

Methocha articulata (Latreille, 1792), described from France, Palearctic;

ssp. *nigrescens* Hoffer, 1938, described from Moravia and Slovak Republic;

ssp. *obscura* Hoffer, 1938, described from the Slovakian-Ukrainian border;

Methocha sisala Nagy, 1968, described from the Carpathian Basin (Romania);

Methocha latronum (Guichard, 1972), described from Corsica (France).

Methocha articulata (Latreille, 1792)

The debate between the valid name (*Methocha articulata*) and the accepted name (*Methocha ichneumonides*)

When we started to get involved with the present study it was not possible for us to avoid the problem of the name of this species, around which a historical confusion has grown and a debate among Entomologists was born. The problematic history of the name of this wasp is summarized as follows:

1792: Latreille, describes simultaneously the species *formicaria* and *articulata* under the Genus *Mutilla*.

1804: Latreille, describes the Genus *Methocha*, but includes the species *articulata* only.

1805: Latreille, writes the Genus name as *Methoca* and from this moment the Author embraces this orthography; the species *articulata* is renamed to *ichneumonides* and from this moment the name *articulata* disappears from Latreille's works.

1806: Latreille, describes *Methoca mutillaria*.

1807: Jurine, uses the combination *Mutilla formicaria*.

1809: Latreille, describes *Tengyra sanvitali* (male). The genus *Methoca* now comprises two species: *ichneumonides* and, doubtfully, *formicaria*. As reference for the former, Latreille indicates not the original description (1792), but his work of 1805 and as synonyms he cites *Mutilla formicaria* Jurine and *Methoca mutillaria* Latreille, reported as a variety. For *formicaria* the Author reports the same diagnosis as in 1792, but a question mark is put before its name.

The name *Methocha* Latreille, 1804 is the valid name for the genus. The adoption of the orthography *Methoca* operated by the same Author starting from 1805 probably reflected a personal change of opinion, but it represents an unjustified emendation, according to the International Code of Zoological Nomenclature.

At the species level, the name *formicaria* should have the priority on all the other names, because it was the first one used by Latreille in 1792, but we do not consider it as the valid name. In fact, the original description of 1792 reveals that the species *M. formicaria* was established on a specimen characterised by a very small size (about 3.5 mm), a red head, ocelli not described (contrary to *M. articulata*) and a bilobate thorax. These features, also reported in Latreille's later works, apparently do not match with the characters commonly used to identify this species. It is our adventurous opinion that *M. formicaria* has been established on a suspect specimen and we regard it as a *nomen dubium*.

The same Latreille, after 1804, was considering the name *articulata* (and then *ichneumonides*) as the most representative of the Genus, more than the name *formicaria*. In fact, in 1809, *M. formicaria* has been included only doubtfully and Jurine (1807) used the incidental name *Mutilla formicaria* to refer to the insect described as *Mutilla articulata* by Latreille (1792), under the genus *Methocha* Latreille (1804). In recent times, only Oehlke (1974), and only theoretically, suggested the

priority of the name *formicaria* (Latreille), but *de facto* he did not use it.

Believing to be in good faith with these assumptions, the debate is reduced to two terms only. In fact, the current dispute among Entomologists is whether restoring the valid name (*articulata*) or keeping on using the historically accepted name (*ichneumonides*), knowing that the name *articulata* (1792) has priority on the name *ichneumonides* (1805) and the assignment of the latter name has been arbitrary.

In the present study we have chosen to support the Principle of Priority:

- type genus: *Methocha* Latreille, 1804.
nec *Methoca* Latreille, 1805 (unjustified emendation).
- type species: *Methocha articulata* (Latreille, 1792).
orig. comb.: *Mutilla articulata* Latreille, 1792.
synonyms: *Mutilla formicaria* Latreille, 1792.
Methoca ichneumonides Latreille, 1805.
Methoca mutillaria Latreille, 1806.
Mutilla formicaria Jurine, 1807.
Tengyra sanvitali Latreille, 1809.
Gonatopus mutillarius Nees, 1834.
Spinolia italica Costa, 1858.
- misspellings: *Metocha*
Metoca
articulata
ichneumonoides

For additional synonymies we refer to Dusmet (1930) and Lin (1966).

European distribution of *Methocha articulata*

M. articulata is well known to have a Palearctic distribution (André, 1903), with an extension to the Russian Far East (Transbaikalia, Irkutskaya oblast, Amurskaya oblast, Primorskii krai, in: Gorbatovsky, 1995). As for its western distribution, the species is virtually diffused in the whole Europe (Dalla Torre, 1897), from the far north (Forsius, 1927) to the Mediterranean area and N Africa, with populations living on both sides of the southern elevations (Alps and Pyrenees).

The mapping attempt that follows (figure 1) is a preliminary exploration of the distribution of the species, without pretending to be all-inclusive of the whole knowledge of this taxon, but with the goal to verify the dimension of its distribution.

