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The European species of the *Chrysis ignita* group: Revision of the *Chrysis angustula* aggregate (Hymenoptera, Chrysididae)

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With 12 figures, 3 maps and 2 tables

Abstract

This paper revises the taxonomy of the European species of the *Chrysis angustula* aggregate and discusses it in a historical review. An illustrated key to the species is presented. For all species and their synonyms I provide the complete reference, type locality, state of type, type depository, and the derivation of the name. The records of the species are depicted on maps and discussed zoogeographically. The phenology of the females is presented. I designate lectotypes of *Chrysis brevidens* Tournier, 1879, *Chrysis ignita* ssp. *excavata* Haupt, 1956, *Chrysis ignita* ssp. *solida* Haupt, 1956, and *Chrysis ignita* ssp. *sparsepunctata* Zimmermann, 1944. *Chrysis* (*mediata*) *fenniensis* Linsenmaier, 1959, is a junior subjective synonym of *Chrysis* (*ignita*) *solida* Haupt, 1956, and *Chrysis* (*ignita*) *excavata* is a junior subjective synonym of *C. longula* Abeille, 1879. I regard the syntypes of *Chrysis gracilis* Schenck, 1856, as lost and classify *Chrysis brevidentata* Schenck, 1856, and *Chrysis gracilis* as nomina dubia. *Chrysis angustula alpina* ssp. n. (France) and *Chrysis leptomandibularis* sp. n. (Germany) are described new to science.

Key words: *Chrysis angustula alpina* ssp. n., *Chrysis leptomandibularis* sp. n., lectotype designations, nomina dubia, synonymy, taxonomy, zoogeography.

Introduction

With more than 100 known species, the *Chrysis ignita* group is the largest species group within the genus *Chrysis* (Kimsey & Bohart 1991). A modern diagnosis as well as a key to the groups of *Chrysis* are given by Kimsey & Bohart (1991) in their world catalog of chrysidid wasps. No overall treatment for this group exists so far, however; there are only few regional works with keys to species of the *C. ignita* group (e.g. Bohart & Kimsey 1982, Linsenmaier 1959a, 1994, 1997a, Tsuneki 1957).

Linsenmaier (1959a) published the most important contribution to the knowledge of the European species of the *Chrysis ignita* group. It includes descriptions of new taxa and a key to the European species and was supplemented in several postscripts (Linsenmaier 1959b, 1968, 1987, 1997b). Unfortunately, Linsenmaier's work does not include a critical review of all previous descriptions. Other authors contributed short papers with few descriptions and only some taxonomic notes (Móczár 1965, Valkeila 1971). Compared to these authors, Kunz (1989, 1994) reviewed the German species of the *C. ignita* group in a more comprehensive manner by including biological data and examining the morphology of the internal segments. In this work, he dropped many of the taxa mentioned by Linsenmaier (1959a) into synonymy.

While studying Palaearctic species of the *Chrysis ignita* group, I reached conclusions incongruent with commonly held opinions concerning taxonomy, nomenclature and type interpretation of certain species. In this paper, I present my results concerning the *C. angustula* aggregate. The structural variation was studied to obtain strict characteristics for distinguishing the different taxa, and all existing type material were revised to reach nomenclatural stability.

Methods, terminology, and collections

For all measurements, I used a calibrated ocular micrometer attached to a Zeiss Stemi 11 microscope allowing a maximum accuracy of 0.015 mm at a magnification of 66×. While measuring, I made sure that both ends of the distance were situated in the same plane. The drawings were made with a drawing tube (camera lucida). To study the internal segments

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and the genital capsule, I softened dry specimens in a wet chamber before dissecting. Preparation was done by using a blunt insect pin (size 1) and a pair of Dumont tweezers while the internal segments were covered with water.

For the description of the external morphological features, I adopted the terminology of Goulet & Huber (1993) and Kimsey & Bohart (1991) (autapomorphies of Chrysididae). The following abbreviations are used: F = flagellomere, LID = least interocular distance, MOD = midocellus diameter, P = pedicellus, PD = puncture diameter, S = gastral sternum, T = gastral tergum.

The 4th edition of the International Code of Zoological Nomenclature (ICZN) – in effect since 1st January 2000 – has been applied to the present work.

The material studied in the present paper is deposited in the following public or private collections:

Public collections

BMNH	The Natural History Museum, London (England)
ETHZ	Eidgenössische Technische Hochschule Zürich, Entomologische Sammlung (Switzerland)
HNHM	Hungarian Natural History Museum, Zoological Department, Budapest (Hungary)
MHNG	Muséum d'Histoire Naturelle, Genève (Switzerland)
MLUH	Martin-Luther-Universität, Halle-Wittenberg, Halle/Saale (Germany)
MNHN	Muséum National d'Histoire Naturelle, Paris (France)
MZLS	Musée de Zoologie, Lausanne (Switzerland)
MZLU	Department of Zoology, Division of Systematics, Lund University (Sweden)
MZSF	Musée Zoologique de l'Université Louis Pasteur & de la Ville de Strasbourg (France)
NHME	Natuurhistorisch Museum Maastricht (The Netherlands)
NHMW	Naturhistorisches Museum Wien (Austria)
NHRS	Natur Historiska Riksmuseet, Stockholm (Sweden)
NMBD	Naturkunde-Museum Bamberg (Germany)
NMBS	Naturhistorisches Museum Bern (Switzerland)
OLML	Oberösterreichisches Landesmuseum, Linz (Austria)
RMNH	Nationaal Natuurhistorisch Museum, Leiden (The Netherlands)
SMFD	Forschungsinstitut und Museum Senckenberg, Frankfurt am Main (Germany)
SMNG	Staatliches Museum für Naturkunde, Görlitz (Germany)
TLMF	Tiroler Landesmuseum Ferdinandeum, Innsbruck (Austria)
UMBB	Übersee-Museum Bremen (Germany)
ZFMK	Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn (Germany)
ZMAN	Institut voor Taxonomische Zoölogie, Zoölogisch Museum van Amsterdam (The Netherlands)
ZMUH	Zoologisches Museum der Universität Hamburg (Germany)

Private collections

Ab	Coll. Abenius (Nynäshamn/Sweden)
Ar	Coll. Arens (Bad Hersfeld/Germany)
Be	Coll. Berg (Gjettum/Norway)
Fl	Coll. Flügel (Knüllwald-Niederbeisheim/Germany)
He	Coll. Hembach (Köln/Germany)
Hi	Coll. Hinrichsen (Berlin/Germany)
Ka	Coll. Kaluza (Leipzig/Germany)
Le	Coll. Lefeber (Maastricht/The Netherlands)
Li	Coll. Linsenmaier (Ebikon/Switzerland)
Ne	Coll. Neumann (Freiburg/Germany)
Ni	Coll. Niehuis (Albersweiler/Germany)
Ro	Coll. Rosa (Bernareggio/Italy)
Sa	Coll. Saure (Berlin/Germany)
Se	Coll. Schmid-Egger (Berlin/Germany)
Ti	Coll. Tischendorf (Darmstadt/Germany)
Wi	Coll. Wickl (Schnaittenbach/Germany)

Historical review

In 1856, Adolf Schenck described five new species of the *Chrysis ignita* group from the former Duchy of Nassau, Germany. According to the author, two of the species (*C. angustula* and *C. gracilis*) differ from other species of the *C. ignita* group in terms of their slender habitus. Five years later, however, Schenck (1861) revised his former opinion and regarded these forms only as variations of *C. ignita* (Linnaeus, 1758):

"*Chrysis vitripennis*, *impressa*, *gracilis*, *angustula* und *brevidentata* sind wohl nur Varietäten der *ignita*, so abweichend sie auch zum Theil in dem Habitus, der Farbe, der Sculptur und der Gestalt des Endsegments und seiner Zähne sind." (Schenck 1861: 174).

It is important to note that even though Schenck's attempt to differentiate these forms seemed to have failed, he was the first author who ever tried to treat the slender specimens of *C. ignita* as distinct species.

In 1879, Henri Tournier described a third slender species of the *Chrysis ignita* group from Peney, Switzerland: *C. brevidens*. It was unclear, however, in which way his species and those described by Schenck differed, since Tournier did not mention *C. angustula* and *C. gracilis*.

Over the course of the next 20 years, many hymenopterists tried to verify the separation of the highly polymorphic *Chrysis ignita* into distinct species, but most authors (e.g. Buysson 1891–1896, Frey-Gessner 1887, Mocsáry 1889) came to the conclusion that the slender specimens were only a variation of *C. ignita*. Nevertheless, they used the specific epithet *brevidens* to name this conspicuous variation, whereas Schenck's names fell into oblivion or were incorrectly synonymised with other variations or species. There were mainly two reasons for this development: First, Tournier distributed identified specimens of *C. brevidens* among contemporaries and museums and, thus, this name became familiar to most of his colleagues. Second, Schenck's syntypes had not been examined.

During the first half of the 20th century, the name *brevidens* was still in use for all specimens of the presumed species *Chrysis ignita* that had two features in common: (a) a slender habitus and (b) very short apical teeth on gastral tergum III:

"var. *brevidens* Tournier. Schmale, zylindrische Rasse mit sehr kurzen Zähnen am 3. Tergit." (Trautmann 1927: 146).

Some authors, however, did not regard these specimens even as distinct variations of *Chrysis ignita*:

"*C.* (*Tetrachrysis*) *ignita* L. [...] Dents apicales presque toujours aiguës et bien nettes: les variétés créées uniquement d'après elles n'ont pas grande valeur: on abandonnera ici, par exemple, les var. *obtusidens* Duf. et Perris, et *brevidens* Tournier, à peine distinctes de la normale." (Berland & Bernard 1938: 116).

In a guiding work, Stephan Zimmermann (1944) published his studies on material of the *Chrysis ignita* group from the eastern Alps. He came to the conclusion that the slender specimens of *C. ignita* are an ecological subspecies. Due to Tournier's (1879) misleading description of *C. brevidens*, however, Zimmermann (1944) assumed that *C. brevidens* was closely related to or even identical with *C. ruddii* Shuckard, 1836 – a species which does not belong to the *angustula* aggregate at all. Thus, he named the presumed new subspecies *sparsepunctata*:

"In eine dritte Gruppe gehören Tiere, die – im allgemeinen kleiner und schlanker als die der beiden vorhergehenden – von diesen ebenfalls durch die Punktierung der Abdominal-Segmente unterschieden sind [...] Ich nenne diese Form *sparsepunctata* und füge hinzu, daß es sich bei ihr um eine gut gekennzeichnete ökologische Rasse von *Chr. ignita* handelt." (Zimmermann 1944: 84–85).

A few years later, however, Zimmermann (1954) realized that his *Chrysis ignita* ssp. *sparsepunctata* was identical with *C. brevidens*. Zimmermann (1944) deserves special mention for the fact that he was among the first in realizing that the slender specimens of the *C. ignita* group are not only a variation of *C. ignita* but a distinct taxon.

A new stage in the study of the *Chrysis ignita* group began with Walter Linsenmaier's (1951) first publication. The author split *C. ignita* extensively into distinct species and variations. Already in his first work, he assigned species rank to the slender forms using the well-known name *brevidens*. In addition, Linsenmaier (1951) gave a description of another distinct form which he presumed to be Schenck's *C. angustula*. Today, this species is known as *C. schencki* Linsenmaier, 1968 (= *C. schenckiana* Linsenmaier, 1959, nec Mocsáry, 1912) and does not belong to the *C. angustula* aggregate.

In 1956, Hermann Haupt described additional taxa of the *Chrysis ignita* group: *C. comosa*, *C. ignita excavata*, and *C. ignita solida*. While *C. comosa*, based on a single male, was an obvious synonym of *C. ruddii* Shuckard, 1836, the identity of the two new subspecies remained unclear.

Paul Blüthgen (1959) – apparently the first author who studied types of cuckoo wasps in Schenck's collection – rescued Schenck's species of the *Chrysis ignita* group from oblivion. Blüthgen (1959) compared a specimen of *C. brevidens*, identified by Linsenmaier, with a syntype of *C. angustula* and found a complete correspondence. He announced the synonymy of *C. angustula* and *C. brevidens* and demonstrated that Linsenmaier (1951) had used the name *C. angustula* incorrectly by applying it to a taxon different from *brevidens* (see above). Blüthgen (1959) also studied a syntype of *C. gracilis* and described its differences to the syntype of *C. angustula*. However, he was not sure about its taxonomic rank.

As a result of Blüthgen's (1959) studies, Linsenmaier (1959a) introduced the name *schenckiana* Linsenmaier, 1959, (nec Mocsáry, 1912) for his former *Chrysis angustula* and used the name *C. angustula* instead of the junior synonym *C. brevidens*. In addition, he split *C. angustula* into two subspecies due to differences of the punctation of gastral tergum II: The nominate form and the subspecies *gracilis*.

Linsenmaier (1959a) also discussed Haupt's subspecies *Chrysis ignita excavata* and *C. ignita solida* as conglomerates of several different species:

"Die von Haupt 1956 aufgestellten ssp. *excavata* und ssp. *solida* sind mehr oder weniger Sammelbegriffe für verschiedene Formen." (Linsenmaier 1959a: 155).

But despite his previous judgment (Linsenmaier 1959a: 155) he finally declared *C.* (*i.*) *solida* as synonym to *C. angustula* (Linsenmaier 1959a: 159).

In 1965, László Móczár described one more slender European species of the *Chrysis ignita* group, *C. chalcea* Móczár, 1965, which was found in former Yugoslavia:

"Die Art ist insbesondere der *Chr. ignita angustula* Schenck ähnlich, von der sie sich vorwiegend durch die Zähne des Abdomenendes, durch die mittlere flache Grubenreihe des 3. Tergits, ferner durch die Länge der Wangen unterscheidet." (Móczár 1965: 178).

Almost 20 years later, David Morgan (1984) designated the first lectotype within the *Chrysis angustula* aggregate (i.e. *C. angustula*) to "ensure future nomenclatural stability":

"Four conspecific specimens stand under *C. angustula* in the Schenck collection at the Forschungsinstitut Senckenberg, Frankfurt am Main. Three of the specimens are unlabeled; the fourth which I here designate as lectotype, has a probable collection drawer label "*ignita* var. *angustula*". All specimens conform with current interpretation." (Morgan 1984: 9).

When I examined this lectotype, I began to doubt its correct identification (Schmid-Egger et al. 1995). Rather, I came to the conclusion that the designated lectotype of *C. angustula* was a typical specimen of *C. angustula* ssp. *gracilis* as described by Linsenmaier (1959a).

In recent years, Peter Kunz (1989, 1994) treated *Chrysis angustula* as synonym of *C. ignita*. While some hymenopterists adopted his classification key, others criticized his conclusions and rejected his nomenclature (e.g. Schmid-Egger et al. 1995).

Results

My examination of more than 600 specimens of the *Chrysis angustula* aggregate from the western and eastern Palaearctic region including all available type material revealed that there exist only three valid taxa within this complex: *C. angustula angustula* Schenck, 1856, *C. angustula alpina* ssp. n., and *C. leptomandibularis* sp. n. Surprisingly, two of them proved to be undescribed yet. All other species mentioned in the historical review above either fall into synonymy with *C. angustula* or were nomina dubia or do not belong to the *C. angustula* aggregate at all.

Chrysis angustula and *C. leptomandibularis* sp. n. can be distinguished by mandibular structures. The feature commonly used for identification within the *C. angustula* aggregate – the punctation of T-II – is often misleading. Associated with the common sexual dimorphism within the *C. ignita* group, one problem remains: Differences in the proportions of the mandibles between both species are comparatively small in males and only savely detectable when the mandibles are spread out. Females can always easily be identified due to more prominent differences.

The males of the *Chrysis angustula* aggregate are hard to differentiate from other species of the *C. ignita* group (e.g. *C. corusca* Valkeila, 1971, *C. schencki* Linsenmaier, 1968, *C.* (*mediata*) *solida* Haupt, 1956). As almost all examined males had closed mandibles and as their genital capsule and subgenital plate had not been extracted before, I was not able to check diagnostic features for validity in a large sample (see material below). Therefore, it is not possible to provide reliable diagnoses to recognize males of the *C. angustula* aggregate yet. In the present paper, the focus is on the morphology of the females. However, I will provide provisional features for distinguishing the males.

Diagnosis of the *Chrysis angustula* aggregate

The species of the *Chrysis angustula* aggregate can be distinguished from all other European species of the *Chrysis ignita* group by the combination of the following features:

- gaster uniformly colored, metallic red or golden,
- slender habitus (fig. 1A, 2A),
- interior edges of mandibles without tooth near the tip (fig. 1B, 2B),
- lateral edges of propodeal teeth concave or parallel in dorsal view (fig. 1A, 2A),
- lateral edges of propodeal teeth inset from tips of metapleural teeth (fig. 1A, 2A), and
- females with thin ovipositor tube (chitinous plate of T-V longer than broad).

