

The genus *Xylophrurus* Förster, 1869 (Hymenoptera: Ichneumonidae) in Finland with a discussion on the status of *X. dentatus* (Taschenberg, 1865)

Juuso Paappanen

Paappanen, J. 2020: The genus *Xylophrurus* Förster, 1869 (Hymenoptera: Ichneumonidae) in Finland with a discussion on the status of *X. dentatus* (Taschenberg, 1865). — *Sahlbergia* 26(1–2): 24–28.

Suomen *Xylophrurus* Förster, 1869 (Hymenoptera: Ichneumonidae) -lajisto selvitetään kirjallisuuden sekä Luonnontieteellisessä keskusmuseossa ja kirjoittajan omassa kokoelmassa olevien yksilöiden perusteella. *Xylophrurus dentatus* (Taschenberg, 1865) -lajin todetaan kirjallisuustietojen perusteella olevan lajin *X. augustus* (Dalman, 1823) nuorempi synonymi. *Xylophrurus tumidus* (Desvignes, 1856) ilmoitetaan ensimmäistä kertaa Suomesta ja Venäjältä. Suomessa todetaan esiintyvän kolme *Xylophrurus*-lajia: *X. augustus*, *X. lancifer* (Gravenhorst, 1829) ja *X. tumidus*.

The Finnish species of the genus *Xylophrurus* Förster, 1869 (Hymenoptera: Ichneumonidae) are reviewed based on literature, the collection of the Finnish Museum of Natural History, and the author's own collection. The validity of *Xylophrurus dentatus* (Taschenberg, 1865) is discussed revealing it to be a junior synonym of *X. augustus* (Dalman, 1823). *Xylophrurus tumidus* (Desvignes, 1856) is reported for the first time from Finland and Russia. Three species are concluded to occur in Finland: *X. augustus*, *X. lancifer* (Gravenhorst, 1829) and *X. tumidus*.

Juuso Paappanen, Kuopio, Finland. Email: japaappanen@gmail.com

Introduction

The genus *Xylophrurus* Förster, 1869 (Hymenoptera: Ichneumonidae, Cryptinae) contains seven species in the Western Palearctic (Yu *et al.* 2012), three of which have been reported from Finland: *X. augustus*, *X. dentatus* and *X. lancifer* (Koponen *et al.* 1999). *Xylophrurus* larvae are parasitoids associated with premature stages of Coleoptera and Aculeata inside wood, branches, woody galls and plant stems (e.g. Giraud & Laboulbène 1877, Adriaanse 1941, Townes & Townes 1962).

Among the Cryptini of North Europe, the *Xylophrurus* females can be distinguished by the conspicuously acute anterior edge of the clypeus, the dark bands in the fore wings, developed genae and the structure of the ovipositor tip, where the lower valve expands dorsally (Townes 1970). Males are more difficult to place in *Xylophrurus*, but all species have at least the distinct acute anterior edge of clypeus and rather developed genae. *Xylophrurus* females can be confused, among others, with *Echthrus reluctator* (Linnaeus, 1758) which, however, lacks the dark band on the fore wing in addition to having a very differently shaped propodeum and first metasomal tergite. A few other genera have representatives with banded fore wings and similar body colouration (e.g. *Enclisis* Townes, 1970), but these lack other characters typical for *Xylophrurus*.

The genus has never been revised and very little taxonomic work has been done during the past century. Consequently, the status of many European species remains unresolved. Especially the males have received little attention and seem to have less useful characters for species separation. Due to the poor knowledge of the genus, it is possible that further, currently unrecognized, species occur in Europe.

In this paper, some light is shed upon this poorly known genus by reviewing the *Xylophrurus* species occurring in Finland and discussing the status of *X. dentatus*.

Materials and methods

All *Xylophrurus* specimens in the collection of Finnish Museum of Natural History, Helsinki (later abbreviated MZH) and my own collection (later abbreviated JP) were reviewed. The vast material of unsorted Ichneumonidae in MZH was not checked for further *Xylophrurus* individuals. All examined specimens have been assigned an identity code, which is given in brackets together with the collection abbreviation, when referring to certain specimens. These stable specimens identifiers also serve as internet links providing access to further information on the specimen. Individually labelled specimens also facilitate later revision of the specimens mentioned in this paper.