For our purpose we have started to collect the data from Literature, from public and private collections and from the on-line databases compiled spontaneously or under the recent biodiversity projects (*Arbeitsatlas Der Bienen und Wespen Bayerns*, *AREALIS*, *Banque de Données Fauniques de Gembloux et Mons*, *Bees Wasps and Ants Recording Society*, *Biological Records Centre*, *Fauna Europaea Service*, *Faunistica Hymenoptera*, *National Biodiversity Network Species Dictionary*, *Species Checklist For Tiphidae*, *Staffordshire Ecological Record*, *Virtual Pustyn*, *ZOBODAT*), that are producing regional checklists, red books and detailed distribution maps. For some countries (i.e. England and Wales,

Scandinavian countries, Belgium, The Netherlands, Germany and Austria, among others) a comprehensive amount of data has been collected, making the regional knowledge of this taxon admirably accurate and deep.

The data set collected up to now comprises the following countries: **Algeria** (André 1903; Berland, 1925; MNHN; NHML); **Austria** (Kohl, 1893; Franz, 1982; OLLD; ZOBODAT); **Belarus** (Shliakhtenko, 2002); **Belgium** (Vander Linden, 1827; Leclercq, 1978; Banque de Données Fauniques de Gembloux et Mons; PMSL); **Bulgaria** (OLLD; MZW; J.Straka, pers. records); **Croatia** (Fauna Europaea Service, 2004); **Czech Republic** (Kubes, 1906; Hoffer, 1935, 1936, 1938; Pádr, 1989; Bogusch *et al.*, 2005; FSPUO; OLLD; J.Straka, pers. records); **Denmark** (ZMUC); **England and Wales** (Smith, 1848; Saunders, 1880, 1896; Westwood, 1881; Rothney, 1893; Elliott and Morley, 1911; Main, 1927, 1931; Rowley, 1929; Else, 1978; Richards, 1980; Biological Records Centre, 1981; additional references in: Falk, 1991; Edwards, 1998; BWARS; Staffordshire Ecological Record; Species Checklist for Tiphidae; NBN's Species Dictionary); **Estonia** (Luig, 1991; V.Soon, pers. records); **Finland** (Forsius, 1927; Forsius and Hellén, 1935; Vikberg, 1986; Söderman and Vikberg, 2002); **France** (Latreille 1792; Lepeletier, 1845; Berland, 1925; *inter alia*); **Germany** (Nees Von Esenbeck, 1834; Taschenberg, 1866; Bowman, 1909; Stoeckert, 1919; Heinrich, 1966; Oehlke, 1974; Stresmann 1981; Westrich, 1984; Kuhlmann *et al.*, 1990; Theunert, 1994; Schmid-Egger *et al.*, 1995; Schmid-Egger and Burger, 1998; Smissen, 1998; Sörensen *et al.*, 1999; Bleidorn and Venne C., 2000; Dathe *et al.*, 2001; Mandery, 2001; Osten, 2001; Mandery *et al.*, 2003; Arens *et al.*, 2004; additional references in: Mandery, 2003, and in: Kroupa, 2005), **Greece** (G.Pagliano, pers. records); **Hungary** (Mocsáry, 1897; Móczár, 1938, 1939; Bajári and Móczár, 1954; Zsolt, 2001); **Italy** (see later); **Kazakhstan** (ZISP); **Latvia** (Tumss, 1976; MZW); **Lithuania** (IEVU); **Morocco** (MNHN); **The Netherlands** (Thijssse, 1900; Bouwman, 1908, 1909; Benno, 1967; Peeters *et al.*, 2004); **Norway** (Siebke, 1880; Strand, 1898, 1919; Erlandsson, 1971; AREALIS); **Poland** (Pulawski, 1963; Razowski, 1997; MZW); **Romania** (Nagy, 1968; NHMB; MBS; OLLD); **Portugal** (Diniz, 1989; NHML); **Russia-NW, -C, -E, -S, Siberia and Far East** (Tobias, 1978; Gorbatovsky, 1995; Kosarikov *et al.*, 1999; Fauna Europaea Service, 2004; ZISP; Virtual Pustyn, 2005); **Slovakia** (Mocsáry, 1897; Hoffer, 1938; Pádr, 1989; Lukáš, 1997; OLLD; CUB); **Spain** (Antiga and Bofill, 1904; Dusmet, 1930; Giner Mari, 1945; MNCNM; NHML); **Sweden** (Aurivillius, 1918; Erlandsson, 1971; Gärdenfors, 2000; Larsson, 2002; EMLU; NHML); **Switzerland** (Krebs, 2002; F.Amiet, pers. records); **Tadjikistan** (ZISP); **Turkey** (NHML; G.Pagliano, pers. records; J.Straka pers. records); **Turkmenistan** (ZISP); **Ukraine** (Hoffer, 1938; ZISP; A.Lelej, *in litteris*).