The features concerning the propodeal teeth are usually reliable for distinguishing *Chrysis corusca* and *C. schencki* respectively, which both can be difficult to separate from *C. angustula* otherwise. *C. longula* Abeille, 1879, and *C. subcoriacea* Linsenmaier, 1959, have concave or parallel propodeal teeth and may look quite slender, thus appearing similar to the *C. angustula* aggregate. In this case, however, they can be readily recognized by the dense, large punctures on the base of T-II.

Key to the species and subspecies of the *Chrysis angustula* aggregate

Females

1 In lateral view, apical $^3/_4$ of the mandibles appearing almost parallel and as broad as the apical segment of the labial palp; its width conspicuously swelling (by more than 250%) toward the base (fig. 3A). Lateral propodeal teeth less prominent than in *C. angustula* (compare fig. 1A and 2A). ..... ***Chrysis leptomandibularis* sp. n. (♀)**

1′ In lateral view, apical $^3/_4$ of the mandibles not appearing parallel, mandibles in the middle broader than the apical segment of a labial palp; its width not swelling so conspicuously (by less than 150%) toward the base (fig. 3B). Lateral propodeal teeth more prominent than in *C. leptomandibularis* sp. n. (compare fig. 1A and 2A). **2**

Separation of the following subspecies is difficult and only possible by using diagnostic features in combination. Note the restricted range of *C. angustula alpina* ssp. n.

2 Subapical gastral pit row is preceded by a weak transverse swelling. Therefore, subsequent transverse groove more conspicuous and more sloping; apical margin longer and more prominent (fig. 4A). Thorax in general very dark (purple or almost black). Color distribution of S-II as in fig. 5A. Lower cavitas frontalis usually dull. Distribution: only known from the western and central Alps ..... ***Chrysis angustula alpina* ssp. n. (♀)**

2′ Subapical gastral pit row is preceded by an extremely weak or no transverse swelling. Therefore, subsequent transverse groove not or extremely weakly developed and not so sloping; apical margin shorter and not so prominent (fig. 4B). Thorax color variable. Color distribution of S-II as in fig. 5B. Lower cavitas frontalis usually shining. Distribution: most of Europe including the western and central Alps..... ***Chrysis angustula angustula* Schenck, 1856 (♀)**

Males

Note: The following differential diagnostic features are based on a small sample of studied males. For this reason, deviations from the given measurements may occur. The male of *Chrysis angustula alpina* ssp. n. is unknown.

1 In lateral view, width of the mandibles in the middle only about $^1/_3$ of its width at the base (fig. 6A). Ratio length to width of F-I about 1.8–2.0 (fig. 7A). Lateral propodeal teeth less prominent than in *C. angustula* (compare fig. 1A and 2A)..... ***Chrysis leptomandibularis* sp. n. (♂)**

1′ In lateral view, width of the mandibles in the middle about $^1/_2$ of its width at the base (fig. 6B). Ratio length to width of F-I about 2.0–2.4 (fig. 7B). Lateral propodeal teeth more prominent than in *C. leptomandibularis* sp. n. (compare fig. 1A and 2A)..... ***Chrysis angustula angustula* Schenck, 1856 (♂)**

Chrysis angustula alpina ssp. n.

Material (10 ♀♀)

Holotype (♀): France, Hautes Alpes, le Lombard (44°48′N/06°52′E), 1750 m, 08. 08. 1997, leg. M. & O. Niehuis [SMFD].

Paratypes (9 ♀♀):

Austria: Tirol, Ischgl (47°01′N/10°16′E), 1400–1700 m, 08. 08. 1992, 2 ♀♀, leg. W. Arens [Ar];

Switzerland: Graubünden, Disentis (46°42′N/08°51′E), Uaul Cavorgia Su, 1500 m, 13. 07. 1994, 1 ♀, leg. P. Duëlli [Ni]; Wallis, Binn (46°22′N/08°11′E), 1525 m, 26. 07. 1953, 1 ♀, leg. H. Kutter [Li]; Wallis, Blatten (46°25′N/07°49′E), Falfleralp, 1750 m, 01. 08. 1995, 1 ♀, leg. M. & O. Niehuis [Ni]; Wallis, Chandolin (46°15′N/07°35′E), 1700 m, 11. 07. 1975, 1 ♀, leg. F. Amiet [NMBS]; Wallis, Grimentz (46°11′N/07°34′E), 1550 m, 27.07.–12. 08. 1944, 2 ♀♀, leg. J. de Beaumont [Li, MZLS]; Wallis, Val Champex (46°02′N/07°07′E), Souche, 1600 m, 11. 07. 1954, 1 ♀, leg. J. Steffen [Li].

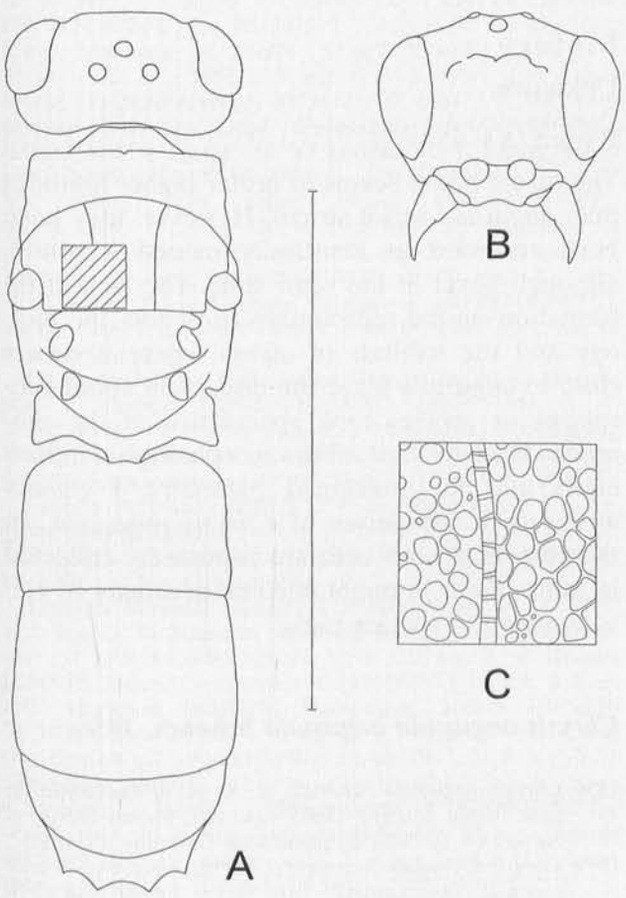


Fig. 1. *Chrysis angustula alpina* ssp. n. female (holotype). **A.** Habitus, dorsal view (wings not shown). **B.** Head, frontal view. **C.** Punctation on scutum (3.2 times enlarged in respect to **A**). Scale: 4.0 mm.

Description

Holotype: Female (fig. 1).

Size: Body length 6.8 mm.

Head: Height 1.5 mm, width 1.9 mm, length 0.9 mm. LID = 1.0 mm. Frons green with golden reflections. A narrow golden stripe along the inner orbits. Scapal basin in the lower half appearing dull, sparsely and irregularly punctate (PD = 0.030–0.045 mm), spaces between punctures app. as PD, upper half with a small oval, rather deep depression (height 0.11 mm, width 0.09 mm) in the mediosagittal line. Punctation on both sides of the depression appearing somewhat finer than in the lower half of scapal basin, the narrow space (app. 0.5 PD) between punctures forming lateroventrad ridges. Transverse frontal carina developed (fig. 1B). Vertex dark blue or almost black, only a narrow golden stripe along the inner orbits. Malae and genae green or turquoise. Malar space = 0.2 mm (= 1.4 MOD). Mandible brown, basal outer edge metallic green. Interior edges of mandibles without tooth. In lateral view mandible 0.09 mm broad in the middle and with a conspicuous shining longitudinal bulge. Scapus and pedicellus of antennae green metallic, flagellum non-metallic black. Relative lengths of P/F-I/F-II/F-III are 1.14/2.05/1.10/1.00. F-IV and the following flagellomeres slightly longer than broad.

Thorax: Length 2.6 mm, width 1.8 mm. Pronotal collar 0.42 mm long in the middle and 1.48 mm broad at the anterior edge. Punctation double, dominant punctation irregular and with

PD = (0.02 mm –) 0.06–0.07 mm. Spaces between dominant punctation varying, but usually 0.5 PD or less and covered additionally with very small scattered punctures (PD = 0.01 mm). Pronotal collar bordered metallic turquoise, enclosed area metallic dark purple, becoming almost black towards the center. Medial groove weakly developed. Scutum metallic dark purple with a big turquoise spot in the middle. Punctation irregular, PD = (0.03 mm –) 0.06 mm (–0.07 mm). Average space between punctures smaller in midsection of scutum than outside of this area (fig. 1C). Tegulae metallic green. Scutellum with rather big punctures (PD = 0.07–0.09 mm). Average space between punctures 0.1 PD. Scutellum black along midline, becoming blue and turquoise towards the sides. Metanotum unmodified, purple. Outer edge of lateral propodeal tooth slightly concave, inset from tips of metapleural teeth (fig. 1A). Wing venation as in other species of the *Chrysis ignita* group.

Abdomen: Length 3.3 mm (T-I 1 mm, T-II 1.4 mm, T-III 0.9 mm). PD on T-I 0.08–0.3 mm, space between punctures app. 0.3 PD and with some very small dots. Punctation on T-II rather regular, PD on the basal part 0.03–0.05 mm, space between punctures 0.4 PD. Punctation getting scattered, double and weaker towards the end of the tergum. Difference between punctation in the apical part of T-I and the basal part of T-II not very conspicuous. Punctation of T-III almost absent, but surface of tergum still rather dull. Subapical pit row with 16 black pits. Pit row preceded by a weak transverse swelling. Therefore, transverse groove prominent and sloping (fig. 4A). Apical margin of T-III rather long and with 4 apical teeth (fig. 1A, 4A). Color distribution of S-II as in fig. 5A. Internal segments as in fig. 8.

Etymology: The specific epithet refers to the type locality of this taxon in the western Alps. It is an adjective in the female gender.

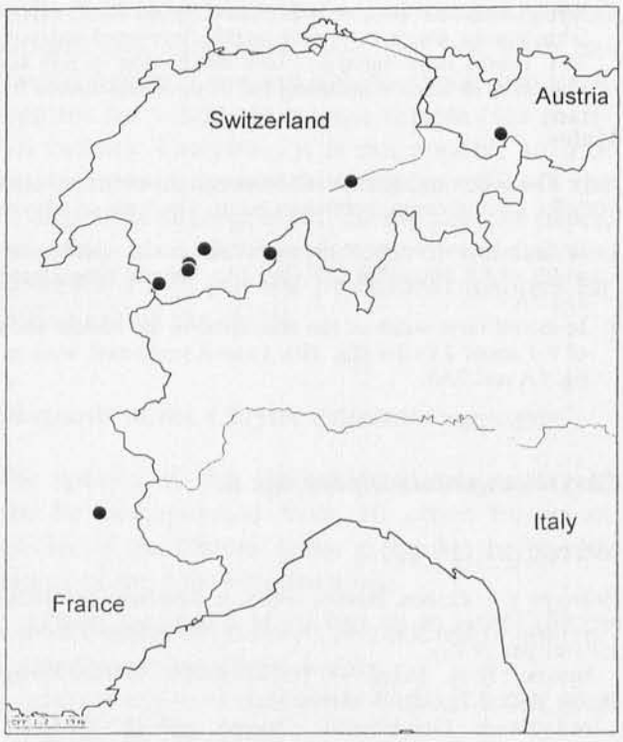
Paratypes: Morphology and coloration similar to that of the holotype. Males are not known for certain.

Distribution and zoogeography

Chrysis angustula alpina ssp. n. is probably confined to the western and central Alps (map 1). All known records are at least 1400 m above mid sea level.

Phenology

Females of *Chrysis angustula alpina* ssp. n. have been found from mid-July until mid-August.



Map 1: Records of *Chrysis angustula alpina* ssp. n.

Biology

Unknown.

Remarks

The taxon *alpina* seems to prefer higher altitudes than *angustula* sensu stricto. However, they have been recorded in identically named locations, although never at the same time. The lack of information on the reproductive isolation, the biology and the habitats of *alpina* where it occurs close to *angustula* leave the discussion about subspecies or species rank speculative at the moment. Due to the subtle morphological differences and the presumed parapatry, I classify *alpina* as a subspecies of *Chrysis angustula*. In the case that both taxa are repeatedly collected in same places, it might become necessary to elevate *alpina* to species rank.

Chrysis angustula angustula Schenck, 1856

1856 *Chrysis angustula* Schenck: p. 30, n. 6. Lectotype female (desig. Morgan 1984). Loc. typ.: former Duchy of Nassau (~ 50°N/08°E) (southwest Germany) [SMFD].

1879 *Chrysis brevidens* Tournier: p. 96–98. Lectotype female (present designation). Loc. typ.: Peney (46°13′N/06°02′E) (Genf, Switzerland) [MHNG].

1944 *Chrysis ignita* ssp. *sparsepunctata* Zimmermann: p. 85–88. Lectotype female (present designation). Loc. typ.: Maria Luggau (46°43′N/12°48′E) (Kärnten, Austria) [NHMW].

Etymology: The specific epithet *angustula* is derived from the Latin word *angústulus, -a, -um* (= somewhat slender); it is an adjective in the female gender. The epithet *brevidens* is compound of the Latin words *brévis, -is, -e* (= short) and *dens* (= tooth); it is an unchangeable noun in apposition. The epithet *sparsepunctata* is derived from the Latin words *spársus, -a, -um* (= scattered) and *punctatus, -a, -um* (= punctate); it is an adjective in the female gender.

Material (452 ♀♀, 28 ♂♂)

Austria: Kärnten, 3 km N St. Lorenzen, Tuffbad (46°43′N/12°48′E), 13. 07. 1970, 1 ♀, leg. A. Kofler [Li]; Kärnten, Maria Luggau (46°43′N/12°45′E), June 1932, 2 ♀♀, 1 ♂, July 1933, 1 ♂, leg. Käufel (lectotype and 3 paralectotypes of *Chrysis ignita* ssp. *sparsepunctata* Zimmermann, 1944) [NHMW]; Kärnten, Mauthen (46°40′N/13°00′E), 10.–25. 06. 1943, 1 ♀, leg. Michalk [Li]; Niederösterreich, Bucklige Welt (~ 47°33′N/16°05′E), without date, 32 ♀♀, 1 ♂, leg. Mader [ETHZ, Li]; Niederösterreich, Steinakirchen am Forst (48°04′N/15°03′E), 18. 07. 1980, 1 ♀, leg. F. Ressl [Li]; Oberösterreich, Linz (48°18′N/14°17′E), Schiltenberg, 01. 09. 1962, 1 ♀, leg. M. Schwarz [Li]; Oberösterreich, Reichenthal (48°33′N/14°23′E), 20. 06. 1967, 1 ♀, leg. A. W. Ebmer [Li]; Voralberg, S Bludenz, Vandans (47°07′N/09°52′E), 640 m, 12. 07. 1995, 1 ♀, leg. C. J. Zwakhals [ZMAN];

Belgium: Liège, Eben (50°47′N/05°41′E), 05. 1973, 1 ♀, leg. B. V. Lefeber [Le]; Liège, Jalhay (50°34′N/05°58′E), 05. 07. 1985, 1 ♀, leg. B. V. Lefeber [Le]; Liège, La Calamine (50°44′N/06°00′E), 04. 08. 1975, 1 ♀, leg. B. V. Lefeber [Le]; Liège, Montagne St. Pierre (50°46′N/05°40′E), 1978, 1 ♀, 15. 06. 1978, 1 ♀, 1986, 1 ♀, leg. B. V. Lefeber [Le]; Liège, Ovifat (50°28′N/06°06′E), 462 m, 29. 07. 1964, 1 ♀, leg. Anonymus [ZMAN]; Liège, Plombières (50°44′N/05°50′E), 07. 08. 1974, 1 ♀, leg. B. V. Lefeber [Le]; Liège, Sohee (50°46′N/05°38′E), 02. 07. 1974, 1 ♀, 29. 08. 1984, 1 ♀, leg. B. V. Lefeber [Le]; Liège, Wonck (50°46′N/05°38′E), 06. 08. 1968, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, As (51°01′N/05°35′E), 02. 07. 1975, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Opcanne (50°49′N/05°40′E), 01. 09. 1985, 1 ♀, leg. V. Lefeber [Le]; Limburg, Tongeren (50°48′N/05°32′E), 24. 06. 1986, 1 ♀, 01. 07. 1986, 1 ♀, 04. 07. 1990, 3 ♀♀, leg. B. van Aartsen [Le];

China: Manchuria, Heilongijang Sheng, Charbin (= Ha-erhpin = Harbin) (45°45′N/126°41′E), 09. 07. 1944, 1 ♀, 25. 07. 1950, 1 ♀, leg. W. Alin [Li]; Manchuria, Heilongijang Sheng, Mao'ershan (45°16′N/127°31′E), 100 km E Harbin on Chinese Eastern Railway, 18. 08. 1941, 2 ♀♀, leg. V. N. Alin [Li];