Due to the considerable amount of erroneous information regarding the hosts of parasitoids (e.g. Broad *et al.* 2018, Shaw 2019), only hosts with several rearing records are cited in this paper. Species identification was carried out by the author in 2019 and was based on the key by Vas (2015), but additional literature was used, including the original descriptions of all the European *Xylophrurus* species. Morphology follows Broad *et al.* (2018). Photographs have been taken with a Canon 600D Camera and a Canon 100 mm f/2.8 Macro lens, stacked together with the CombineZP software.

The status of *Xylophrurus dentatus* (Taschenberg, 1865)

The few European species today placed in *Xylophrurus* have historically been included in several genera (*Cryptus* Fabricius 1804, *Echthrus* Gravenhorst 1829, *Kaltenbachia* Förster 1869, *Nyxeophilus* Förster 1869, *Xylophrurus* Förster 1869, *Caenocryptus* Thomson 1873 and *Macrocryptus* Thomson 1873). This has made the taxonomy of the genus rather complicated. Another factor contributing to the confusing taxonomy has been the use of an incorrect spelling, *X. angustus* (attributed to either Dalman or Thomson), when referring to *X. augustus* (e.g. Seyrig 1926, Hellén 1956, Jonaitis 1981). The confusion even led Jonaitis (1981) to consider *X. angustus* and *X. augustus* different taxa.

Probably the most problematic species in the genus has been *X. dentatus*. In contrast to other European *Xylophrurus*, it was described based on a male, with the female described decades after the original description, apparently independently of each other, by Speiser (1908) and Meyer (1933). Furthermore, *X. dentatus* has been synonymised on several occasions with both *X. augustus* (Seyrig 1926, Adriaanse 1941) and *X. lancifer* (Kriechbaumer 1891, Hedwig 1940). Currently, *X. dentatus* is considered a valid species (Sawoniewicz 2003).

The notion that *X. dentatus* male and *X. augustus* female are the same species was first brought up by Schmiedeknecht (1904) who briefly mentioned that he had previously thought they were the same species, but changed his mind after finding a better fitting male for *X. augustus* in Algeria (as *Kaltenbachia apum* (Thomson, 1873)). Seyrig (1926) reared several *X. dentatus* males along with *X. augustus* females, considering them the opposite sexes of the same species (however he used the incorrect name *Kaltenbachia angusta* Thoms.). Adriaanse (1941) followed up on Seyrig (1926), giving even more evidence and a thorough discussion on the topic, which can be summarised as follows:

- He observed copulation between *X. augustus* female and *X. dentatus* male on several occasions.
- He reared *X. dentatus* males along with *X. augustus* females from several host species but never with any other *Xylophrurus* species.
- In addition to his own rearing experiments, the sexes had been reared together by other authors in different locations (Habermehl 1922, Seyrig 1926).
- The connection between *X. dentatus* male and female *sensu* Speiser (1908) was seen weak and the description ambiguous (see Schmiedeknecht (1931) and Hedwig (1940) for more discussion).
- *Xylophrurus augustus* (*K. apum*) male *sensu* Schmiedeknecht (1904) is only found in Algeria. Seyrig (1926) considered it a local colour form of *X. dentatus*.
- Adriaanse (1941) concluded that *X. dentatus* male and *X. augustus* female are the same species.