Despite the need of an exam of the specimens conserved at the Natural History Museum of London, *M. articulata* is reported also from Cyprus and Libya, and these data have been included in the map. Moreover, in a geographical continuity with the mapped countries, we

list as likely also Moldova, all the remaining countries of the Mediterranean basin and at least the countries of the Caucasus region, since we have not collected references for them. As far as Luxembourg is concerned, the species seems to be effectively absent, according to the investigations performed up to now (Schneider, 2000; N. Schneider, *in litteris*).

Italian distribution of *Methocha articulata*

As far as Italy is concerned, *M. articulata* was known from few locations only (Pagliano, 1987). We report herein a deeper analysis of the presence of the species in the Italian administrative divisions, thanks to new data drawn from Literature and from public and private collections, some of which unpublished: **Piedmont** (Costa, 1886; Pagliano, 1987; MCSNG; MCSNM); **Lombardia** (MCSNG: Canonica d'Adda); **Trentino Alto Adige** (Grandi, 1954; Pagliano, 1987; MZUR; MNCNM); **Liguria** (G. Pagliano, *in litteris*); **Emilia Romagna** (Grandi, 1927; MCSNG; L. Colacurcio, pers. records; G. L. Agnoli, pers. records); **Tuscany** (Latreille, 1809, as *Tengyra sanvitali* from "Etruria"; DISTA; Sistema delle Aree Protette della Provincia di Arezzo G. Pagliano *in litteris*); **Abruzzo** (DISTA: Scanno); **Latium** (Latreille, 1809, as *Tengyra sanvitali* from "Agro Pedemontano"; Costa, 1858, as *Spinolia italica*; Castellani, 1940); **Campania** ("provincie napoletane", Costa, 1886); **Calabria** (Pagliano, 1987); **Sicily** (De Stefani, 1889; M. Arnone, pers. records).

We have limited the detail of the distribution data to the administrative divisions (figure 2), because the collection of this wasp on the Italian territory has always

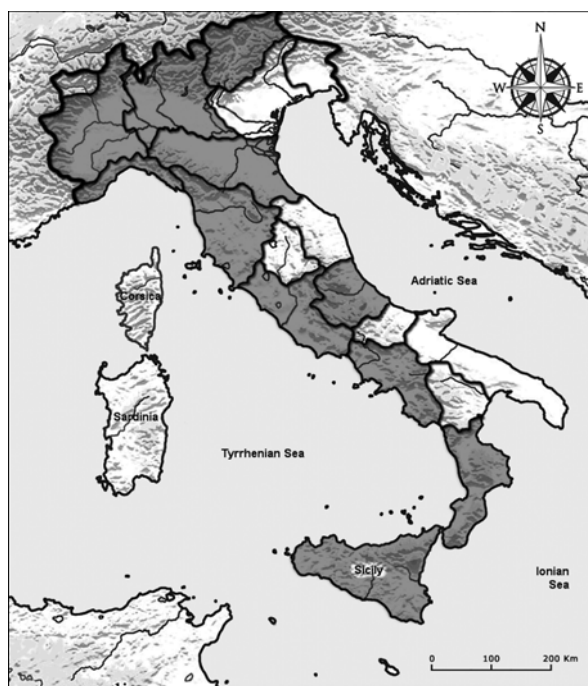


Figure 2. Interim sketch map of the Italian distribution of *Methocha articulata* (Latreille).

been providential and not induced by a systematic collecting approach, with the exception of Piedmont. Moreover, some of the data drawn from the ancient literature are too vague to define a point on a map. Consequently, for our preliminary investigation, a finer detail was premature.

Other taxa of *Methocha* described from Europe

The subspecies of *M. articulata* described from Europe are *M. nigrescens* and *M. obscura*, both established by Hoffer in 1938, the former from Moravia and Slovak Republic, the latter from the Carpathian city Užhorod, at the border between the Slovak Republic and Ukraine.

At the level of species, two more taxa were described from Europe: *M. sisala* from Romania, and *M. latronum* from Corsica (France), both relegated to remote and scarcely accessible areas. Moving eastwards, another species, *M. picipes* (Morawitz, 1890), is known from Turkmenistan (Transcaspia), where it may possibly cohabit with the typical form.

Subspecies of *Methocha articulata*

According to the original description, *M. nigrescens* is characterised by a dark thorax with reddish pronotum and propodeum ("*Scutello nigro, mesothorace vel toto nigro vel tantum lateribus nigris*"), while *M. obscura* is characterised by a thorax nearly totally dark ("*Thorace toto infuscato*"). No other morphological differences are given.

Methocha sisala

M. sisala is apparently a valid species, structurally characterised both for male and female and with a defined distribution (Forest of Băile Felix, Carpathian Basin, Romania), but we did not have the opportunity to examine any specimen, so we have an open opinion on the validity of this species.