Croatia: Pregrada (46°10′N/15°45′E), without date, 1 ♀, leg. Anonymus [HNHM];

Denmark: Ringkøbing, Birkild Asp (56°26′N/08°29′E), 08. 1990, 1 ♀, leg. O. Mehl [Ni];

England: Berkshir, Slough (51°31′N/00°36′W), 18. 06. 1929, 1 ♂, leg. O. W. Richards [BMNH]; Buckinghamshire, Ivinghoe (51°50′N/00°38′W), 28. 07. 1950, 1 ♀, leg. R. B. Benson [BMNH]; Essex, Colchester (51°53′N/00°53′E), 1908, 1 ♀, ex coll. Harwood [BMNH]; Hampshire, Totton (50°55′N/01°30′W), 28. 06. 1952, 1 ♀, leg. C. R. Vardy [BMNH]; Surrey, Horsell (51°19′N/00°34′W), 12. 06. 1915, 1 ♂, leg. R. J. Champion [BMNH];

Finland: Hame, Hämeenlinna (61°0′N/24°27′E), 06. 07. 1954, 1 ♀, leg. Valkeila [RMNH]; Hame, Hattula (61°04′N/24°23′E), without date, 1 ♀, leg. Hellén [Li]; Uusimaa, Helsinki (60°10′N/24°58′E), 27. 06. 1957, 1 ♀, 14. 07. 1957, 2 ♀♀, 26. 07. 1957, 1 ♀, 11. 08. 1957, 1 ♀, leg. O. Ranin [Li, RMNH]; Uusimaa, Kyrkslätt (60°06′N/24°20′E), 23. 06. 1943, 1 ♀, leg. R. Öller [Li];

France: Allier, Broût-Vernet (46°11′N/03°16′E), < 1900, 2 ♀♀, ex coll. R. Du Buysson [MNHN]; Alsace, Bas-Rhin, Foret Haguenau (48°49′N/07°47′E), 09. 08. 1959, 1 ♀, 16. 09. 1968, 1 ♀, 27. 09. 1968, 1 ♀, leg. M. Klein [Li, MZSF]; Bas-Rhin, Alsace, Monswiller (48°45′N/07°23′E), 06. 07. 1932, 1 ♀, leg. Grauvogel [MZSF]; Haute Savoie, Sciez (46°20′N/06°23′E), 08. 08. 1933, 1 ♀, leg. J. de Beaumont [MZLS]; Hérault, Montpellier (43°37′N/03°52′E), < 1867, 1 ♀, leg. O. Sichel [MNHN]; Lozère, St. Énimie (44°22′N/03°25′E), 21.–28. 06. 1986, 1 ♀, leg. P. Thomas [Le]; Marne, Saint-Imoges (49°06′N/03°50′E), 16. 08. 1954, 1 ♀, leg. M. Caruel [ZMAN]; Saône-et-Loire, Digoin (46°30′N/03°59′E), 19. 08. 1973, 1 ♀, 21. 09. 1973, 1 ♀, leg. K. Vegter [RMNH]; Vosges, Remiremont (48°01′N/06°35′E), < 1898, 1 ♀, ex coll. Noualhier [MNHN];

Germany: Baden-Württemberg, Freiburg (47°59′N/07°50′E), Wittental, 22. 07. 1970, 1 ♀, 07. 09. 1970, 1 ♀, 09. 09. 1970, 2 ♀♀, leg. R. Gauss [Li]; Baden-Württemberg, Kirchzarten (47°58′N/07°57′E), 03. 07. 1965, 1 ♀, 16. 06. 1966, 4 ♀♀, leg. W. Perraudin [Li]; Baden-Württemberg, Kirchzarten (47°58′N/07°57′E), 04. 06. 1971, 1 ♀, leg. R. Gauss [Li]; Baden-Württemberg, Kirchzarten (47°58′N/07°57′E), Geroldstal, 30. 06. 1965, 1 ♀, 01. 07. 1965, 1 ♀, 04. 07. 1965, 2 ♀♀, leg. W. Perraudin [Li]; Baden-Württemberg, Stuttgart, Waldenbuch (48°38′N/09°08′E), Schaichtal, 08. 09. 1989, 1 ♀, leg. C. Schmid-Egger [Se]; Bayern, 5 km E Dachau (48°15′N/11°26′E), Obergrashof, 28. 05.–03. 06. 1992, 2 ♀♀, 04.–10. 06. 1992, 1 ♀, 11.–17. 06. 1992, 1 ♀, 09.–15. 07. 1992, 1 ♀, 30. 07.–12. 08. 1992, 2 ♀♀, 13.–26. 08. 1992, 1 ♀, 10.–23. 09. 1992, 2 ♀♀, leg. S. Blank [Se]; Bayern, Albersdorf, Haßberge (50°06′N/10°41′E), 08. 1954, 1 ♀, leg. H. Weidner [ZMUH]; Bayern, Eglsee (49°27′N/11°50′E), 20. 07. 1989, 1 ♀, leg. K.-H. Wickl [Wi]; Bayern, Grassau (47°47′N/12°27′E), 16. 06. 1986, 1 ♀, leg. Ettenberger [Ni]; Bayern, Haidhof (49°42′N/11°09′E), 22. 06. 1989, 1 ♀, leg. K.-H. Wickl [Wi]; Bayern, Hartmannshof (49°30′N/11°34′E), 03. 06. 1989, 1 ♀, leg. K.-H. Wickl [Wi]; Bayern, Hirschau (49°33′N/11°57′E), 29. 05. 1989, 1 ♀, leg. K.-H. Wickl [Wi]; Bayern, Karlstadt a. M. (49°58′N/09°47′E), 07. 08. 1935, 1 ♀, leg. W. Noll [RMNH]; Bayern, Murnau (47°34′N/11°08′E), 01. 08. 1997, 2 ♀♀, leg. O. Niehuis [Ni]; Bayern, Oberstdorf (47°24′N/10°17′E), 01. 07. 1931, 1 ♀, 15. 06. 1943, 1 ♀, leg. Dr. Enslin [Li]; Bayern, Oberstdorf (47°24′N/10°17′E), 06. 1951, 1 ♀, leg. Raab [Li]; Bayern, Schnaittenbach (49°33′N/12°00′E), 20. 06. 1986, 1 ♀, 05. 08. 1986, 1 ♀, 22. 09. 1986, 1 ♀, 27. 05. 1988, 1 ♀, 03. 06. 1988, 1 ♀, leg. K.-H. Wickl [Wi]; Berlin, Britzer Garten (52°26′N/13°25′E), 16. 07. 1996, 1 ♀, leg. H.-J. Flügel [Fl]; Berlin, Köpenick (52°27′N/13°35′E), Gosener Wiesen, Kaniswall, 19. 07. 1994, 1 ♀, leg. C. Saure [Sa]; Berlin (52°26′N/13°26′E), 17. 06. 1996, 1 ♀, 03. 07. 1996, 1 ♀, 10. 08. 1998, 1 ♀, leg. H.-J. Flügel [Fl]; Berlin, Tegel, Flughafensee (52°35′N/13°15′E), 04. 08. 1993, 1 ♀, leg. C. Saure [Sa]; Berlin-Pankow (52°34′N/13°25′E), Buch, Hüterland-Krhs., 12. 08. 1993, 1 ♀, leg. G. Jaeschke [Sa]; Brandenburg, Drögen, StOÜbP (53°09′N/13°09′E), 23. 07. 1997, 2 ♀♀, leg. H.-J. Flügel [Fl]; Brandenburg, Fürstenberg, Feuchtwiese (53°12′N/13°09), 11. 08. 1997, 2 ♀♀, leg. H.-J. Flügel [Fl]; Brandenburg, Potsdam (52°24′N/13°03′E), Döberitzer Heide, 1995, 2 ♀♀, 18. 06. 1996, 1 ♀, 01. 07. 1996, 1 ♂, leg. A. Hinrichsen [Hi]; Brandenburg, Zossen, Sumpfweg (52°12′N/13°28′E), 25. 05. 1993, 1 ♀, leg. H.-J. Flügel [Fl]; Bremen, Bremen-Gröpelingen (53°07′N/08°46′E), "bei *Sym. bifasc.*" 11. 08. 1893, 1 ♀, leg. J. D. Alfken [UMBB]; Bremen, Bremen-Seehausen (53°07′N/08°43′E), 15. 07. 1902, 1 ♀, leg. J. D. Alfken [UMBB]; former Duchy of Nassau (~ 50°N/08°E), < 1856, 1 ♀ (lectotype of *Chrysis angustula* Schenck, 1856) [SMFD]; Hessen, Bad Hersfeld (50°53′N/09°42′E), 29. 05. 1960, 1 ♀, leg. Anonymus [RMNH]; Hessen, Bad Salzschlirf (50°37′N/09°30′E), July 1900, 1 ♀, leg. Anonymus [UMBB]; Hessen, Ersrode, Waldlichtung (50°59′N/09°37′E), 04. 06. 1998, 1 ♀, leg. H.-J. Flügel [Fl]; Hessen, Grube Messel (49°56′N/08°44′E), 22. 06. 1998, 1 ♀, leg. S. Tischendorf [Ti]; Hessen, Marburg (50°48′N/08°46′E), 17. 06. 1957, 1 ♀, 31. 07. 1958, 1 ♀, 18. 08. 1958, 1 ♀, leg. H. Wolf [Li]; Hessen, Marburg-Cölbe (50°49′N/

08°47′E), 20. 06. 1988, 1 ♀, leg. F. Geller-Grimm [Se]; Hessen, Nd. Beisheim, Dorfrand (51°03′N/09°32′E), 260 m, 01.–10. 08. 1996, 2 ♀♀, 13. 06. 1997, 3 ♀♀, 15. 06. 1998, 1 ♀, 1 ♂, 20.–25. 06. 1998, 3 ♀♀, leg. H.-J. Flügel [Fl]; Mecklenburg-Vorpommern, Born (54°24′N/12°32′E), Darß-3ENE, 20. 06. 1998, 1 ♀, leg. Franke [SMNG]; Niedersachsen, Bomlitz (52°54′N/09°39′E), 01. 07. 1993, 1 ♀, leg. Sprick [Ni]; Niedersachsen, Hundsmühlen (53°06′N/08°11′E), 05. 08. 1977, 1 ♀, leg. Haeseler [RMNH]; Niedersachsen, Marschacht (53°25′N/10°23′E), 08. 08. 1916, 3 ♀♀, ex coll. E. Krüger [ZMUH]; Rheinland-Pfalz, Dichtelbach (50°00′N/07°42′E), 10. 06. 1997, 1 ♀, leg. M. Niehuis [Ni]; Rheinland-Pfalz, Einsiedlerhof (49°26′N/07°40′E), 05. 09. 1996, 3 ♀♀, leg. M. Niehuis [Ni]; Rheinland-Pfalz, Koblenz (50°22′N/07°35′E), 11. 07. 1996, 1 ♀, leg. Geissen [Ni]; Rheinland-Pfalz, Lindenberg (49°23′N/08°06′E), 10. 08. 1996, 1 ♀, leg. M. Niehuis [Ni]; Rheinland-Pfalz, Mainz-Mombach (50°01′N/08°13′E), 07. 06. 1993, 1 ♀, leg. C. Schmid-Egger [Se]; Rheinland-Pfalz, Neupotz (49°07′N/08°19′E), 09. 07. 1993, 2 ♀♀, leg. M. Niehuis [Ni]; Rheinland-Pfalz, Schloßböckelheim (49°47′N/07°42′E), 20. 06.–04. 07. 1995, 1 ♀, leg. L. Simon et al. [Se]; Rheinland-Pfalz, Sondernheim (49°12′N/08°21′E), Holzlager, 01. 06. 1993, 1 ♀, 05. 07. 1993, 1 ♀, 08. 07. 1993, 2 ♀♀, 13. 08. 1993, 1 ♀, leg. O. Niehuis [Ni]; Rheinland-Pfalz, Sondernheim (49°12′N/08°21′E), Holzlager, 18. 06. 1997, 2 ♀♀, leg. M. Niehuis [Ni]; Sachsen, Bräunsdorf near Freiberg (50°56′N/13°13′E), 03. 08. 1951, 1 ♀, leg. Krieger (*Chrysis brevidens* Tourn., det. Blüthgen 1957) [SMNG]; Sachsen, Dubring (51°23′N/14°13′E), Dubringer Moor, 26. 07. 1989, 1 ♀, leg. H.-J. Schulz [SMNG]; Sachsen, Hähnichen OL. (51°22′N/14°52′E), NSG Niederspree, 08. 08. 1989, 1 ♀, leg. Franke [SMNG]; Sachsen, Waltersdorf near Zittauen (50°52′N/14°39′E), 05. 07. 1994, 1 ♀, leg. H.-J. Schulz [SMNG]; Schleswig-Holstein, Grande (53°35′N/10°23′E), 07. 1912, 1 ♀, 12. 06. 1915, 1 ♀, 08. 06. 1917, 1 ♀, ex coll. E. Krüger [ZMUH];

Italy: Piemonte (45°N/8°E), < 1867, 1 ♀, ex coll. O. Sichel [MNHN]; Toscana, Volterra (43°24′N/10°51′E), 10. 1985, 1 ♀, leg. F. Amiet [NMBS]; Trentino-Alto Adge, Bolzano (46°30′N/11°20′E), Sarntal, 1250 m, 20.–30. 06. 1976, 2 ♀♀, leg. C. J. Zwakhals [ZMAN]; Trentino-Alto Adige, Rojen (46°46′N/10°28′E), 05. 08. 1994, 1 ♀, leg. O. Niehuis [Ni];

Luxembourg: Ettelbrück (49°51′N/06°07′E), 10. 06. 1976, 1 ♀, leg. K. Vegter [RMNH]; Mersch (49°45′N/06°06′E), 17.–27. 06. 1987, 2 ♀♀, leg. B. V. Lefeber [Le];