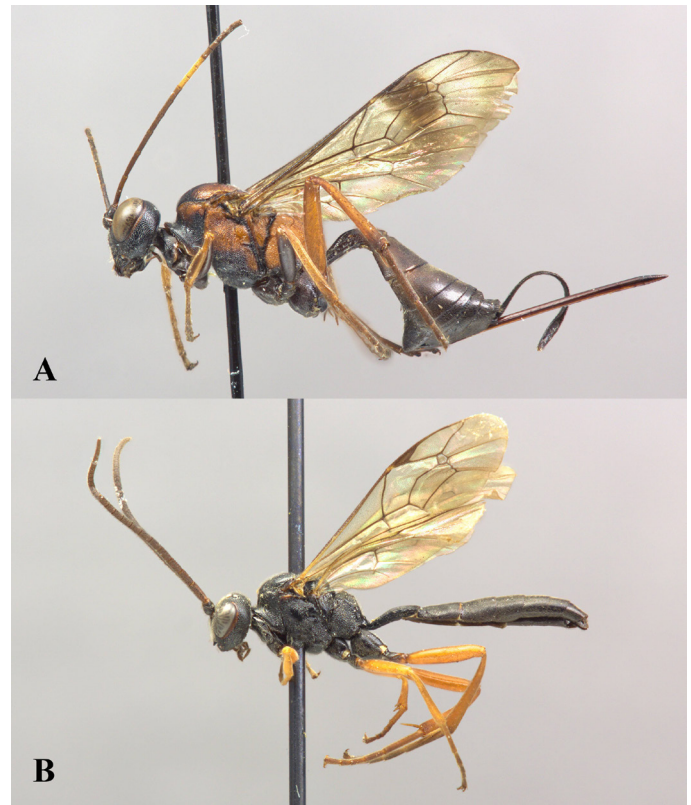


Figure 1. **A)** *Xylophrurus augustus* ♀, collected in Liperi 2015 [JP: <http://tun.fi/JX.1097486>]. **B)** *X. augustus* ♂, collected in Nokia [MZH: <http://id.luomus.fi/GP.103949>].

There is some room for doubt whether Adriaanse's interpretations of the two species are correct, since he did not examine any type material. However, he did cite the original description of *X. dentatus* and he also described the appearance of *X. augustus* female in some detail. In addition, it is unlikely that all three authors, who reared the two species together, had interpreted the species incorrectly.

Despite the considerable amount of evidence favouring the synonymy of the two species, Sawoniewicz (2003) reinstated *X. dentatus* as a valid species. He argued that the synonymisation by Adriaanse (1941) was incorrect but gave no further reasons why. Thus, it is obvious that Seyrig's (1926) and Adriaanse's (1941) view should be considered correct and *X. dentatus* rendered a junior subjective synonym of *X. augustus*.

It should be noted that Hedwig (1940) synonymised *X. dentatus* with *X. lancifer* (as *Kaltenbachia dentifera* (Thomson, 1896)). His discussion only involved females and it seems he was unaware that the type of *X. dentatus* is a male. Thus, he presumably meant that *X. dentatus* female *sensu* Speiser (1908) is synonymous with *X. lancifer*. He also gave a short description of *X. augustus* male, which agrees well with the original description of *X. dentatus*.

The synonymisation of *X. dentatus* and *X. augustus* leaves the identity of *X. dentatus* female *sensu* Meyer (1933) and Jonaitis (1981) as well as *X. augustus* male *sensu* Schmiedekne-

cht (1904) uncertain. The resolution is, however, beyond the scope of the present study. Based on the original description, Schmiedeknecht (1931) and Hedwig (1940), *X. dentatus* female *sensu* Speiser (1908) is most likely conspecific with *X. lancifer*.

Species

Xylophrurus augustus (Dalman, 1823)

Cryptus augustus ♀ Dalman, 1823.

= *Cryptus dentatus* ♂ Taschenberg 1865.

nec Kaltenbachia dentata (Taschenberg, 1865) *sensu* Speiser (1908) (♀).

nec Kaltenbachia dentata (Taschenberg, 1865) *sensu* Meyer (1933) (♀).

Figure 1.

Material examined:

♀ Finland *N*: Loviisa 1937 Åke Nordström leg.
[MZH: <http://id.luomus.fi/GP.103908>]

♂ Finland *Ta*: Hattula Lennart von Essen leg.
[MZH: <http://id.luomus.fi/GP.103947>]

♂ Finland *Ta*: Hattula Lennart von Essen leg.
[MZH: <http://id.luomus.fi/GP.103948>]

♂ Finland *Ta*: Nokia Thorwald Grönblom leg.
[MZH: <http://id.luomus.fi/GP.103949>]

♀ Finland *Kb*: Liperi 12.8.–20.8.2015 Ali Karhu leg.
[JP: <http://tun.fi/JX.1097486>]

The female is easily distinguished from both *X. lancifer* and *X. tumidus* by its red and black mesosomal colouration (Vas 2015). A similar species, *X. nigricornis* (Thomson 1885), so far only found in South Europe, has completely dark antennae. The male has completely dark and densely punctate metasoma.