M. sisala females are distinguished from *M. articulata* for the smaller size (4.5-5.0 mm) and for the shorter mesoscutum.

Methocha latronum

M. latronum (orig. comb.: *Methocha latronum*) was described by Guichard in 1972 from the forests of Vizzavona and Restonica Valley, Corsica, at high altitude, where it was found in association with *Cicindela campestris corsicana* Roeschke ("was accompanied sparingly by a green tiger beetle, presumably *Cicindela campestris*").

The species was established on four small females (3.75-5 mm), with hirsute habitus, abundant white hair, overall abundant shallow punctuation; head and metasoma shining black, but, at least in some areas, with rugulosity; clypeus without any tubercle; antennae reddish with pedicel and apical 5-6 flagellomeres darker; mesosoma dull red with propodeal spiracles obscured by rugulosity.

Known biotopes for *Methocha* in Europe

Sandy areas with a xerothermic regime are the typical habitat for *Methocha* species, and they are the typical habitat of their preys.

Sandy biotopes are generally found along the coastlines (i.e. coastal dunes and intertidal zone), and many consistent cases are reported from S England, S Finland, The Netherlands, E Spain, NE Italy, among others. In C Europe also the vegetated aeolic dunes ("Binnendüne") are known biotopes for *Methocha* (Kuhlmann *et al.*, 1990).

Many other biotopes for *Methocha* have been discovered with time, like the plains of the continental rivers (Grandi, 1954; Westrich, 1984; Bleidorn and Venne, 2000; figure 3); the N and C European heathland and woodless steppe (Aerts, 1955; Falk, 1991; Lukáš, 1997); the open spaces in forests and pinewoods (Nagy, 1968; Guichard, 1972; Hembach and Cölln, 1991; Kuhlmann *et al.*, 1990); the C European anthropogenic limestone meadows, sand-pits and gravel-pits ("Kalkmagerrasen", Hembach and Cölln, 1991; Bleidorn and Venne, 2000); the landslips and clay hills (Falk, 1991).

All these biotopes represent different situations with a sand relation and with a quite wide altitude and climatic spectrum. For example, in France, Spain and Italy we notice an altitude and ecological variety in biotopes known for *Methocha*, from the coastlines to the continental areas along the foothills up to the medium altitudes of Pyrenees and Alps.

The broad phenology of *M. articulata* ranges from the second half of March to the first half of October (Peeters *et al.*, 2004), with a maximum around July and August for males and from June to August for females.

The winged males of *Methocha* run a lifecycle different from the apterous females, that's why they are traditionally considered much more uncommon than females and a parthenogenetic theory has been even suggested (Pagden, 1925, 1926, 1932).



Figure 3. Sandy spots along the rivers are one of the continental biotopes of *Methocha* tiphiids. Fiume Reno near Bologna (Italy).

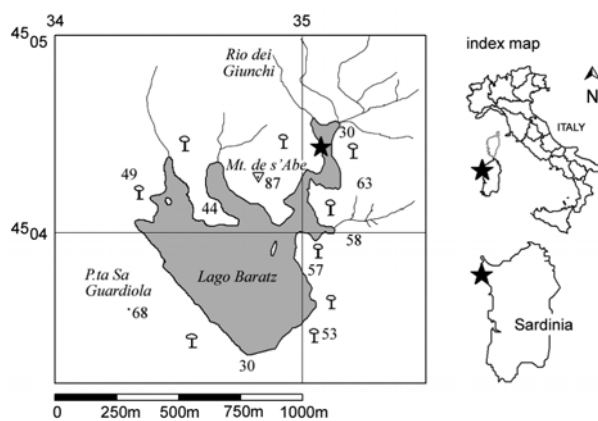


Figure 4. Outline of Lake Baratz, north-western Sardinia, Italy. The star (★) indicates the sampling point of *M. latronum* (Guichard). Re-drawn from I.G.M.I. sheet No. 179-II SW.

It is known that males visit flowers (*Pastinaca*, *Daucus*, *Torilis* and thistles, in Falk, 1991; *Euphorbia seguieriana* Neck., S. Tischendorf, *in litteris*). An efficient method to sample males is the Malaise trap (Krombein, 1982; Hembach and Cölln, 1991; Cölln and Jakubzik, 1999) and, in a lesser extent, the ultra-violet light trap (Krombein, 1982). Concerning females, apart from the traditional sight-hunting on the ground, the validity of wet pitfall traps has been positively field-tested (S. Tischendorf, *in litteris*).

Methocha latronum in Sardinia, Italy

On the 27th of June 1995 we have found a female specimen of *M. latronum* on the NE shore of Lake Baratz near Alghero (Sassari prov.), NW Sardinia, Italy (figure 4). The specimen was walking on the soil, in an area close to the water and free from vegetation, at UTM co-ordinates 32T-ML351045 (Sheet "La Corte" No. 179-II SW of the Istituto Geografico Militare Italiano), and it was exploring the opening of a burrow dug by a tiger beetle larva (Coleoptera Cicindelidae). The larva proved unfortunately impossible to collect, while no Cicindelid adult specimens were seen on the shore.