The Netherlands: Drenthe, Emmen (52°47′N/06°54′E), 04. 06. 1971, 1 ♀, 30. 06. 1971, 1 ♀, 03. 08. 1971, 1 ♀, 05. 07. 1972, 1 ♀, 28. 07. 1975, 1 ♀, leg. K. Vegter [RMNH]; Friesland, Appelscha (52°57′N/06°22′E), 28. 06. 1992, 1 ♀, leg. G. Bergsma [ZMAN]; Friesland, Heerenveen (52°57′N/05°55′E), 06. 1929, 1 ♀, leg. H.-J. Klaassen [ZMAN]; Gelderland, Asperen (51°53′N/05°07′E), 05. 08. 1972, 1 ♀, leg. C. J. Zwakhals [RMNH]; Gelderland, Asperen (51°53′N/05°07′E), 16. 07. 1972, 1 ♀, leg. B. V. Lefeber [Le]; Gelderland, Ederveen (52°04′N/05°35′E), 01.–04. 07. 1931, 1 ♀, leg. J. Broerse [ZMAN]; Gelderland, Elburg (52°27′N/05°50′E), 10. 06. 1992, 1 ♀, 30. 06. 1992, 2 ♀♀, leg. B. V. Lefeber [Le]; Gelderland, Kotten (51°57′N/06°46′E), Malaise trap, 11. 06. 1993, 1 ♀, C. J. Zwakhals [ZMAN]; Gelderland, Nunspeet (52°23′N/05°48′E), 09. 07. 1977, 1 ♀, leg. R. T. S. Thomas [ZMAN]; Gelderland, Nunspeet (52°23′N/05°48′E), De Vennen, 11. 07. 1986, 1 ♀, leg. H. Wiering [ZMAN]; Gelderland, Vragender (51°59′N/06°37′E), 22. 07. 1976, 1 ♀, leg. B. van Aartsen [ZMAN]; Gelderland, Neerijnen (51°50′N/05°17′E), 17. 07. 1991, 1 ♀, Malaise trap, leg. C. J. Zwakhals [Le]; Groningen, Sellingen (52°57′N/07°09′E), 28. 07. 1975, 1 ♀, leg. K. Vegter [RMNH]; Limburg, Arcen (51°29′N/06°11′E), 15. 07. 1980, 1 ♀, leg. B. van Aartsen [ZMAN]; Limburg, Bemelen (50°51′N/05°46′E), 25. 06. 1967, 1 ♀, 17. 06. 1996, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Bunde (50°54′N/05°44′E), 1973, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Cadier (50°50′N/05°46′E), 1977, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Echt (51°06′N/05°42′E), 05. 08. 1949, 1 ♀, 23. 07. 1954, 1 ♀, leg. R. Geurts [NHME]; Limburg, Echt (51°06′N/05°53′E), 01. 08. 1973, 2 ♀♀, leg. B. van Aartsen [Le, ZMAN]; Limburg, Elsloo, (50°57′N/05°45′E), 10. 07. 1966, 1 ♀, leg. H. Meuffels [Le]; Limburg, Elsloo (50°57′N/05°45′E), 10. 08. 1969, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Epen (50°47′N/05°54′E), 06. 1938, 1 ♀, leg. H.-J. Klaassen [ZMAN]; Limburg, Gulpen (50°49′N/05°53′E), 30. 07. 1917, 1 ♀, 13. 07. 1927, 1 ♀, 30. 07. 1927, 1 ♀, ex coll. B. E. Bouwman [ZMAN]; Limburg, Heythuysen (51°15′N/05°54′E), 04. 06. 1963, 1 ♀, 04. 06. 1964, 1 ♀, 28. 06. 1965, 1 ♀, leg. H. Sanders [NHME]; Limburg, Kelmond (50°55′N/05°48′E), 1973, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Koeberg (50°52′N/05°44′E), 02. 07. 1969, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Leeuwen (51°13′N/06°00′E), 18. 06. 1920, 1 ♀, leg. P. J. M. Schuijt [ZMAN]; Limburg, Maastricht (50°51′N/05°42′E), 21. 07. 1953, 1 ♀, leg. H. Sanders [NHME]; Limburg, Paarlo (51°09′N/06°02′E), 30. 06. 1967, 2 ♀♀, leg. H. Sanders [NHME]; Limburg, Simpelveld (50°50′N/05°59′E), 26. 06. 1992, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Spar (51°15′N/05°56′E), Houterhof, 13. 06. 1952, 1 ♀, leg. H. Sanders [NHME]; Limburg, St. Pietersberg (50°49′N/05°41′E), 01. 08. 1965, 2 ♀♀, 17. 06. 1989, 5 ♀♀, 30. 06. 1989, 1 ♀, 28. 06. 1990, 1 ♀, 21. 07. 1990, 1 ♀, 04. 07. 1991, 1 ♀, 24. 06. 1992, 1 ♀, 11. 07. 1996, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Terziet (50°46′N/05°55′E), 24. 05. 1946, 1 ♀, leg. L. Vári [ZMAN]; Limburg, Tombe (50°50′N/05°41′E), 05. 1970, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Valkenburg (50°53′N/05°50′E), 19. 06. 1929, 1 ♀, leg. H. Dettmer [NHME]; Limburg, Venlo (51°22′N/06°10′E), without date, 2 ♀♀, ex coll. Dr. J. Th. Oudemans [ZMAN]; Limburg, Vlodrop (51°08′N/06°05′E), 21. 08. 1987, 1 ♀, leg. B. V. Lefeber [Le]; Limburg, Vijlen (50°47′N/05°58′E), 21. 08. 1989, 1 ♀, 10. 07. 1990, 1 ♀, leg. B. V. Lefeber [Le]; Noord-Brabant, Breda (51°35′N/04°47′E), 30. 06. 1953, 1 ♀, 01. 07. 1953, 2 ♀♀, leg. J. P. van Lith [RMNH]; Noord-Brabant, Eindhoven (51°26′N/05°27′E), 20. 06. 1954, 2 ♀♀, 27. 08. 1954, 2 ♀♀, leg. G. v. d. Zanden [RMNH]; Noord-Brabant, Ulvenhout (51°33′N/04°48′E), 27. 07. 1947, 1 ♀, 05. 07. 1952, 1 ♀, 09. 08. 1953, 1 ♀, leg. J. P. van Lith [RMNH]; Noord-Brabant, Ulvenhout (51°33′N/04°48′E), Rakens, 24. 06. 1952, 1 ♀, 26. 06. 1952, 3 ♀♀, 05. 06. 1954, 1 ♀, 07. 06. 1954, 1 ♂, 24. 07. 1954, 1 ♀, 18. 05. 1958, 1 ♀, leg. J. P. van Lith [RMNH]; Noord-Holland, Weesp (52°19′N/05°02′E), 18. 06. 1990, 1 ♀, leg. Teriien [ZMAN]; Overijssel, Hasselt (52°30′N/06°07′E), 06. 07. 1987, 1 ♀, leg. B. V. Lefeber [Le]; Overijssel, Deventer (52°16′N/06°09′E), 1956, 2 ♀♀, leg. Betrem [RMNH]; Overijssel, Enschede (52°13′N/06°53′E), Duivengoor, 17. 06. 1978, 1 ♀, leg. R. Leys [ZMAN]; Overijssel, Rouveen (52°37′N/06°11′E), 28. 06. 1986, 1 ♀, leg. B. van Aartsen [Le]; Overijssel, Weerselo (52°21′N/06°51′E), Het Molenven, 29. 05.–01. 06. 1990, 1 ♀, 01.–12. 06. 1990, 1 ♀, 12.–27. 06. 1990, 1 ♀, leg. M. J. Delfos, Ph. Pronk [RMNH]; Utrecht, De Bilt (52°07′N/05°11′E), 26. 08. 1942, 1 ♀, leg. P. M. F. Verhoeff [RMNH]; Utrecht, De Bilt (52°07′N/05°11′E), Bureveld, 19. 08. 1942, 1 ♀, leg. P. M. F. Verhoeff [RMNH]; Utrecht, Driebergen (52°04′N/05°17′E), 17. 06. 1922, 1 ♀, leg. Dr. J. Th. Oudemans [ZMAN]; Zuid-Holland, Numansdorp (51°44′N/04°26′E), 08. 1914, 1 ♀, leg. A. Dulfer, ex coll. Dr. J. Th. Oudemans [ZMAN];

Norway: Akershus, Steinsgård (60°16′N/11°05′E), 07. 06. 1989, 1 ♂, leg. P. Ottesen [Be]; Hedmark, Breiviken (60°24′N/11°38′E), 13. 07. 1993, 1 ♀, leg. A. Haagenrud [Be]; Østfold, Råde (59°23′N/10°52′E), 27. 06. 1980, 1 ♀, leg. P. Ottesen [Be]; Østfold, Rygge (59°23′N/10°43′E), Sildebauen, 24. 07. 1996, 2 ♀♀, leg. L. Aarvik [Be]; Østfold, Tune (59°17′N/11°05′E), Råkil, 04. 07. 1991, 1 ♀, leg. T. J. Olsen [Be];

Poland: Województow Wroclawskie, Wroclaw (= Breslau) (51°05′N/17°00′E), 16. 06. 1955, 1 ♀, 20. 06. 1955, 1 ♀, leg. W. J. Pulawski [Li]; Województwo Szczecińskie, Bielinek (= Bellinchen (Oder)) (52°56′N/14°09′E), 30. 06. 1935, 1 ♂ (former syntype of *C. ignita* ssp. *solida* Hpt.), leg. Haupt [MLUH];

Slovakia: Stúrovo (47°48′N/18°43′E), 08. 08. 1959, 1 ♀, leg. Dr. Pádr [Li];

Spain: Cataluña, Balenyà (41°48′N/02°14′E), 16. 07. 1935, 1 ♀, leg. Vilarrubia [ETHZ]; Pr. Burgos (42°20′N/03°40′W), Oua, 600 m, 07. 1952, 1 ♀, leg. Dr. W. Marten [Li];

Sweden: Blekinge Län, Mörrum (56°12′N/14°45′E), 28. 06. 1948, 1 ♀, leg. Kj. Añder [Li]; Göteborgs och Bohus Län, Lyse (58°19′N/11°29′E), 12(?). 07. 1915(?) (date difficult to read), 1 ♀, ex coll. E. Wieslander [NHRS]; Hallands Län, Enslöv (56°45′N/12°58′E), Årnilt, 11. 06. 1978, 1 ♂, 28. 06. 1978, 1 ♂, leg. H. Andersson [MZLU]; Jämtlands Län, Hls., Kyrkbyn (61°51′N/14°02′E), Färila aug., 1943, 1 ♀, leg. E. Lind [NHRS]; Kalmar Län, Bergkvara (56°24′N/16°04′E), 10. 07. 1984, 2 ♀♀, leg. R. Danielsson [Ni]; Kalmar Län, Möckhult (57°14′N/16°13′E), 24. 07. 1988, 1 ♀, 15. 08. 1988, 1 ♀, leg. R. Baranowski [MZLU]; Kalmar Län, Mönsterås (57°02′N/16°26′E), 07. 1992, 1 ♀, leg. W. Kronblad [Ni]; Kalmar Lan, Öland, Högsrum (56°46′N/16°35′E), 11. 07. 1939, 1 ♀, ex coll. E. Wieslander [NHRS]; Kopparbergs Län, Dr., Täktbo (60°10′N/12°22′E), 31. 07. 1977, 1 ♀, 1979, 1 ♀, leg. L.-A. Janzon [NHRS]; Kopparbergs Län, Källslätten, (60°37′N/15°29′E), 09. 06. 1974, 1 ♀, leg. J. Björklund [Ab]; Kopparbergs Län, Särna (61°54′N/13°13′E), Nysätersvallen, 30. 06. 1977, 2 ♂♂, leg. L.-O. Wikars [Ab]; Kristanstads Län, Skäralid (56°02′N/13°15′E), 26. 08. 1934, 1 ♀, ex coll. N. Burrau [Li]; Kronobergs Län, Sm., Åseda (57°10′N/15°20′E), Ekefors, 02. 07. 1969, 1 ♀, leg. B. Gustavsson [NHRS]; Kronobergs Län, Växjö (56°53′N/14°49′E), S Åreda, 08. 07. 1983, 1 ♀, 27. 07. 1991, 1 ♀, 04. 07. 1992, 1 ♀, 25.–27. 07. 1996, 1 ♀, 18. 08. 1996, 1 ♀, 09.–10. 08. 1997, 3 ♀♀, leg. R. Danielsson [MZLU]; Östergötlands Län, Bl., Sjöarp (57°48′N/15°12′E), 03. 08. 1939, 1 ♀, leg. B. Frederiksson [NHRS]; Stockholms Län, 100 m V Grava (58°53′N/17°52′E), Käringboda NR, Ösmo, 1996, trap nest, 1 ♀, 1 ♂, leg. J. Abenius [Ab]; Stockholms Län, 250 m SSO Trollboda, Ö Styran, Sorunda, (58°59′N/17°51′E), 13. 08.–06. 09. 1996, 1 ♀, leg. J. Abenius [Ab]; Stockholms Län, 300 m NO Gryt, Ösmo, (58°58′N/17°54′E), 26. 06. 1993, 1 ♂, leg. J. Abenius [Ab]; Stockholms Län, 300 m S Väggarö (58°59′N/17°51′E), Sorunda, 11. 06. 1994, 2 ♂♂, leg. J. Abenius [Ab]; Stockholms Län, 350 m SV Björkbacken (58°55′N/17°50′E), Djursnäs, Ösmo, 1994, 2 ♀♀, trap nest, together with 1 ♀ of *Symmorphus connexus*, leg. J. Abenius [Ab]; Stockholms Län, 400 m NO Österäng (58°56′N/17°51′E), Djursnäs, Ösmo, 02.– 10. 06. 1995, 1 ♂, 22.–29. 06. 1995, 1 ♂, leg. J. Abenius [Ab]; Stockholms Län, 500 m NO Österäng (58°56′N/17°51′E), Djursnäs, Ösmo, 22.–29. 06. 1995, 1 ♂, 30. 06.–31. 07. 1995, 1 ♂, leg. J. Abenius [Ab]; Stockholms Län, 500 m NO Österäng (59°11′N/18°14′E), Djursnäs, Ösmo, 22.–29. 06. 1995, 1 ♂, 30. 06.–31. 07. 1995, 1 ♂, leg. J. Abenius [Ab]; Stockholms Län, 700 m NO Djursnäs, Ösmo, (58°55′N/17°49′E), 28. 07.–14. 08. 1995, 1 ♀, 27.05.– 10. 07. 1996, 1 ♂, 11.–26. 07. 1996, 1 ♀, 15.08.–01. 09. 1996, 1 ♀, leg. J. Abenius [Ab]; Stockholms Län, 800 m S. Hultö, Djursnäs, Ösmo, (58°54′N/17°50′E), 06.–25. 07. 1996, 1 ♂, 25. 07.– 12. 08. 1996, 1 ♀, leg. J. Abenius [Ab]; Stockholms Län, Nynäshamn (58°52′N/17°55′E), Lövhagen, 06. 06. 1992, 1 ♀, trap nest, leg. J. Abenius [Ab]; Stockholms Län, Ösmo sn, 600 m SO Vasshammar, (58°54′N/17°52′E), 11. 08. 1998, 1 ♀, leg. J. Abenius [Ab]; Stockholms Län, Ösmo, 800 m V Djursnäs, (58°55′N/17°48′E), 1997, 2 ♀♀, trap nest, leg. J. Abenius [Ab]; Stockholms Län, Ösmo, Käringboda NR, 500 m SSV Rassa, (58°52′N/17°52′E), 1997, 2 ♀♀, trap nest, leg. J. Abenius [Ab]; Stockholms Län, Ösmo, Käringboda NR, 500 m SSV Rassa, (58°52′N/17°52′E), 1997, 2 ♀♀, trap nest, together with 1 ♂ of *Symmorphus bifasciatus*, leg. J. Abenius [Ab]; Stockholms Län, Ösmo, Käringboda NR, 700 m N Ängsvik, (58°52′N/17°53′E), 1997, 1 ♀, trap nest, leg. J. Abenius [Ab]; Stockholms Län, Sö., Tullgarn (58°58′N/17°35′E), 20. 08. 1979, 1 ♀, leg. L.-A. Janzon [NHRS]; Stockholms Län, Upl., Rådmansö (59°46′N/18°58′E), 04. 08. 1957, 1 ♀, leg. O. Lundblad [NHRS]; Värmlands Län, 100 m V Grava (59°28′N/13°25′E), Käringboda NR, Ösmo, 1996, 1 ♀, 1 ♂, trap nest, leg. J. Abenius [Ab]; Västmanlands Län, Östervaala, Brattberg (60°12′N/17°02′E), 16. 07. 1991, 1 ♂, leg. J. Abenius [Ab];