X. augustus is a parasitoid of *Aculeata* nesting in plant stems, especially *Gymnomerus laevipes* (Shuckard, 1837) (Vespididae) nesting in *Rubus* L. stems (Giraud & Laboulbène 1877, Seyrig 1926, Adriaanse 1941). Other host groups besides *Aculeata* have occasionally been reported but until verified they should be regarded as doubtful. Unlike other species in the genus, *X. augustus* flies in late summer, which is why Dalman (1823) named the species *augustus*.

Xylophrurus tumidus (Desvignes, 1856)

Figure 2A.

Material examined:

♀ Finland *Ab*: Vihti 23.6.1962 Eila Karvonen leg.
[MZH: <http://id.luomus.fi/GP.103916>]

♀ Finland *N*: Helsinki, Munkkiniemi 20.5.1934 Nybom leg.
[MZH: <http://id.luomus.fi/GP.103920>]

♀ Finland *Ta*: Heinola, Pohjoismäki 21.5.–2.6.2018 Juuso Paappanen leg. [JP: <http://tun.fi/JX.1097487>]

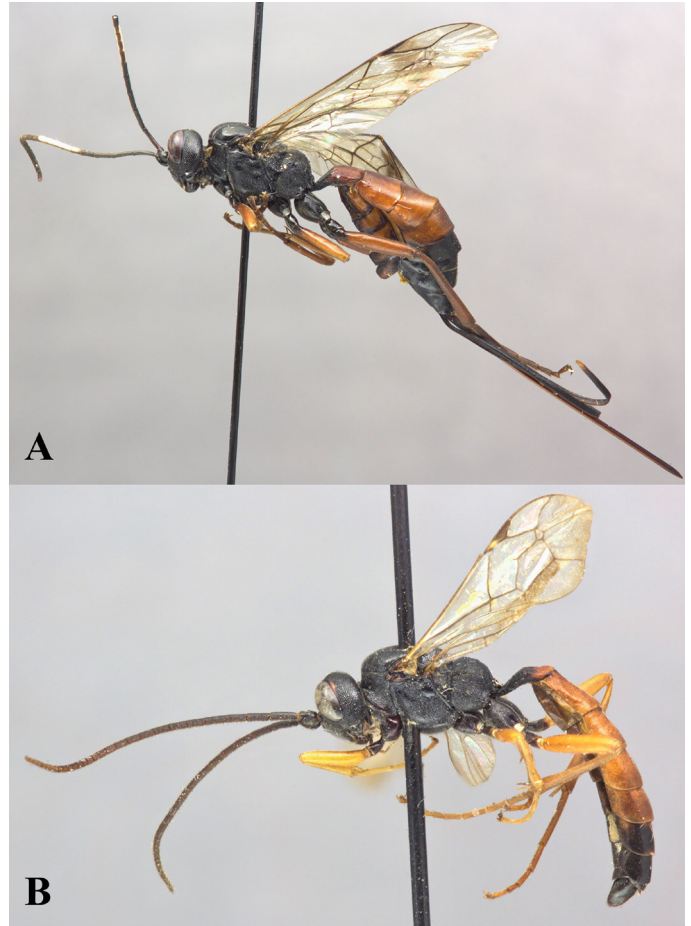


Figure 2. A) *Xylophrurus tumidus* ♀, collected in a recently burned pine-dominated forest in Heinola 2018 [JP: <http://tun.fi/JX.1097487>]. **B)** *Xylophrurus tumidus* or *X. lancifer* ♂, reared from *Saperda carcharias* in Föglö 1940 [MZH: <http://id.luomus.fi/GP.103950>].

♀ Finland *Sa*: Valkeala L. Hjelt leg.