The Lake Baratz - the only natural lake of Sardinia not filled by a forced barrage - is a small coastal lake at 1.5 km from the sea, with a modest catchments basin characterised by a marked xerothermic regime. The lake is in a remote and wild territory of the isle, called La Nurra, scarcely anthropized and scarcely visited by the summery tourism. The territory of the Lake Baratz is under the Sardinian regional protection program and has been qualified as a site of interest by the European Union.

Morphological comparison between *Methocha latronum* and *Methocha articulata*

For an overview of the morphology of *M. articulata* we refer to the works of Grandi, 1961; Oehlke, 1974; Krombein, 1979; Richards, 1980; Pagliano, 1987; Kimsey, 1991; Brothers, 1993, and Witt, 1998, *inter alia*.

The *M. articulata* females examined for this study

show a body dimension ranging from 3.5 to 9.0 mm, with a modal length of about 6.0 mm, a shining habitus, usually impunctate or microscopically punctured, with smooth and reflecting interspaces and sparse pubescence (figure 5 a-c).

In comparison to the original description (Guichard, 1972), the *M. latronum* female collected in Sardinia shows a bigger size (6.5 mm) and a completely mat habitus, without shining reflections (figure 5 d-i).

Compared to *M. articulata* females, the Sardinian female is clearly opaque, with matte, sculptured and densely pubescent integuments (figure 5d); the punctuation on the head vertex (figure 5h) shows an average diameter which is double, and it is denser: the single points are interspaced by sculptured areas, rather than the typical smooth ones. The pubescence on the head is longer and denser than in *M. articulata*, measuring in *M. latronum* up to 4.5 MOD. The diameter of the punctures on the mesosoma is 1.6 to 2.5 times wider in *M. latronum* than in *M. articulata*, measuring in the former up to 1.0 MOD, with the pubescence up to 3.7 MOD. The pronotum of *M. latronum* (figure 5e) shows a deep median depression, wide 1.8 MOD and long 3/4 of the pronotum length; except for the central mesothorax, the interspaces on the rest of the mesosoma are striped and irregularly grooved, not as smooth as in *M. articulata*. In both species the punctuation of the metasoma is finer than on the remainder of the body and the respective diameters are not significantly different (0.2-0.4 MOD);

however, only few sparse points are visible in *M. articulata* and the metasoma appears nearly polished and glabrous, whereas in *M. latronum* (figure 5i) the points per area are fairly denser, the associated pubescence is dense and long (up to 4.3 MOD) and the interspaces are finely striped with an irregular trend, both on terga and on sterna. The first gastral tergum is black in *M. articulata*, partially reddish in *M. latronum* (reddish on the anterior tergal half, entirely reddish in sternal view). S-VI wider in *M. latronum* than in *M. articulata*.

The male of *M. latronum* is still unknown.

The differences between *M. articulata* and *M. latronum* are summarised in table 1.

Discussion

A proposition to throw light on the name of *Methocha articulata*

In the present study we have embraced the status *M. articulata* to refer to the species commonly named *M. ichneumonides*, since we have chosen the way of the Principle of Priority.

According to the norm 23.2 of the ICZN (1999), the name *M. articulata* is the valid name, but it is seldom used by the Entomologists who generally look at it as the senior synonym of *M. ichneumonides*, younger and commonly used name. From this viewpoint and despite its taxonomi-