Switzerland: Basel-Landschaft, Waldenburg (47°23′N/07°45′E), 20. 07. 1946, 1 ♀, leg. W. Linsenmaier [Li]; Bern, Balm (46°45′N/08°08′E), 10. 09. 1987, 1 ♀, 17. 09. 1987, 1 ♀, leg. F. Amiet [NMBS]; Bern, Bätterkinden (47°08′N/07°32′E), 25. 07. 1887, 1 ♀, leg. Anonymus [Li]; Bern, Bern (46°57′N/07°26′E), 07. 1887, 11 ♀♀, leg. Gadmen [Li, NMBS]; Bern, Gstaad (46°29′N/07°17′E), 17. 08. 1953, 1 ♀, leg. Anonymus [Li]; Bern, Habkern (46°44′N/07°52′E), 30. 07. 1955, 1 ♀, leg. H. Pochon [NMBS]; Bern, Köniz (46°56′N/07°25′E), 16. 09. 1925, 1 ♀, leg. Bucher [NMBS]; Bern, Leuzigen (47°10′N/07°27′E), 14. 09. 1978, 1 ♀, leg. F. Amiet [NMBS]; Bern, Rüschegg (46°47′N/07°23′E), 23. 06. 1955, 1 ♀, leg. H. Pochon [NMBS]; Bern, Steffisburg (46°47′N/07°38′E), Aaregien, 06. 1925, 1 ♀, 20. 06. 1925, 1 ♀, 23. 06. 1926, 1 ♀, leg. Naef [Li]; Bern, Worb (46°56′N/07°34′E), 18. 07. 1926, 1 ♀, leg. Bucher [NMBS]; Bern, Zwischenflüh im Diemtigtal (46°36′N/07°31′E), 1040 m, 16. 07. 1948, 1 ♀, leg. Bucher [NMBS]; Genève, Versoix (46°17′N/06°09′E), 26. 06. 1932, 1 ♀, leg. J. de Beaumont [MZLS]; Genf, Peney (46°13′N/06°02′E), 15. 06. 1877, 1 ♀, 31. 05. 1878, 1 ♀ (both paralectotypes of *C. brevidens* Tourn.), 11. 06. 1878, 1 ♀ (lectotype of *C. brevidens* Tourn.), ex coll. H. Tournier [MHNG]; Genf, Peney (46°13′N/06°02′E), 15. 07. 1884, 1 ♀, ex coll. H. Tournier [MHNG]; Graubünden, Feldis (46°48′N/09°26′E), 24. 08. 1944, 1 ♀, leg. Dr. Ad. Nadig [ETHZ]; Graubünden, Fläsch (47°02′N/09°31′E), 18. 08. 1930, 1 ♀, leg. Dr. Ad. Nadig [ETHZ]; Graubünden, Saas (46°55′N/09°48′E), 07. 1886, 2 ♀♀, leg. Anonymus [Li, NMBS]; Graubünden, Sent (46°49′N/10°20′E), 26. 07. 1926, 1 ♀, leg. Dr. Ad. Nadig [ETHZ]; Graubünden, Somvix (46°44′N/08°56′E), 08. 1888, 4 ♀♀, 25. 07. 1891, 3 ♀♀, leg. Anonymus [NMBS]; Graubünden, Val Sinestra (46°51′N/10°20′E), 1475 m, 25. 08. 1933, 1 ♀, leg. Dr. Ad. Nadig [ETHZ]; Graubünden, Versam (46°48′N/09°20′E), 09. 07. 1898, 2 ♀♀, leg. Anonymus [NMBS]; Luzern, Luzern (47°02′N/08°16′E), 10. 06. 1948, 4 ♀♀, 19. 07. 1948, 1 ♀, 21. 07. 1948, 1 ♀, 08. 09. 1956, 1 ♀, 16. 06. 1957, 1 ♀, 06. 1958, 1 ♀, 06. 1971, 1 ♀, 07. 07. 1977, 1 ♀, leg. W. Linsenmaier [Li]; Neuchâtel, Environs de Neuchâtel (47°01′N/06°56′E), Thielle, 09. 1954, 1 ♀, ex coll. J. Jacob [MZLS]; Obwaden, Flüeli (46°52′N/08°16′E), 06. 1958, 2 ♀♀, leg. W. Linsenmaier [Li]; Sankt Gallen, Vättis (46°55′N/09°26′E), 09. 07. 1914, 1 ♀, leg. Steck [Li]; Solothurn, Solothurn (47°13′N/07°32′E), 17. 07. 1986, 1 ♀, leg. F. Amiet [NMBS]; Thurgau, Reuti (47°37′N/09°08′E), 470 m, 01. 08. 1954, 1 ♀, leg. Bucher [NMBS]; Waadt, Cudrefin (46°57′N/07°01′E), 15. 08. 1931, 1 ♀, leg. Steck [ETHZ]; Waadt, Cudrefin, La Sauge (46°59′N/07°03′E), 433 m, 10. 08. 1959, 1 ♀, 26. 08. 1959, 2 ♀♀, 27. 08. 1959, 1 ♀, 16. 08. 1963, 2 ♀♀, leg. J. de Beaumont [MZLS]; Waadt, Jorat (= name of the wooded mountains N Lausanne) (~ 46°35′N/06°42′E), 02. 07. 1965, 1 ♀, 06. 07. 1965, 1 ♀, leg. J. de Beaumont [MZLS]; Waadt, Préverenges (46°31′N/06°32′E), 405 m, 08. 07. 1956, 1 ♀, leg. Cl. Besuchet [MZLS]; Waadt, river Venoge (~ 46°30′N/06°32′E), 370 m, 22. 07. 1934, 1 ♀, 07. 1935, 1 ♀, leg. R. Matthey [MZLS]; Wallis (46°10′N/07°30′E), 15. 07. 1884, 1 ♀, leg. Anonymus [NMBS]; Wallis, Ayer (46°11′N/07°36′E), Val d'Anniviers, 1500 m, 07. 07. 1968, 1 ♀, leg. W. Perraudin [Li]; Wallis, Binn (46°22′N/08°11′E), 26. 08. 1953, 1 ♀, leg. H. Pochon [NMBS]; Wallis, Euseigne (46°10′N/07°25′E), 01. 08. 1992, 2 ♀♀, leg. W. Linsenmaier [Li]; Wallis, Euseigne (46°10′N/07°25′E), 25.–26. 07. 1939, 2 ♀♀, leg. Ad. Nadig [Li]; Wallis, Evolène (46°07′N/07°30′E), 11. 07. ?, 1 ♀, 07. 07. 1908, 1 ♀, leg. Anonymus [NMBS]; Wallis, Grimentz (46°11′N/07°34′E), 13. 07.–02. 08. 1941, 2 ♀♀, 16. 07.–05. 08. 1942, 2 ♀♀, leg. J. de Beaumont [MZLS]; Wallis, Grimentz (46°11′N/07°34′E), 1800 m, 30. 06. 1967, 1 ♀, leg. W. Linsenmaier [Li]; Wallis, Grimentz (46°11′N/07°34′E), 18. 08. 1941, 1 ♀, leg. Dr. Ad. Nadig [ETHZ]; Wallis, Lötschental, Kippel (46°24′N/07°46′E), 1500 m, 01.–03. 08. 1979, 1 ♀, leg. R. Leys [ZMAN]; Wallis, Martigny (46°06′N/07°04′), 07. 1935, 1 ♀, leg. R. Matthey [MZLS]; Wallis, Mayens de Sion (46°15′N/07°21′E), 08. 1942, 3 ♀♀, J. de Beaumont [Li, MZLS]; Wallis, Mission (46°11′N/07°36′E), 1290 m,

29.–30. 07. 1966, 1 ♀, leg. Steffen [Li]; Wallis, Sierre (46°18′N/07°31′E), 14. 06. 1959, 1 ♀, leg. Naef [Li]; Wallis, Verbier (46°06′N/07°13′E), 12. 07. 1959, 1 ♀, ex coll. J. Steffen [Li]; Wallis, Verbier (46°06′N/07°13′E), 17.–30.–07. 1939, 1 ♀, leg. J. de Beaumont [MZLS];

Tschechia: Jihormoravský Kraj, Břeclav (48°46′N/16°53′E), 06. 1994, 1 ♀, leg. J. Simandl [Ni];

Turkey: "Asia minor" (app. 39°N/35°E), without date, 1 ♀, leg. Anonymus [HNHM].

The identity of the species *Chrysis angustula* was dubious until the examination of a syntype by Blüthgen (1959). He compared this syntype, labeled "*ignita* var. *angustula*" with a specimen identified as *C. brevidens* by Linsenmaier. Since both specimens were corresponding, Blüthgen (1959) announced the synonymy of both names.

Blüthgen (1959) assumed the studied syntype of *Chrysis angustula* as the only type and does not refer to the other syntypes belonging to that species in Schenck's collection. But as Schenck (1856) mentions several males and females in the original description of *C. angustula*, there must have been at least 4 syntypes. According to article 74.5 of the ICZN, Blüthgen's (1959) examination of *Chrysis angustula* cannot be regarded as lectotype designation.

Morgan (1984) designated a lectotype of *Chrysis angustula*; the lectotype is a female, has a length of 7.5 mm and shows a distinctly finer punctation on the base of T-II than at the end of T-I. As already mentioned, this specimen is incongruent with Linsenmaier's (1959a) interpretation of this taxon. Linsenmaier differentiates two subspecies of *C. angustula*: While the nominate form is characterized by a somewhat finer punctation on the base of T-II than at the end of T-I ("Pkt auf Tergit 2 [...] an der Basis ein wenig feiner als auf Tergit 1."), the ssp. *gracilis* is defined ironically exactly by a gaster punctation as it is described in the lectotype of *angustula* above ("Punktierung auf Tergit 2 [...] schon an der Basis sehr viel feiner als auf Tergit 1").

The question arises whether Morgan's lectotype designation is based on an authentic syntype. This is especially important since Linsenmaier's nominate form of *C. angustula* includes specimens of *C. leptomandibularis* sp. n. and since Blüthgen (1959) described the apparently lost (see below) labeled syntype of *C. gracilis* mainly by comparison with the labeled syntype of *C. angustula*.

Due to the following reasons, I believe that the designated lectotype of *Chrysis angustula* and the syntype examined by Blüthgen (1959) are almost certainly the same specimen:

1. Schenck labeled his specimens restrictively, i.e. only one specimen of each species received a label. Therefore, lectotype and the type studied by Blüthgen should be identical if the label has not been exchanged.
2. Blüthgen (1959) compared the syntype of *C. angustula* with a specimen of *C. brevidens* (det. Linsenmaier) labeled "Bucklige Welt" (Nieder-Österreich, leg. Mader). He found both completely corresponding:
   "... entspricht ... in allen Einzelheiten genau einem ... ♀ derselben Herkunft" (Blüthgen 1959: 74).
   I do not know the present depository of the specimen from Austria that Blüthgen saw, but I found 32 specimens with exactly the same label in several collections (including Linsenmaier's). All specimens show a fine punctation on the base of T-II and are congruent with the lectotype.
3. Blüthgen (1959) noticed that *C. brevidens* is common and widely distributed:
   "... als häufiger Parasit in Stengeln oder Käferbohrlöchern nistender Hymenopteren bekannt und weit verbreitet." (Blüthgen 1959: 75).
   This is true for *C. a. angustula* but not for *C. leptomandibularis* sp. n., which is rarely collected and only locally abundant.
4. Finally, the designated lectotype matches completely the description given by Schenck (1856).

How did this confusion arise and why did Linsenmaier (1959a) assign the name *Chrysis angustula* to specimens with a rather coarse punctation on the base of T-II? A possible explanation is Blüthgen's (1959) description of *C. gracilis*. He describes the labeled syntype of the latter by comparing it with the labeled syntype of *C. angustula*. Therefore, Linsenmaier was only able to interpret the relative differences between the two syntypes. In particular, Blüthgen (1959) emphasizes the conspicuous differences between the punctation of T-I and T-II in his description of syntype of *C. gracilis*:

"... auf Tergit 2 ähnlich wie bei *a.* ," [*a.* = abbreviation of *angustula*] "aber merklich weniger eng, und zwar ist sie im mittleren Drittel des Tergits merklich feiner (und sticht deshalb viel stärker von der groben des 1. Tergits ab) als bei *a.*, in ihrer Stärke ziemlich gleichmäßig, die polierten Zwischenräume nicht oder nur hier oder da punktiert ..." (Blüthgen 1959: 75).

This description mirrors Linsenmaier's (1959a) diagnosis of *Chrysis angustula* ssp. *gracilis*:

"Pkt auf Tergit 2 deutlich feiner, schon an der Basis sehr viel feiner als auf Tergit 1." (Linsenmaier 1959a: 159).

It is worth noticing that Linsenmaier underlined the words "sticht deshalb viel stärker von

der groben des 1. Tergits ab" in his own offprint of Blüthgen's (1959) work.

Probably only because Blüthgen emphasizes the contrast of the punctation between T-I and T-II in *Chrysis gracilis*, Linsenmaier assigns all specimens without such a contrast to *C. angustula*. Therefore, Linsenmaier's interpretation of the latter depends critically on the identity of the former whose identity is unknown (see below).

Synonymy

Chrysis brevidens Tournier, 1879

I studied all available specimens of *C. brevidens* that are found under this name in Tournier's collection, which is deposited in the MHNG. According to the information given in the original description of *Chrysis brevidens* by Tournier (1879), there must have been 26 syntypes. However, there are only 7 females and 2 males of *C. brevidens* left in that author's collection. Since none of them bears an identification label, their status as syntypes needed to be checked. Only 3 females and 1 male of these specimens had been collected before 1879 and, therefore, could be syntypes of *C. brevidens*; their identity is shown in tab. 1.

To ensure future nomenclatural stability I designate a female of *Chrysis brevidens* (label: *P: 11 VI-78*) with spread-out mandibles as lectotype because the specimen matches completely the description given by Tournier (1879) and because examination of the diagnostic shape of the mandible is possible. The lectotype is damaged, as of the second leg on the right side only the coxa is present. It has a length of 7.0 mm and shows a rather fine but terse punctation on the base of T-II. The other two females are designated as paralectotypes. Probable additional types exist in other collections, but since Tournier did not use identification labels, it is difficult to determine whether these specimens are real syntypes. For this reason, designation of the lectotype was only possible in Tournier's own collection (see also recommendation 74D of the ICZN).

At first, I considered to designate the only male of *Chrysis brevidens* in Tournier's collection as lectotype to avoid the introduction of a new name (i.e. *C. leptomandibularis* sp. n.). But there are two important reasons against doing so:

1. The description of *C. brevidens* is inconsistent with the morphology of that specimen: "..; sa ponctuation [of T-II] est médiocre, serrée, trois fois plus fine que celle du segment précédent, les intervalles des points sont étroits, équivalent à peu près à la moitié de la largeur d'un des points; ils sont lisses, brillants;.." (Tournier 1879: 97). The studied specimen has a much coarser punctation on the base of T-II. Therefore, it is questionable whether this is an authentic syntype.
2. Males of species of the *Chrysis ignita* group are often very difficult to separate. Even though the males of *C. angustula* and *C. leptomandibularis* sp. n. can be identified, designation of a male as lectotype would probably cause future problems in case further similar species will be described. In this context, the unknown male of *C. angustula alpina* ssp. n. has to be mentioned.

In his later work, Tournier identified more or less all slender specimens of the *Chrysis ignita* group as *C. brevidens*, including *C. leptomandibularis* sp. n. and even *C. ignita* form A sensu Linsenmaier (1959a). Thus, the slightly different descriptions of *C. brevidens* given by some authors in the 19th century (e.g. Buysson 1891–1896, Frey-Gessner 1887, Mocsáry 1889) can easily be understood.

Chrysis ignita sparsepunctata Zimmermann, 1944

I studied 4 syntypes from the collection of the NHMW. To ensure an unambiguous assignment of the name I designate a female, which bears the following labels, as lectotype:

1st label: 'Maria Luggau im Lessachtale 1200 m Juni 1932 Käufel',
2nd label: 'Type *Ch. ignita sparsepunctata* Z. det. Zimmermann'.

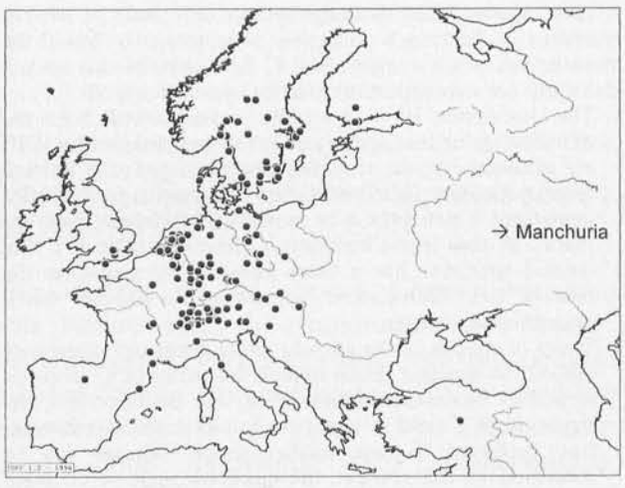
The lectotype has a length of 9.2 mm and is a typical *Chrysis a. angustula*. The remaining 3 syntypes, 1 female and 2 males, are designated as paralectotypes. They are also typical *C. a. angustula*.

Distribution and zoogeography

Chrysis angustula angustula has a vast distribution covering more than 9000 km from Manchuria (China) in the Far East to Spain. Within Europe, it is common in the central and northern

Table 1
Identity and designations of specimens of *Chrysis brevidens* Tournier, 1879, deposited in the Muséum d'Histoire naturelle, Genève. Note: P used on the labels by Tournier is the abbreviation of Peney.

Coll. Tournier	Label	Identity	Sex	Designation
Chrysis brevidens	P: 11 VI–78	*Chrysis a. angustula* Schenck, 1856	female	Lectotype
Chrysis brevidens	P: 15 VI–77	*Chrysis a. angustula* Schenck, 1856	female	Paralectotype
Chrysis brevidens	P: 31 V–78	*Chrysis a. angustula* Schenck, 1856	female	Paralectotype
Chrysis brevidens	P: 04 VI–77	*Chrysis leptomandibularis* sp. n.	male	



Map 2: Records of *Chrysis angustula angustula* Schenck, 1856, in the western Palaearctic region.

parts but scarce in the Mediterranean area (map 2). The lack of samples from Eastern Europe does not allow a statement for this area. The nominate form of *C. angustula* can be interpreted as a Siberian faunal element of the expansive type.

Phenology

The phenology of the females of *Chrysis angustula angustula* is shown in fig. 9. Their flight period lasts from mid-May until the end of September. The few males, which I have studied were collected from the beginning of June until mid-July. However, this does certainly not represent the actual flight period of this sex.

Biology

Symmorphus bifasciatus (Linnaeus, 1761) (= *S. mutinensis* (Baldini, 1894)) has been mentioned repeatedly as host of "*C. angustula*" sensu lato in the literature (e.g. Blüthgen 1961, Lith 1958). Within the studied material, two females of *Chrysis a. angustula* from Sweden (leg. Abenius) hatched from a trap nest together with a female of that eumenid wasp, thus confirming the previous statements and making this host-parasite relationship very likely. Apart from this, the proportions of *S. bifasciatus* and *C. a. angustula* (at least the larger specimens) are very similar. According to Blüthgen (1961) and Schmidt & Schmid-Egger (1991), *S. bifasciatus* is a Eurosiberian faunal element, which is distributed from Manchuria and the Ussuri region at the Pacific cost in the Far East to Western Europe (including Ireland and England). Thus, parasite and probable host show nearly identical ranges.

Chrysis a. angustula also hatched from trap nests together with *Symmorphus connexus* (Curtis, 1826) (coll. Abenius: Sweden, coll. Wickl: Germany). As the proportions of the smaller specimens of *C. a. angustula* are similar to that of *S. connexus*, this host-parasite relationship is also very likely.

Remarks

Tormos et al. (1997) gave a description of the mature larva of *C. angustula*. It cannot be ruled out that this description concerns the new species *Chrysis leptomandibularis* sp. n., although there are no records of it from Spain, so far. The assignment of the described larva to *C. a. angustula* should be regarded as uncertain, particularly as the authors do not provide any information about the host, and the identification of the species relies exclusively on studies on males.