[MZH: <http://id.luomus.fi/GP.103918>]

♀ Finland *Ok*: Suomussalmi Wolter Hellén leg.

[MZH: <http://id.luomus.fi/GP.103915>]

♀ Russia *Ka*: Antrea 9.6.1955 Erik Thuneberg leg.

[MZH: <http://id.luomus.fi/GP.103921>]

♀ Russia *Kl*: Kirjavalahki Wolter Hellén leg.

[MZH: <http://id.luomus.fi/GP.103919>]

♀ Russia *Kol*: Petrosawodsk Alexander Günther leg.

[MZH: <http://id.luomus.fi/GP.103917>]

♀ Russia *Kol*: Soutjärvi 12.6.1943 Wolter Hellén leg.

[MZH: <http://id.luomus.fi/GP.103922>]

Based on the examined material, *Xylophrurus tumidus* is reported for the first time from Finland and Russia.

This species was raised from synonymy with *X. lancifer* relatively recently (Schwarz & Shaw 1998). After the separation of the two species, it is possible that some synonyms and host records of *X. lancifer* should instead be assigned to *X. tumidus*.

Xylophrurus tumidus female can be separated from other European *Xylophrurus* species by the long ovipositor which is at least 2.5 times the length of the hind tibia (almost as long

as the entire body), whereas in other species the ratio is well below 2 (approximately as long as the metasoma) (Horstmann 1993, Vas 2015). *Xylophrurus lancifer* is the most similar species sharing the same colouration. Based on the examined material, other distinguishing features are observed: *X. tumidus* has more swollen mandibular bases, weaker sculpture of metasomal tergites, is larger (fore wing length about 10 mm; about 8 mm in *X. lancifer*) and has more flagellar segments (about 23; about 21 in *X. lancifer*). However, apart from the length of the ovipositor, all these features seem to overlap between the two species.

The male of *X. tumidus* is yet undescribed, but there are specimens in MZH that would match well with the female, such as the large and elongate male in Figure 2B [MZH: <http://id.luomus.fi/GP.103950>].

There is only one very old host record for *X. tumidus*: *Trichiosoma lucorum* (Linnaeus, 1758) (Cimbicidae) (Rudow 1882). *Trichiosoma* species have exposed larvae and cocoons and, thus, seem dubious hosts for a species with such a long and strong ovipositor. Some host records of *X. lancifer* should probably be assigned to *X. tumidus*. Perhaps those concerning *Saperda carcharias* (Linnaeus, 1758), in which case the distinctly longer ovipositor of *X. tumidus* would help reaching the larvae, which develop deep in the wood of *Populus tremula* L. (Cramer 1954). The ovipositor of *X. lancifer* seems too short for that purpose. One *Xylophrurus* male in MZH is also reared from *S. carcharias* [MZH: <http://id.luomus.fi/GP.103950>] (Figure 2). All examined specimens for which a collection date is known (5) were collected in May or June.

Xylophrurus lancifer (Gravenhorst, 1829)

Figure 3.

Material examined:

- ♀ Finland *Ab*: Karjalohja 28.5.1935 Lindqvist leg.
[MZH: <http://id.luomus.fi/GP.103911>]
- ♀ Finland *N*: Hanko 3.6.1933 Hans Luther leg.
[MZH: <http://id.luomus.fi/GP.103909>]
- ♀ Finland *N*: Hanko, Lappohja 12.6.1935 Adolf Nordman leg.
[MZH: <http://id.luomus.fi/GP.103910>]
- ♀ Finland *Ta*: Hattula Lennart von Essen leg.
[MZH: <http://id.luomus.fi/GP.103912>]
- ♀ Finland *Tb*: Toivakka 6.6.1975 Ella Tiihonen leg.
[MZH: <http://id.luomus.fi/GP.103914>]
- ♀ Finland *Kb*: Kontiolahti Emil Grönvik leg.
[MZH: <http://id.luomus.fi/GP.103913>]
- ♀ Finland *Kb*: Liperi, Käsämä 18.5.–26.6.2016 Ali Karhu leg.
[JP: <http://tun.fi/JX.1097489>]
- ♀ Finland *Kb*: Liperi, Käsämä 18.5.–26.6.2016 Ali Karhu leg.
[JP: <http://tun.fi/JX.1097488>]

After the separation of *X. tumidus* from *X. lancifer* (Schwarz & Shaw 1998), the latter species still remains dimorphic. Few



Figure 3. *Xylophrurus lancifer* ♀, collected in Hanko 1935 [MZH: <http://id.luomus.fi/GP.103910>].