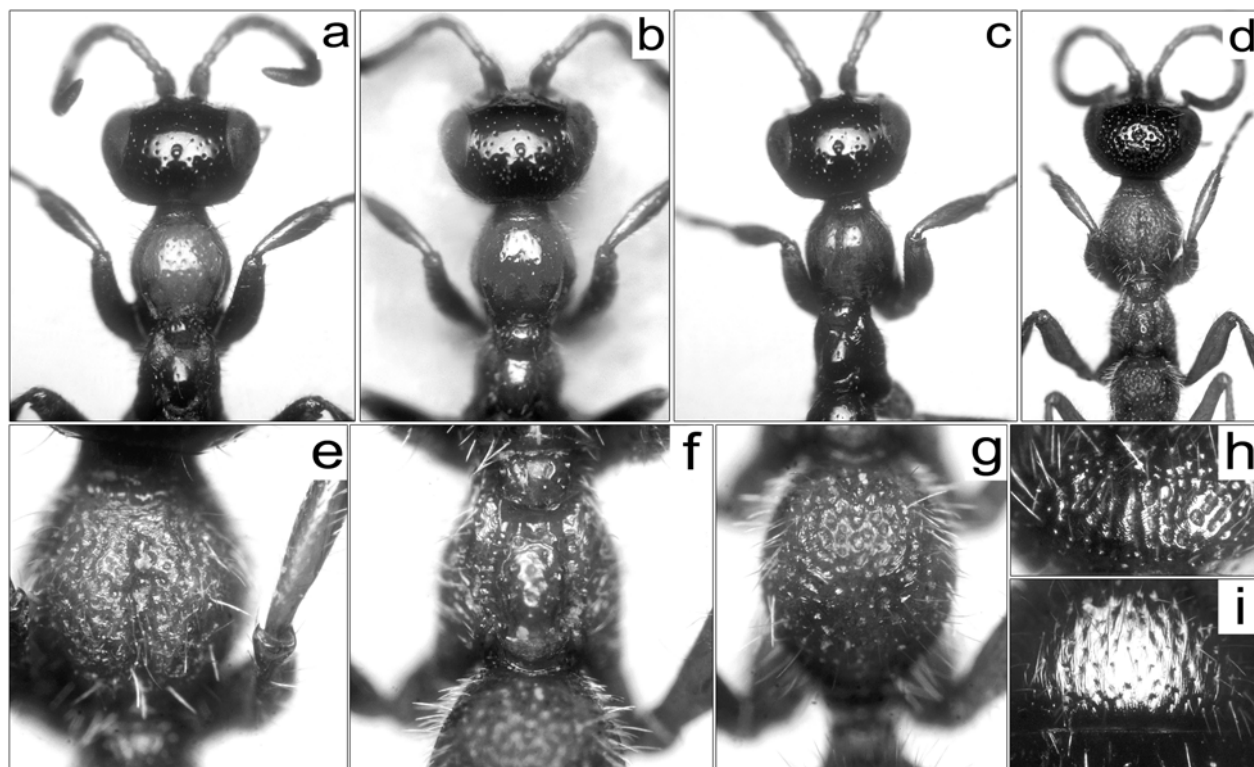


Figure 5. Microphotographs of *Methocha articulata* (Latreille) (a-c) and *Methocha latronum* (Guichard) (d-i): a - *M. articulata* from central-northern Italy (Emilia-Romagna), 20x; b - *M. articulata* from northern Italy (Piedmont), 20x; c - *M. articulata* from Estonia (Vagula), 20x; d - *M. latronum* from Italy (Sardinia, Lake Baratz), 18x; e - *M. latronum*: prothorax, 35x; f - *M. latronum*: mesothorax, 35x; g - *M. latronum*: metathorax, 35x; h - *M. latronum*: head, vertex, 40x; i - *M. latronum*: metasoma, T-II, 40x.

Table 1. Main differences between *Methocha articulata* (Latreille) and *M. latronum* (Guichard) from Sardinia.

<i>M. articulata</i> (Latreille, 1792)	character	<i>M. latronum</i> (Guichard, 1972)
polished and shiny	habitus	sculptured and opaque
sparse and fine	punctuation	irregular, dense and coarse
sparse and short	pubescence	dense and long (up to 4.5 MOD)
smooth or with weak points	interspaces	striped and sculptured
present	tubercle on clypeus	absent
convex	pronotum	convex with a long median depression
visible	propodeal spiracles	obscured by rugulosity
entirely black	T-I	reddish in the anterior half
entirely black	S-I	entirely reddish
narrow	S-VI	wide

cal validity, the name *M. articulata* could become a *nomen oblitum* (ICZN, 23.9.2) and *M. ichneumonides* the valid name by reversal of precedence (ICZN, 23.9).

In recent times the name *M. articulata* has been used by Krombein (1949), then embraced by Lin (1966), Nagy (1968), Pagliano (1994), Lukáš (1997), Osten (2001), Stolle and Burger (2004), and by other opinion leaders. Consequently, the reversal of precedence to support the name *M. ichneumonides* can be suggested only by invoking the risk of producing a confusion (ICZN, 23.9.3), but this subjective eventuality has to be demonstrated.

We believe that the principle of priority is the correct choice, but we admit that in a such case the risk of disorientating somebody is palpable, even if not enough to threaten the stability. On the other side, even if we recognise the acquired value of an accepted name, we cannot ignore its taxonomical weakness.

Afterwards, we are talking about a peculiar and unique species, and we would like to find a global agreement on its name. Probably, in such a case, an opinion of the ICZN Commission - supported by a broad consultation of the Entomological conclave - would be appreciated.

Subspecies of *Methocha articulata*

Nagy (1968) suggested that *M. articulata* individuals with the typical habitus (reddish body) come from the south of Europe, while in the northern-central countries the subspecies *nigrescens* is more common.

We note that darker specimens really seem to be more common in the central and northern countries, but the spectrum of this darkening and of its latitudinal occurrence is quite wide and apparently not supported by other morphologic evidences. Using a deductive approach, the significance of this character seems to be purely climatic and referred to continental factors occurring also in the southern territories (*i.e.* Italy and Spain).