***Chrysis leptomandibularis* sp. n.**

Material (135 ♀♀, 9 ♂♂)

Holotype (♀): GERMANY, Rheinland-Pfalz, Monsheim, Sandgrube (49°38′N/08°12′E), 28. 05. 1998, 1 ♀, leg. G. Reder [SMFD].

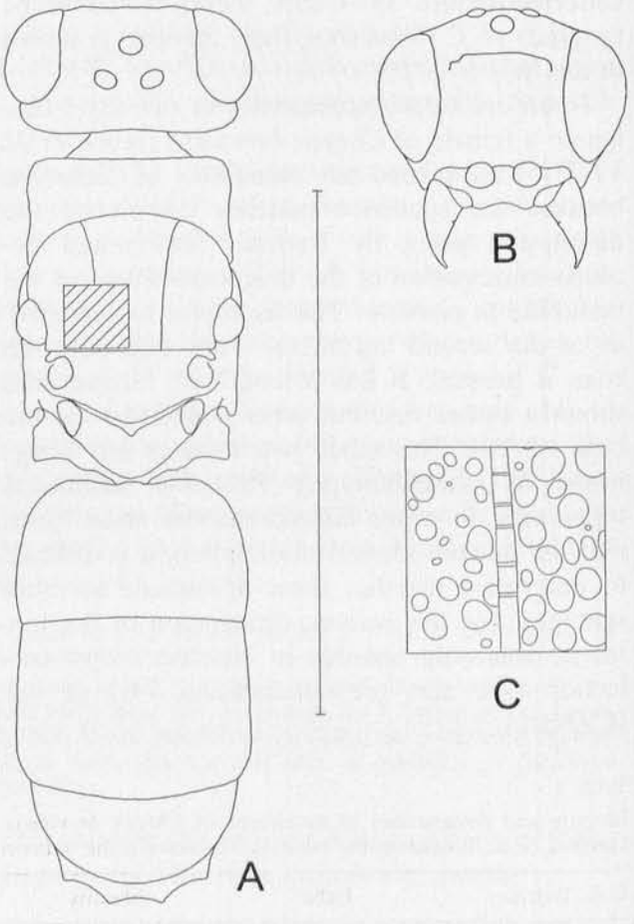


Fig. 2. *Chrysis leptomandibularis* sp. n. female (holotype). **A.** Habitus, dorsal view (wings not shown). **B.** Head, frontal view. **C.** Punctation on scutum (3.2 times enlarged in respect to **A**). Scale: 4.0 mm.

Paratypes (134 ♀♀, 9 ♂♂):

Armenia: Transcaucasia (~ 40°N/45°E), Vedi env., Chosrov reserve, 1500 m, 01.–20. 07. 1983, 1 ♂, leg. Anonymus [Ni];

Austria: Kärnten, Bodensdorf (46°41′N/13°57′E), 19. 07. 1951, 1 ♀, leg. E. Priesner [TLMF]; Niederösterreich, Oberndorf an der Melk (48°04′N/15°13′E), 21. 08. 1980, 2 ♀♀, leg. F. Ressl [OLML]; Niederösterreich, Purgstall (48°03′N/15°08′E), 08. 08. 1972, 1 ♀, 24. 06. 1994, 1 ♀, leg. Ressl [Ni, OLML]; Niederösterreich, Schauboden (48°05′N/15°08′E), 04. 07. 1977, 1 ♀, leg. E. Hüttinger [OLML]; Oberösterreich, Umgebung Urfahr (48°19′N/14°17′E), Pöstlingsberg, 11. 06. 1953, 1 ♀, leg. F. Koller [OLML]; Oberösterreich, Eferding (48°19′N/14°01′E), 17. 06. 1978, 1 ♀, leg. J. Gusenleitner [OLML]; Oberösterreich, Hongar (47°55′N/13°42′E), 20. 06. 1957, 3 ♀♀, 14. 07. 1960, 4 ♀♀, 07. 07. 1962, 1 ♀, leg. R. Löberbauer [OLML]; Oberösterreich, Jaidhaus bei Innerbreitenau (47°51′N/14°21′E), 05. 07. 1982, 1 ♀, leg. F. Gusenleitner [OLML]; Oberösterreich, Linz (48°15′N/14°17′E), 18. 06. 1964, 1 ♀, leg. J. Schmidt [OLML]; Oberösterreich, Linz (48°15′N/14°17′E), Traunauen, 01. 07. 1961, 1 ♀, leg. M. Schwarz [Li]; Oberösterreich, Mondsee (47°52′N/13°21′E), 18. 08. 1970, 1 ♀, leg. R. Gauss [Li]; Oberösterreich, Ostermiething (48°03′N/12°50′E), 17. 07. 1978, 1 ♀, leg. J. Gusenleitner [OLML]; Oberösterreich, Puchenau (48°19′N/14°11′E), 23. 06. 1959, 3 ♀♀, leg. J. Schmidt [OLML]; Oberösterreich, Rottenegg (48°03′N/15°08′E), 25. 06. 1959, 2 ♀♀, 28. 06. 1959, 1 ♀, 22. 05. 1966, 2 ♂♂, 25. 06. 1967, 1 ♀, 30. 06. 1968, 1 ♀, 24. 06. 1970, 2 ♀♀, leg. J. Schmidt [OLML]; Oberösterreich, Rottenegg (48°03′N/15°08′E), Steinleiten, 17. 06. 1960, 2 ♀♀, leg. J. Schmidt [OLML]; Oberösterreich, St. Georgen an der Gusen (48°17′N/14°27′E), 07. 06. 1953, 1 ♀, leg. F. Koller [OLML]; Oberösterreich, Trattenbach (48°07′N/14°23′E), 12. 08. 1953, 2 ♀♀, 29. 07. 1954, 2 ♀♀, 04. 08. 1954, 1 ♀, 13. 08. 1954, 1 ♀, 29. 06. 1957, 4 ♀♀, leg. Lughofer [OLML]; Oberösterreich, Traunsteingebiet (47°52′N/13°50′E), 04. 08. 1952, 1 ♀, 30. 06. 1963, 2 ♀♀, leg. Löberbauer [OLML];

France: Bas-Rhin, Alsace, Forêt Haguenau (48°49′N/07°47′E), 19. 07. 1962, 1 ♀, leg. M. Klein [MZSF]; Seine et Oise, Oise (49°30′N/02°30′E), Montfort l'am., 1906, 1 ♀, leg. Belleze [MNHN];

Germany: Baden-Württemberg, Grissheim (47°52′N/07°36′E), Trockenaue, 21. 07. 1997, 1 ♀, leg. C. Neumann [Ne]; Baden-Württemberg, Kirchzarten (47°58′N/07°57′E), 16. 06. 1966, 1 ♀, leg. Perraudin [Li]; Baden-Württemberg, Markgröningen (48°54′N/09°04′E), Rotenacker, 07. 09. 1989, 1 ♀, leg. Schmid-Egger [Se]; Baden-Württemberg, Pforzheim, Niefern (48°55′N/08°47′E), Lattenwald, 05. 06. 1990, 1 ♀, leg. Schmid-Egger [Se]; Bayern, 5 km E. Dachau (48°15′N/11°29′E), Obergrashof, Malaise trap, 18.–24. 06. 1992, 1 ♀, 16.–29. 07. 1992, 1 ♀, leg. S. Blank [Se]; Bayern, Dachau (48°15′N/11°26′E), 02. 07. 1982, 1 ♀, leg. K. Warncke [Li]; Bayern, Nürnberg (49°28′N/11°03′E), without date, 1♀, leg. Angerer [Ar]; Bayern, Zell am Main (49°49′N/09°52′E), 02. 07. 1935, 1 ♀, leg. Schneid [NMBD]; Brandenburg, Blankensee, Bauernmuseum (52°14′N/13°08′E), 10. 07. 1992, 3 ♀♀, leg. H.-J. Flügel [Fl]; Niedersachsen, Bookholzberg (53°06′N/08°32′E) (label: Gruppenbühren), 07. 06. 1895, 1 ♀, leg. J. D. Alfken [UMBB]; Niedersachsen, Wildeshausen (52°54′N/08°26′E) (label: Hosüne), 28. 06. 1903, 1 ♀, leg. J. D. Alfken [UMBB]; Nordrhein-Westfalen, Köln (50°57′N/06°56′E), 24. 06. 1938, 1 ♀, leg. Aerts [ZFMK]; Nordrhein-Westfalen, Siegen (50°53′N/08°01′E), 20. 07. 1948, 1 ♀, leg. H. Wolf [Li]; Rheinland-Pfalz, Eifel, Daun, Stadtkyll-Wirfttal (50°21′N/06°32′E), Malaise trap, 09. 07. 1995, 1 ♀, 11. 07. 1995, 1 ♀, leg. A. Precht [He]; Rheinland-Pfalz, Freudenburg (49°33′N/06°32′E), Eiderberg, Malaise trap, 30. 06.–06. 07. 1991, 1 ♀, leg. Cölln [He]; Rheinland-Pfalz, Gimbsheim (49°45′N/08°23′E), 30. 06. 1998, 1 ♂, leg. M. Niehuis [Ni]; Rheinland-Pfalz, Hahnweiler (49°35′N/07°13′E), Heiden-Berg, 23. 07. 1998, 1 ♀, leg. M. Niehuis [Ni]; Rheinland-Pfalz, Mittelbach (49°13′N/07°20′E), E Weiher-Berg, 15. 08. 1997, 1 ♀, leg. M. Niehuis [Ni]; Rheinland-Pfalz, Mosel, Wittlich, Wehlen (49°56′N/07°02′E), Malaise trap, 06. 07. 1991, 1 ♀, 26. 07. 1992, 1 ♀, leg. Cölln, Leopold [He]; Rheinland-Pfalz, Neuburg (48°59′N/08°15′E), Stixwörth, 05. 06. 1997, 1 ♀, leg. M. Niehuis [Ni]; Rheinland-Pfalz, Sondernheim (49°12′N/08°21′E), Rheindamm, 01. 06. 1993, 1 ♀, 1 ♂, leg. O. Niehuis [Ni]; Sachsen, Colditz (51°08′N/12°48′E), 11. 06. 1993, 1 ♂, leg. S. Kaluza [Ka]; Sachsen, Ostritz (51°01′N/14°55′E), Friedensblick, E. 06. 1989, 1 ♀, leg. Sieber [SMNG]; Schleswig-Holstein, Grande (53°35′N/10°23′E), 07. 1912, 1 ♀, ex coll. E. Krüger [ZMUH]; Schleswig-Holstein, Lübeck, Wulfsdorfer Heide (53°48′N/10°41′E), 26. 06. 1998, 1 ♀, leg. J. van der Smissen [Ni]; ITALY: Piemonte, Bellinzago (45°34′N/08°38′E), fiume Ticino, 27. 06. 1997, 1 ♀, leg. P. Rosa [Ro]; Valle d'Aosta, Ozein (45°40′N/07°14′N), 07. 08. 1993, 1 ♀, 02. 07. 1994, 1 ♀, leg. P. Rosa [Ro];

The Netherlands: Limburg, Echt (51°06′N/05°53′E), 03. 07. 1951, 1 ♀, 24. 06. 1955, 1 ♀, leg. R. Geurts [NHME]; Limburg, Haelen (51°14′N/05°57′E), 28. 06. 1952, 1 ♀, leg. H. Sanders [NHME]; Limburg, Lerop (51°10′N/05°59′E), 10. 06. 1964, 1 ♀, leg. H. Sanders [NHME]; Limburg, Spar (51°15′N/05°56′E), 13. 06. 1952, 1 ♀, 08. 07. 1952, 2 ♀♀, leg. H. Sanders [NHME]; Limburg, St. Pietersberg (50°50′N/

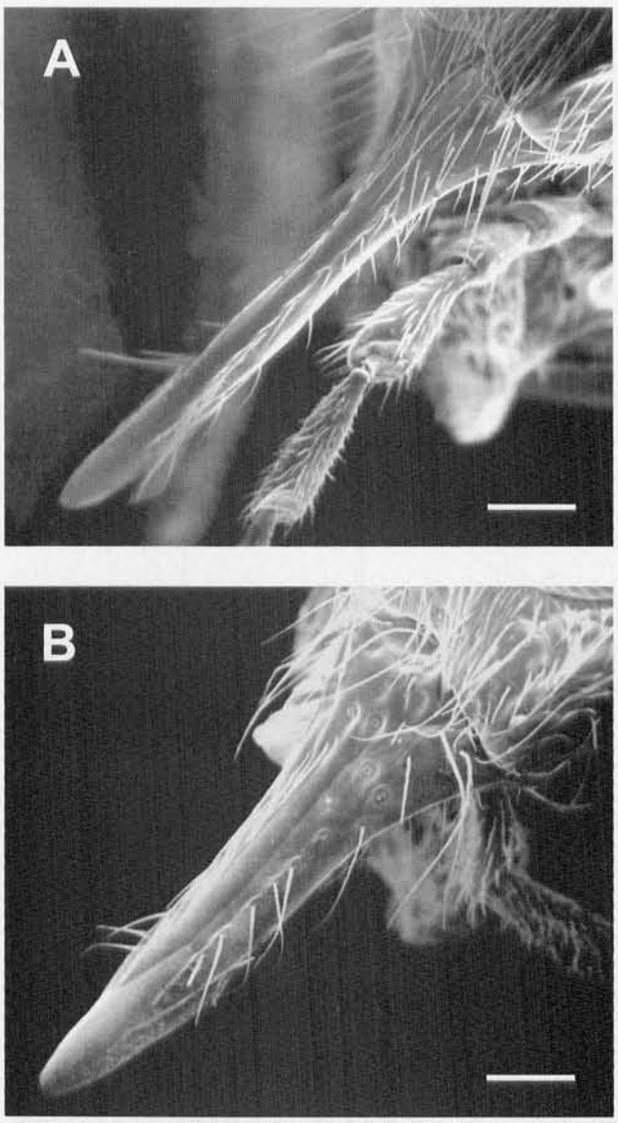


Fig. 3. Left mandible, lateral view. **A.** *Chrysis leptomandibularis* sp. n. female (paratype). **B.** *Chrysis angustula angustula* Schenck, 1856, female. Scale: 0.1 mm.

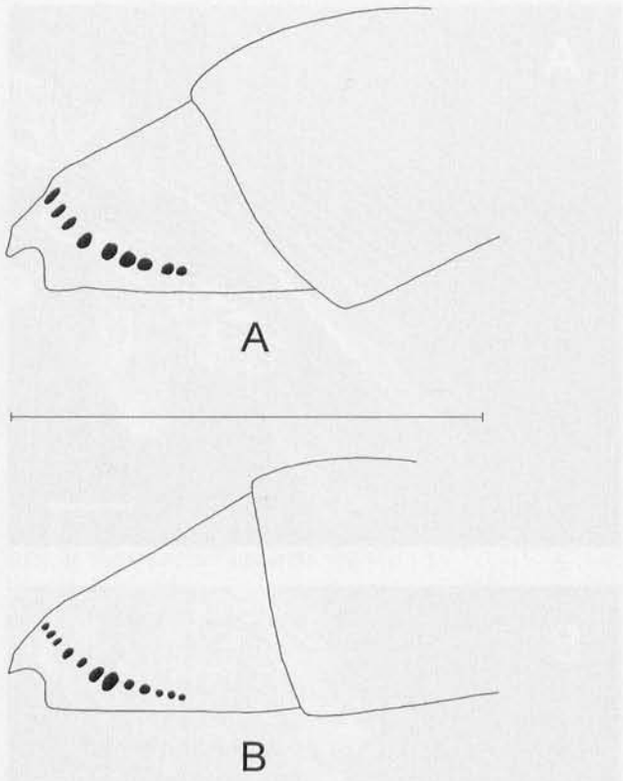


Fig. 4. Gastral tergum III, lateral view. **A.** *Chrysis angustula alpina* ssp. n. female (holotype). **B.** *Chrysis angustula angustula* Schenck, 1856, female. Scale: 2.0 mm.

05°41′E), ex *Crataegus* sp. trunk, 1968, 1 ♀, 21. 07. 1990, 1 ♀, 04. 07. 1991, 1 ♀, leg. B. V. Lefeber [Le, NHME]; Noord-Brabant, Ulvenhout (51°33′N/04°48′E), 13. 07. 1947, 2 ♀♀, 08. 06. 1948, 1 ♀, 24. 07. 1949, 2 ♀♀, 16. 09. 1951, 1 ♀, 28. 06. 1952, 1 ♀, 04. 05. 1956, 1 ♂ ("Nest *A. debilitatus*"), 09. 05. 1956, 1 ♀ ("*Od. debilitatus*"), 24. 05. 1956, 3 ♀♀, 29. 05. 1956, 1 ♀, 04. 06. 1956, 1 ♀, 06. 06. 1956, 1 ♀ ("*Od. debilitatus*"), leg. J. P. van Lith [Li, RMNH]; Noord-Brabant, Ulvenhout (51°33′N/04°48′E), Hondsdonk, 03. 06. 1954, 1 ♀, leg. J. P. van Lith [RMNH]; Noord-Brabant, Ulvenhout (51°33′N/04°48′E), Rakens, 07. 07. 1951, 2 ♀♀, 25. 05. 1953, 2 ♀♀, 24. 06. 1953, 2 ♀♀, 28. 06. 1953, 1 ♀, leg. J. P. van Lith [Li, RMNH]; Noord-Brabant, Waalwijk (51°41′N/05°04′E), 29. 06. 1949, 1 ♀, leg. Sand [Le]; Gelderland, Kotten (51°57′N/06°46′E), 11. 06. 1993, 1 ♀, leg. C. J. Zwakhals [ZMAN];

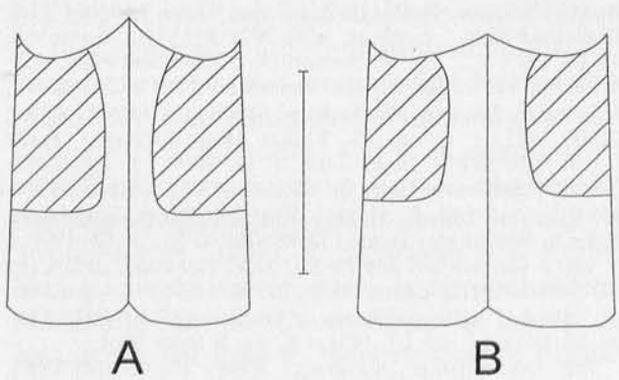


Fig. 5. Gastral sternum II, ventral view. **A.** *Chrysis angustula alpina* ssp. n. female (holotype). **B.** *Chrysis angustula angustula* Schenck, 1856, female. The metallic green or golden areas are depicted white, the non-metallic black spots are shown shaded. Scale: 1.0 mm.

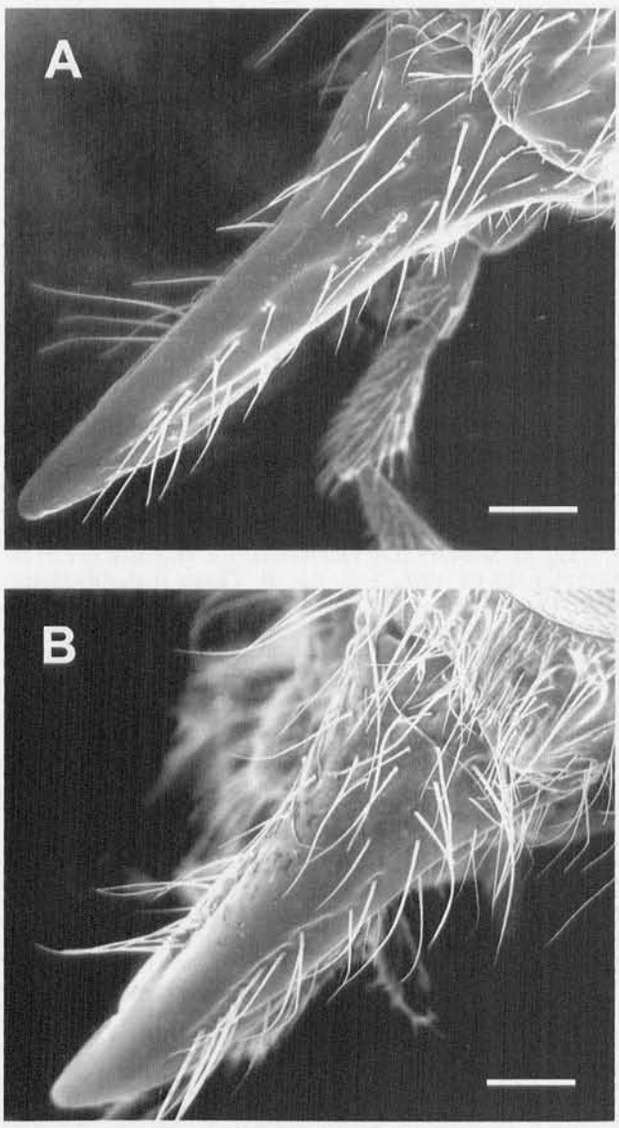


Fig. 6. Left mandible, lateral view. **A.** *Chrysis leptomandibularis* sp. n. male (paratype). **B.** *Chrysis angustula angustula* Schenck, 1856, male. Scale: 0.1 mm.

Gelderland, Putten (52°16′N/05°37′E), 15. 08. 1884, 1 ♀, 10. 07. 1906, 1 ♀, 11. 07. 1906, 1 ♀, leg. Dr. J. Th. Oudemans [ZMAN];

Poland: Województwo Szczecińskie, Bielinek (= Bellinchen (Oder)) (52°56′N/14°09′E), 06. 1935, 1 ♀, leg. Haupt [MLUH];

Switzerland: Bern, Rüfenacht (46°56′N/07°32′E), 590 m, 21. 06. 1927, 1 ♀, leg. Steck [ETHZ]; Bern, Uttigen (46°47′N/07°34′E), 20. 06. 1943, 1 ♀, leg. Naef [Li]; Bern, Worb (46°56′N/07°34′E), 18. 07. 1926, 1 ♀, leg. Bucher [NMBS]; Genf, Peney (46°13′N/06°02′E), 04. 06. 1877, 1 ♂, 10. 05. 1884, 1 ♂, 03. 08. 1884, 1 ♀, 06.1892, 1 ♀, ex coll. Tournier [MHNG]; Genf, river Allondon (46°13′N/06°00′E), 405 m, without date, 1 ♀, ex coll. Maercky [MZLS]; Grau-

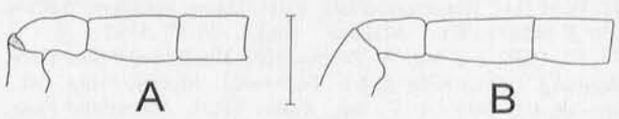


Fig. 7. Pedicellus and first two flagellomeres, lateral view. **A.** *Chrysis leptomandibularis* sp. n. male (paratype). **B.** *Chrysis angustula angustula* Schenck, 1856, male. Scale: 0.25 mm.

bünden, Chur (46°52′N/09°32′E), 20. 06. 1922, 1 ♀, leg. Dr. Ad. Nadig [ETHZ]; Luzern, Rigi Südfuss (47°04′N/08°25′E), 11. 06. 1950, 1 ♀, 12. 06. 1952, 1 ♀, leg. Linsenmaier [Li]; Unterwalden, Stansstad, mountain Lopper Pilatus (46°59′N/08°19′E), 825 m, 12. 06. 1947, 1 ♀, leg. Linsenmaier [Li]; Waadt, river Venoge (~ 46°30′N/06°32′E), 370 m, 07. 1935, 1 ♀, leg. R. Matthey [MZLS]; Wallis (46°10′N/07°30′E), ~ 900 m, 02. 07. 1951, 1 ♀, 01. 09. 1953, 1 ♀, leg. Linsenmaier [Li]; Wallis, Euseigne (46°10′N/07°25′E), 10. 07. 1936, 1 ♀, leg. Steck [Li];

Turkey: Artvin, Şavşat (41°15′N/42°22′E), 03.–11. 06. 1972, 1 ♀, leg. C. Holzschuh [Li];

Ukraine: Kyiiwska Oblast, Kiew (50°27′N/30°31′E), Khotov vil., 24. 06. 1977, 1 ♀, leg. Nesterov [Ni].

Etymology: The specific epithet is derived from the Greek word λεπτός (= leptós = thin) and the Latin word *mandibularis*, *-is*, *-e* (= characterized by its mandibles). It is an adjective in the female gender.

Description

Holotype: Female (fig. 2).

Size: Body length 6.9 mm.

Head: Height 1.4 mm, width 1.8 mm, length 0.9 mm. LID = 0.9 mm. Frons green with golden reflections. Scapal basin in the lower half sparsely and irregularly punctate (PD = (0.015 mm –) 0.030 mm (–0.045 mm)), spaces between punctures app. as PD, upper half with a small oval, rather deep depression (height 0.14 mm, width 0.08 mm) in the mediosagittal line and with lateroventrad ridges on both sides of the depression. Transverse frontal carina well developed and slightly arced (fig. 2B). Vertex dark blue, purple around the ocelli. Genae green with golden reflections. Malar space = 0.15 mm (= 1 MOD). Mandible brown, but midsection hyaline amber. Interior edge of mandibles without tooth. In lateral view distal parts of the mandibles extremely thin (0.04 mm) and with almost absolutely parallel sides (as in fig. 3A). Scapus and pedicellus green metallic, flagellum non-metallic black. Relative lengths of P/F-I/F-II/F-III are 1.30/1.75/1.05/1.00. F-IV and the following flagellomeres slightly longer than broad.

Thorax: Length 2.8 mm, width 1.7 mm. Pronotal collar 0.49 mm long in the middle and 1.55 mm broad at the anterior edge. Punctation double, dominant punctation irregular and with PD = 0.03–0.06 mm (–0.07 mm). Spaces between dominant punctation varying, but usually 0.5 PD and covered additionally with very small scattered punctures (PD = 0.01 mm). Pronotal collar bordered metallic green golden, enclosed area metallic dark blue and purple, getting darker towards the center. Medial groove weakly

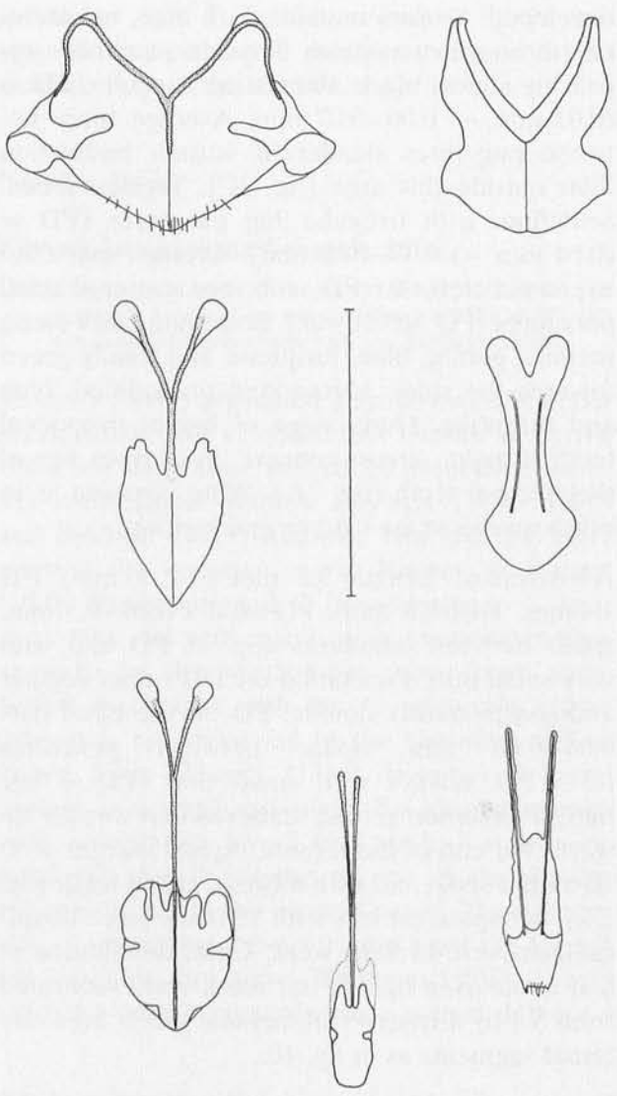


Fig. 8. *Chrysis angustula alpina* ssp. n. female (holotype). Internal segments. Scale: 1.5 mm.

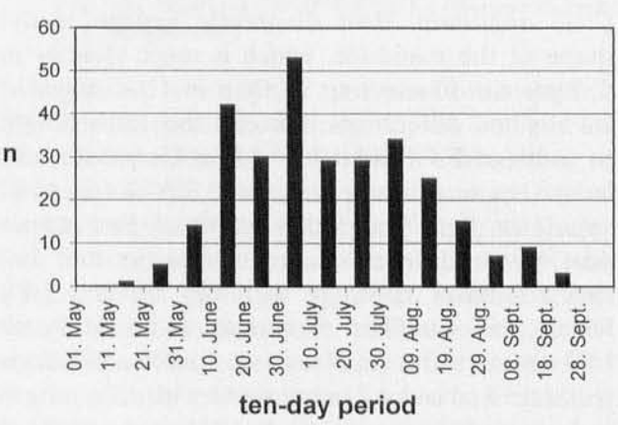


Fig. 9. Phenology of females of *Chrysis angustula angustula* Schenck, 1856. Material (N = 296) collected between 1877 and 1998 in Austria (N = 5), Belgium (N = 15), China (N = 4), England (N = 2), Finland (N = 7), France (N = 8), Germany (N = 84), Italy (N = 1), Luxembourg (N = 1), The Netherlands (N = 81), Norway (N = 5), Poland (N = 2), Slovakia (N = 1), Spain (N = 1), Sweden (N = 19), and Switzerland (N = 60). Earliest date: 18 May (The Netherlands), latest date: 27 September (France).

developed. Scutum metallic dark blue, but in inner three-quarter spaces between punctures appearing almost black. Punctation irregular, PD = (0.03 mm –) 0.06–0.07 mm. Average space between punctures smaller in scutum midsection than outside this area (fig. 2C). Tegulae green. Scutellum with irregular big punctures (PD = (0.04 mm –) 0.07–0.09 mm). Average space between punctures 0.6 PD, with very scattered small punctures (PD = 0.01 mm). Scutellum black along midline, getting blue, turquoise and finally green towards the sides. Metanotum unmodified, blue and turquoise. Outer edge of lateral propodeal teeth straight, almost concave, inset from tips of metapleural teeth (fig. 2A). Wing venation as in other species of the *Chrysis ignita* group.

Abdomen: Length 3.2 mm (T-I 1 mm, T-II 1.4 mm, T-III 0.8 mm). PD on T-I 0.06–0.3 mm, space between punctures app. as PD and with very small dots. Punctation on T-II rather regular and conspicuously double, PD on the basal part 0.04–0.06 mm, space between punctures 0.5–1 PD, always with small dots (PD = 0.01 mm). Punctation getting scattered and weaker towards the end of the tergum. Apical margin of T-III rather short and with 4 broad apical teeth (fig. 2A). Subapical pit row with 15 black pits. Subapical transverse swelling weak. Color distribution of S-II about as in fig. 5B, but black spots separated from S-I by a transversal metallic green area. Internal segments as in fig. 10.

Paratypes: Morphology and coloration of the females as in the holotype. Males of *Chrysis leptomandibularis* sp. n. are very similar to that of *C. a. angustula*. Best diagnostic feature is the shape of the mandible, which is more slender in *C. leptomandibularis* sp. n. than in *C. a. angustula*. Further differences concern the ratio length to width of F-I (about 1.8–2.0 in *C. leptomandibularis* sp. n. whereas it is about 2.0–2.4 in *C. a. angustula*, fig. 7) and the length of the propodeal teeth (differences are similar to that between females, compare with fig. 1A and 2A). Finally, the quotient maximum width of head/LID seems to be smaller in *C. leptomandibularis* sp. n. (it is about 4.2) compared with *C. a. angustula* (here it is about 4.5), but a larger sample is needed. The genital capsule and subgenital plate (S-VIII) of *C. leptomandibularis* sp. n. are shown in fig. 11.

Distribution and zoogeography

Chrysis leptomandibularis sp. n. is known from Central Europe, northern Italy, the Ukraine and

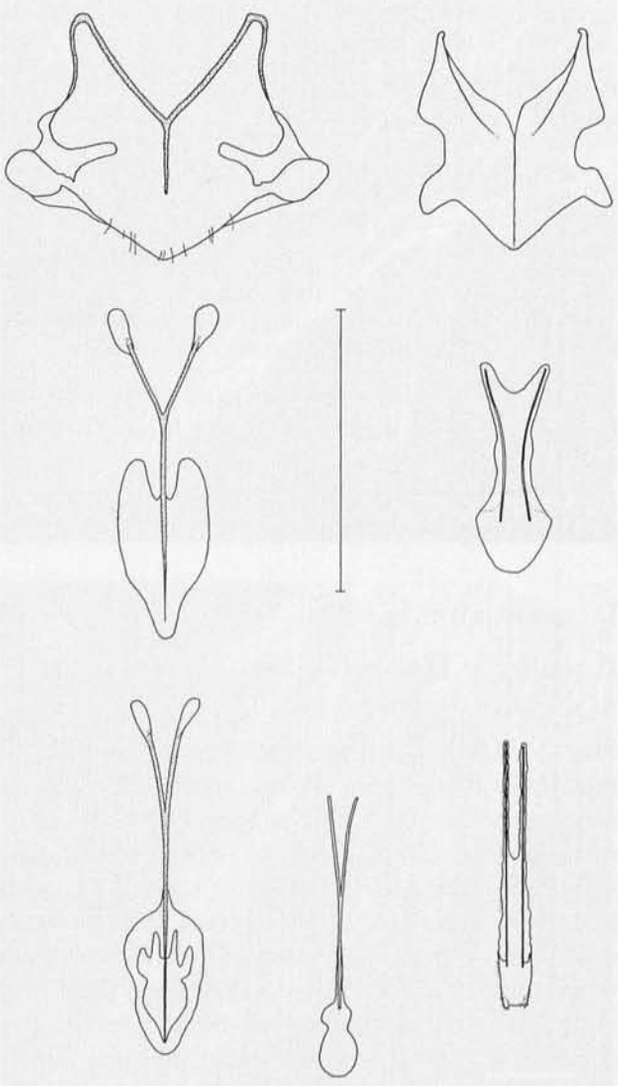


Fig. 10. *Chrysis leptomandibularis* sp. n. female (holotype). Internal segments. Scale: 1.5 mm.