In this perspective we suggest the synonymy between the two subspecies, *nigrescens* and *obscura*, because they are separated exclusively by a different degree of darkening.

With a less conservative approach we would also put the two subspecies under synonymy with the species *M. articulata*, but we wish to leave this aspect for a further investigation.

Supposed rarity of *Methocha* species

The supposed rarity of *Methocha* species seems to be only partially well-founded. Historically, *M. articulata* has been always reported as a rare species ("rare part-out", Berland, 1925, *inter alia*). Nowadays, on the contrary, new sampling methods and the investigation of non-conventional biotopes are changing the statement of its rarity in the direction of a local but not uncommon species. In fact, a modern and specific sampling approach has demonstrated that *Methocha* is more frequent than expected and able to develop individual-rich populations in the right biotopes (Bleidorn and Venne, 2000).

M. articulata is reported as not uncommon in The Netherlands (common in sandy regions but not abundant, Peeters *et al.*, 2004); in W-Germany, where it is periodically monitored; in the ex-DDR ("locally common", Oehlke, 1974); in Poland ("not uncommon", Pulawski, 1963); in the Baltic countries ("it should not be considered to be a very rare species in Estonia", V. Soon, pers. comm.); in Slovak Republic ("very common" in many localities, Hoffer, 1938).

In contrast, records from many other countries are still sporadic and the specimens in both public and private collections are noticeably few: in such cases the species acquires the status of a widespread but very local species.

Certainly, the highly specialized behaviour of *Methocha* has always masked its real diffusion and a wise sampling in the right biotopes could review the assumption of its supposed rarity.

Conclusions

Taxonomic validity of *Methocha latronum*

The occurrence of *M. latronum* in Sardinia confirms Guichard's intuition about such possibility (Guichard, 1972) and its apparent absence from Provence (France) and Catalonia (Spain) - *i.e.* from the areas to which the Corsican-Sardinian block was connected in the past - both suggest that *M. latronum* is a Corsican-Sardinian endemite. According to Vigna Taglianti *et al.* (1999), its chorotype is 3900.19 = SACO (Sardo-Corsican endemite).

Despite the lack of knowledge about the male, we

consider *M. latronum* a good species, characterised by morphologic and chromatic differences and by an insular separation from the typical *M. articulata*, which has never been reported from the Corsican-Sardinian block.

An interesting trend in flagellomere relative lengths was noticed in the specimens examined herein, showing that length/diameter ratios in the *M. latronum* female are generally high, if not at the top of the series for all the flagellomere relative ratios measured in the *M. articulata* females. However, this datum, despite its inner taxonomical significance, is just preliminary due to the fact that we had the opportunity to examine only one specimen of *M. latronum*.

Lacking of further collecting data from other areas of Sardinia, we consider the Sardinian distribution of *M. latronum* limited to the north-western territory of the island, La Nurra. As pointed out for the Cicindelid beetles (Cassola, 1998, *inter alia*), from which *Methocha* species depend, the settlement to a restricted habitat is strong and the environmental sensitivity is extreme. From this assumption and for the environmental instability of the Lake Baratz, the Sardinian population of *M. latronum* is considered here highly vulnerable and extremely susceptible to any environmental stress that can substantially perturb its ephemeral habitats.

The Corsican and the Sardinian populations of *M. latronum* are strictly related to each other, but reciprocally isolated from the time of the definitive opening of the Strait of Bonifacio, and morphologically slightly differentiated, probably at a subspecific level. They are both limited to remote micro-environments, but the Corsican typical place is characterised by the high altitude forests of the central part of the island (from 900 to 1800 m, above the snow line), while in Sardinia the species occurs in the north-western coast, at the sea level and in a drastic xerothermic context. A such altitude variety in the local case of *M. latronum* evidently reflects the same variety registered for *M. articulata* in other territories, since their settlement is subsequent to the settlement of Cicindelid colonies at different altitudes.

As pointed out by G. Else (unpublished, in Falk, 1991) the size of the specimens belonging to different populations could be related to the host species they prey. According to such point of view, the difference in size between the Corsican and the Sardinian *M. latronum*, that are supposed to prey on different Cicindelid species, could be explained. However, without a direct comparison to the typical specimens from Corsica, we have decided that, so far, no separate status can be established for the Sardinian population, leaving this aspect for a future investigation.

As far as tiger beetles are concerned, eight taxa are known to occur in Sardinia (Cassola, 1970, 1972; Vigna Taglianti, 1993), three of which have been recorded from around the Lake Baratz, namely *Cicindela campestris corsicana*, *Calomera* (= *Lophyridia*) *littoralis fiorii* (Grandi) and *Lophyra flexuosa sardea* (Dejean). The former species, for instance, has been positively collected in the coastal areas of Argentiera and Alghero, thus not far from Lake Baratz, but it is seldom collected around lakes and moreover its biological cycle usually stops at the end of May and starts again in October

(Cassola, 1972). Consequently, it seems more probable that the involved larva at Lake Baratz belonged either to *C. littoralis fiorii* (Grandi) or to *L. flexuosa sardea* (Dejean), both recorded just from the shores of the lake (Cassola, 1972), as their biology seems to be more consistent with *M. latronum* than that of *C. campestris*. One of these species - or even both - is likely to be the host of *Methocha* at Lake Baratz.

Likely origin of *Methocha latronum*

The presence of *M. articulata* south of the Alps and the Pyrenees, along the coasts of the Mediterranean basin and in Sicily lets us postulate a paleomediterranean settlement of the species, with the paleotyrrhenian area considered herein as the hypothetical centre of its dispersion. The currently disjointed but sequential distribution of the species in this area is represented by noticeable stations in N Africa, Spain, France, Italy, Greece. In the case of Italy, the known locations, even if disjointed, describe in a whole a quite continuous distribution from the Alpine arcs (mainly western) to Sicily, with the majority of the collecting sites along the peninsular Italy apparently concentrated in the western side of the Apennines. Also in the case of France and Spain we register a similar situation, with many collecting stations just along the Mediterranean coasts, making the distribution pattern quite continuous from N Africa to south Spain (Granada) up to Sicily.

All these data seem to be consistent with a migration hypothesis of the species started during the marine regressions of the Miocene and completed during the Plio-Pleistocenic ones, when the species could have migrated to reach the margins of the Mediterranean basin and its emerged territories, like the Apennine elevations and the Tyrrhenian islands. In a such hypothesis the settlement along the coasts of the Mediterranean countries could be considered as preceding the colonisation of the continental biotopes. The presence of *M. articulata* in some young districts of Italy (Emilia-Romagna, Tuscany, Latium) is probably post-Pliocenic.

Also the northern European diffusion of *M. articulata*, able to reach the high latitudes of Scandinavia, seems to be quite recent. The climatic pressure of the Quaternary events could have been able to expand the distribution of *M. articulata*, pushing the populations to migrate, to reach territories otherwise prohibited and to settle in many coastal areas of northern Europe, thanks to the concurrent migration of many Cicindelids with the cold faunal flow.

Among the possible hypothesis to understand the differentiation of *M. latronum*, the most probable is a Tertiary hypothesis. In such period, the detachment of the Corsican-Sardinian microplate and the repeated faunal exchanges between the two islands and among the continents are known dynamics (Minelli *et al.*, 2002). Also the entity of the distinguishing characters of *M. latronum* makes us suppose an ancient differentiation of the Corsican-Sardinian populations.

To better understand the paleogeographic scenario, we need to invoke the geological history of the Corsican-Sardinian microplate, initially attached to the coasts of

Catalonia (Spain) and Provence (France) and then detached to reach the present position, bearing a faunal load that, with time, has genetically drifted to differentiate new forms. Such dynamics are considered likely for most of the fauna populating Corsica and Sardinia and the presence of *M. articulata* along the facing coastline of Spain (*i.e.* Valencia, Barcelona, Girona) and Provence (*i.e.* Avignon, Marseille) seems to encourage this hypothesis. Also the supposed hosts, *C. littoralis fiorii* and *L. flexuosa sardea*, are trusted to have had a Tertiary settlement (Cassola, 1972). Consequently, *M. latronum* turns out to be an isolated vicariant of *M. articulata*, as a result of a post-Tertiary allopatric speciation from its monophyletic origin subsequent to the end of faunal exchanges with the continent.

The presence of *M. latronum* in both Corsica and Sardinia and in such remote biotopes could be explained either with a fractionating of an original wider distribution involving both islands, or with a dispersion by migration from one island to another. The latter process should have occurred before the opening of the Strait of Bonifacio, or later, during the Pleistocenic regressions.

Unfortunately, we are not able to compute the migrating potential, theoretically scarce, of *Methocha*'s pioneers with wingless females. After all, *Methocha* species have a weak species-specific dependence, and, together with the fact that the larval eco-ethology of Cicindelids is similar for all the species, *Methocha* populations can attack on different Cicindelid species from different colonies, showing a high degree of opportunism (Krombein, 1982). This assumption could support a migration hypothesis, but also any general adaptation to changed ecological conditions, thanks to the opportunism against any Cicindelid colony found on *Methocha*'s survival path.

From this point of view, *C. campestris corsicana* - subspecies of a species probably migrated from the continent to Corsica with the Quaternary cold faunal flow (Cassola, 1972) - could have become the survival host for some *Methocha* nomads moving to remote areas of the island. In this case, the settlement of *M. latronum* in the Corsican elevations could be regarded as a recent event. Consequently, we even cannot exclude the possibility of a migration of *M. latronum* from Sardinia to Corsica, supposedly encouraged by that faunal enrichment that acted as an attractive and determined secondary adaptations to new hosts and to new biotopes.

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