Transcaucasia (map 3). It seems to be absent from Great Britain and Fennoscandia. Therefore, Mediterranean or Siberian origins are both unlikely. The most reasonable interpretation of the

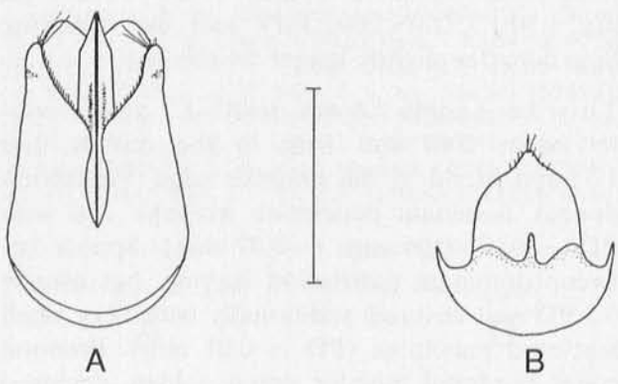
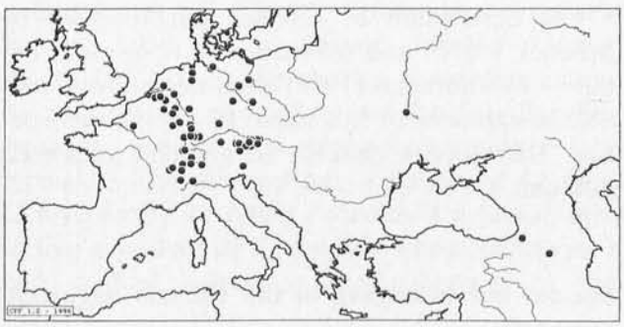


Fig. 11. *Chrysis leptomandibularis* sp. n. male (paratype). **A.** Genital capsule. **B.** Subgenital plate. Scale: 0.5 mm.



Map 3: Records of *Chrysis leptomandibularis* sp. n.

records is that *C. leptomandibularis* sp. n. has a Caspian origin, but more records are needed to confirm this assumption.

Phenology

The phenology of the females of *Chrysis leptomandibularis* sp. n. is shown in fig. 12. Their flight period lasts from the beginning of May until mid-September. The seven male paratypes have been collected from the beginning of May until mid-July.

Biology

Due to the small size and the slender habitus, it is most probable that the host or the hosts of *Chrysis leptomandibularis* sp. n. are small species of the genus *Symmorphus* (Eumenidae). A male of *C. leptomandibularis* sp. n., collected by J. P. van Lith (Ulvenhout, 04. 05. 1956), bears the label "Nest *A. debilitatus*". It is not clear whether this specimen hatched from a collected nest or whether it was only collected near a colony of *Symmorphus debilitatus* (Saussure, 1855) (see also Lith 1964). However, the proportions of *S. debilitatus* and *C. leptomandibularis* sp. n. are very similar, making *S. debilitatus* a good candidate for host of this cuckoo wasp.

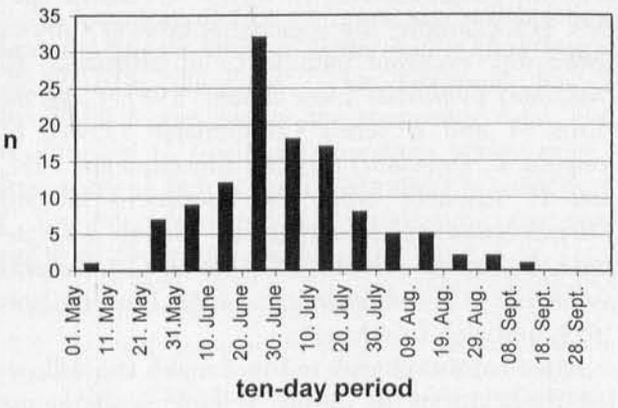


Fig. 12. Phenology of females of *Chrysis leptomandibularis* sp. n. Material (N = 119) collected between 1884 and 1998 in Austria (N = 47), France (N = 1), Germany (N = 20), Italy (N = 3), The Netherlands (N = 36), Switzerland (N = 11), and the Ukraine (N = 1). Earliest date: 5 May, latest date: 16 September (both from The Netherlands).

Nomina dubia

Chrysis brevidentata Schenck, 1856

1856 *Chrysis brevidentata* Schenck: p. 30–31, n. 7. Holotype probably female. Loc. typ.: Weilburg (50°29′N/08°16′E) (Hessen, Germany) [type lost, see Blüthgen 1959].

Mocsáry (1889) presumed a synonymy of *Chrysis brevidentata* with *C. obtusidens* Dufour & Perris, 1840, but was unsure and added a question mark. The subsequent authors Buysson (1891–1896) and Bischoff (1913) followed him but the latter omitted the question mark. Kimsey & Bohart (1991) finally assigned *C. brevidentata* to *C. ignita* as they did with many other uncertain names as well. As this species has never been mentioned in context with the *C. angustula* aggregate, it is not discussed in the historical review above. Since Schenck (1856) describes *C. brevidentata* as a small and somewhat slender species with conspicuous broad anal teeth, it cannot be ruled out that it belongs to one of the slender species studied in the present paper. The description is ambiguous, however, and since the type is not available any more (Blüthgen 1959), *C. brevidentata* must be regarded as a nomen dubium.

Chrysis gracilis Schenck, 1856

1856 *Chrysis gracilis* Schenck: p. 30, n. 5. Syntypes females. Loc. typ.: Weilburg (50°29′N/08°16′E) (Hessen, Germany) [syntypes lost].

I was unable to study the syntypes of this species. There is no specimen labeled "*ignita* var. *gracilis* Sch." in the collection of the SMFD. According to Blüthgen (1959), one syntype is damaged, as of the hind legs only the femora are present. Therefore, I examined all unlabeled specimens of the *Chrysis ignita* group in Schenck's collection, but also in vain. As Schenck's collection was deposited in the 'Zoologisches Institut der Universität Marburg/Lahn' before it was moved to Frankfurt, I finally searched for the syntypes in Marburg, but again without any result. According to Prof. Dr. R. Remane, who fortunately arranged the transfer of Schenck's collection to Frankfurt, specimens of the collection had been used for exhibitions in the university before his time. It seems possible that both syntypes were lost or destroyed in the course of such an exhibition.

Table 2
Differences between *Chrysis angustula* Schenck, 1856, and *Chrysis gracilis* Schenck, 1856, according to the original description given by Schenck (1856).

Chrysis angustula	*Chrysis gracilis*
Endzähne spitz oder etwas abgerundet; alle Zwischenräume gleich bogenförmig. $2^1/_2$–$3^1/_3$ L	Endzähne stumpf; der Zwischenraum zwischen den 2 mittleren fast gerade. 3–$4^1/_2$ L
–	–
T-III apex with pointed or somewhat rounded teeth; gap between teeth equally arched	T-III apex with blunt teeth; gap between the interior teeth nearly straight.

The only differences between *Chrysis angustula* and *C. gracilis* mentioned by Schenck (1856) in the original diagnosis are the shape of the anal teeth and the different average size (tab. 2). This information does not allow a clear assignment of *C. gracilis* to *C. angustula* or *C. leptomandibularis* sp. n. or any other species. However, the size of $4^1/_2$ L[2] shows that the biggest specimen of *C. gracilis* must have been larger than Schenck's specimens of *C. viridula* Linnaeus, 1761 (3–4 L, as "Chrysis bidentata *Lin.*") and *Chrysura trimaculata* (Förster, 1853) (4 L, as "Chrysis aerata *Dhlb.*"). Since *C. leptomandibularis* sp. n. is one of the smallest species of the *C. ignita* group in Central Europe, it is extremely unlikely that Schenck (1856) described a member of this species.

Blüthgen (1959) mentions more details, particularly proportions of the head and the thorax as well as the kind of punctation of the gastral terga. The more slender habitus and the proportions of the head of the syntype described by Blüthgen (1959) in comparison to *Chrysis angustula* are features that are more common in *C. leptomandibularis* sp. n. However, they are not diagnostic and also occur in *C. angustula*. In conflict with the morphology of *C. leptomandibularis* sp. n. is the description of the punctation of the gastral terga. Blüthgen (1959) points out the distinct contrast between the fine punctation of T-II and the coarse punctation of T-I in *C. gracilis*. *C. leptomandibularis* sp. n. never shows such a contrast. Furthermore, Blüthgen (1959) mentions the nearly exclusive simple (not double) punctation and the shining space between the punctures on T-II. These features are also not present in *C. leptomandibularis* sp. n.

The description of *Chrysis gracilis* given by Schenck (1856) and subsequently – in more detail – by Blüthgen (1959) does not allow a reliable assignment of this name to any known species. Therefore, *C. gracilis* is regarded as nomen dubium.

Species not belonging to the *Chrysis angustula* aggregate

Chrysis chalcea Móczár, 1965

1965 *Chrysis chalcea* Móczár: p. 176–178. Holotype female. Loc. typ.: Zenica (44°12′N/17°54′E) (Bosnia and Herzegovina) [HNHM].

I studied the holotype of *Chrysis chalcea* and, as already presumed by Linsenmaier (1987), the species is closely related to *C. obtusidens* Dufour & Perris, 1840.

Chrysis ignita excavata Haupt, 1956, and *Chrysis ignita solida* Haupt, 1956

Haupt's species of the *Chrysis ignita* group are deposited in the MLUH and were examined in the present revision. None of the specimens labeled *Chr.* (*Chrysis*) *ignita excavata* and *Chr.* (*Chrysis*) *ignita solida* are marked as syntypes. In addition, all labels were written in 1957, making the identification of syntypes difficult. But as Haupt labeled the specimens only one year after his work had been published, it is probable that specimens collected before 1956 are syntypes.

I am now able to confirm Linsenmaier's (1959a) assumption that both described subspecies are conglomerates of different distinct species. For example, the specimens labeled *Chrysis ignita* ssp. *excavata* include *C. a. angustula*, *C.* (*mediata*) *fenniensis* Linsenmaier, 1959, *C. ignita* (form *A* and *B* sensu Linsenmaier 1959a), *C. longula*, *C.* (*mediata*) *mediata* Linsenmaier, 1951, and *C. schencki*, while the specimens labeled *Chrysis ignita* ssp. *solida* include *Chrysis a. angustula*, *C. cerastes* Abeille, 1877 (sic!), *C.* (*mediata*) *fenniensis*, *C. rutiliventris vanlithi* Linsenmaier, 1959, and also *C. schencki*.

After careful consideration I make the following designations to ensure reliable assignments of the names in the future:

[2] L is the abbreviation of 'Linien' (= lines) which Schenck (1856) gave as a measure; they correspond with the so-called "Rheinisches Dezimalmaß". Unfortunately, I was unable to find a conversion into a current measure.

Lectotype of *Chrysis ignita* ssp. *excavata* Haupt, 1956, is a female labeled '*Nebra 26. 05. 1915*'. It is damaged as of the left antenna only scapus, pedicellus, and the first flagellomere are present. The designated lectotype is a typical *C. longula* and has a length of 12 mm. Consequently, *C. ignita excavata* is a junior subjective synonym of *C. longula* whose lectotype I had studied before in the collection of the MNHN:

Chrysis longula Abeille, 1879

1879 *Chrysis longula* Abeille: 74. Lectotype female (desig. Morgan 1984). Loc. typ.: Frankfurt am Main (50°07′N/08°41′E) (Hessen, Germany) [MNHN].

1956 *Chrysis ignita* ssp. *excavata* Haupt: 114. Lectotype female (present designation). Loc. typ.: Nebra (51°17′N/11°35′E) (Sachsen-Anhalt, Germany) [MLUH]. Nec Brullé 1846. **New synonym**

The reasons for this decision are that the specimen matches completely both the description and the illustration given by Haupt (1956) and that the author himself pointed to the large size of some of the specimens.

Linsenmaier (1959a) mentions that some specimens of *Chrysis ignita excavata* could be *C. mediata:*

"Haupt, 1956 hat ssp. *excavata* aufgestellt (= synonym *excavata* Brullé 1846), die sich unter andern auch auf *mediata* beziehen dürfte." (Linsenmaier 1959a: 154)

I did not place much weight on this comment as it was only speculation at that time and the lectotype designation does not cause instability of nomenclature and, therefore, is not in contrast to recommendation 74A of the ICZN. (Note that *Chrysis excavata* Haupt, 1956, is not a synonym but a homonym of the Neotropical C. *excavata* Brullé, 1846.)

As lectotype of *Chrysis ignita* ssp. *solida* I designate a female labeled '*Bellinchen (Oder) Haupt 22. 06. 1936 Ringofen*'. The lectotype has a length of 8 mm, shows the ovipositor tube, and is a typical *C. (mediata) fenniensis* whose type I had studied before in Linsenmaier's collection. C. *(mediata) fenniensis* is a junior subjective synonym of *C. (ignita) solida*:

Chrysis (mediata) solida Haupt, 1956

1956 *Chrysis ignita* ssp. *solida* Haupt: 115. Lectotype female (present designation). Loc. typ.: Bielinek (= Bellinchen (Oder)) (52°56′N/14°09′E) (Województwo Szczecińskie, Poland) [MLUH].

1959 *Chrysis mediata* ssp. *fenniensis* Linsenmaier (a): 154. Holotype female. Loc. typ.: Hattula (61°04′N/24°23′E) (Hame, Finland) [Li]. **New synonym**

Decisive for this designation is the fact that the specimen is the only syntype that is completely congruent with both the description and the illustration given by Haupt (1956).

Linsenmaier (1959a) assigns *Chrysis ignita* ssp. *solida* as a synonym to *C. angustula*, while he mentions only 4 pages earlier that *solida* is probably a conglomerate of different species. As this was only speculation I did not feel obligated to follow his interpretation.

I considered designating a syntype with the identity of *Chrysis a. angustula* as lectotype to avoid instability in nomenclature, but I decided against it because of the following two reasons. First, all available syntypes with the identity of *C. angustula* are males and none of these matches the illustration as each of them has a longer vertex. Second, the designation of a male lectotype within the *C. ignita* group should be avoided.

Discussion

The presented taxonomic results do not correspond with those of Linsenmaier (1959a) nor with those of other authors. Although Linsenmaier (1959a) recognized two different taxa within the *Chrysis angustula* aggregate, their separation was inaccurate and diagnostic features remained vague. Treating *C. leptomandibularis* sp. n. as equivalent with Linsenmaier's nominate form of *C. angustula* is not possible, and it is also not possible for the nominate form as defined in the present work in respect of *gracilis* sensu Linsenmaier (1959a). Therefore, records and observations of *C. angustula* s.l. published before the turn of the millennium cannot be cited without examination of the matching specimens. To avoid confusion in the future, it is necessary for researchers to refer to the applied nomenclature and to the key used.

The different shape of the mandibles within the *Chrysis ignita* group has not been given much attention so far. This is remarkable, given that for some species mandibular features have been reported. For example, *C. brevitarsis* Thomson, 1870, and *C. chinensis* Mocsáry, 1912, are known to have an additional tooth on the interior edge near the tip (Linsenmaier 1959a), which therefore makes their identification simple. Interestingly, due to this feature there has never been any dispute about the taxonomic validity of these two rare species. The present results show that the shape of the mandibles immediately enables identification of *C. leptomandibularis* sp. n., and this diagnostic feature seems to be valid not

only within the *C. angustula* aggregate but the whole *C. ignita* group. The extremely thin mandibles in females of *C. leptomandibularis* sp. n. have to be regarded as apomorphic. Why such a mandible evolved in that species is unknown.

The examination of males in the present study was limited by the small amount of specimens with spread-out mandibles and dissected genital capsule. Later preparation (after softening) is difficult, time-consuming, and most importantly, can lead to damage of specimens. In order to extend our knowledge about the *Chrysis ignita* group it is necessary that newly collected material is prepared properly, that is, that mandibles are spread out in both sexes, that the ovipositor tube is visible or even dissected in females, and that the genital capsule and S-VIII are extracted in males.

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