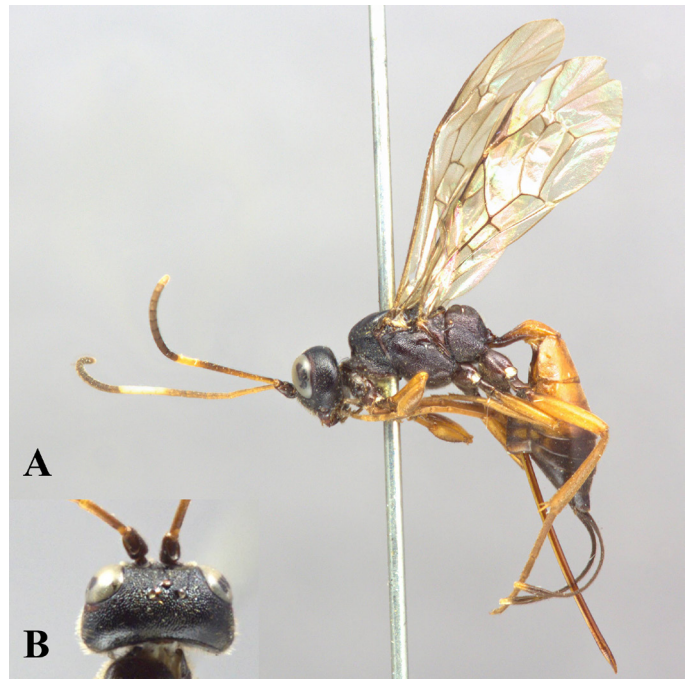


Figure 4. **A)** *Xylophrurus* cf. *coraebi* ♀, collected in Muonio 1925 [MZH: <http://id.luomus.fi/GP.103946>]. Note, that the rather pale colouration and the faded bands in the fore wings are due to the old age of the specimen. **B)** *X.* cf. *coraebi*, head in dorsal view of the same specimen.

specimens are small (fore wing about 5.5 mm), have more narrowed genae together with strong and dense metasomal punctation (even as strong as in *X. augustus*). With the limited material available and no other data besides morphology, it is impossible to say whether these specimens constitute a separate species or whether the differing characters are merely a result of small size.

Xylophrurus lancifer is reported mainly as a parasitoid of *Saperda populnea* (Linnaeus, 1758) (e. g. Giraud & Laboulbène 1877, Mocsáry 1895, Georgiev *et al.* 2004), which makes galls in *Populus* L. and *Salix* L. twigs. To a lesser extent, *Saperda carcharias* is reported as a host (Meyer 1934, Cramer 1954). All examined specimens for which a collection date is known (6) were collected in May or June.

***Xylophrurus* cf. *coraebi* (Thomson, 1885)**

Figure 4.

Material examined:

♀ Finland *KiL*: Muonio 5.7.1925 Justus Montell leg.[MZH: <http://id.luomus.fi/GP.103946>]

One female *Xylophrurus* collected from Muonio, northern Finland, differs from *X. lancifer* by its more swollen genae, agreeing with the description of *X. coraebi* (Thomson, 1885). However, since I have only seen one specimen and the difference from *X. lancifer* is rather subtle, I refrain from regarding *X. coraebi* as occurring in Finland until further specimens are collected and/or the differences between the two species are established. *Xylophrurus coraebi* is a rare and poorly known species only known from France, Germany and Spain (Yu *et al.* 2012).

Acknowledgments

Thank you to Juho Paukkunen for the access to the *Xylophrurus* specimens in MZH. Gergely Várkonyi and Ika Österblad reviewed and improved the manuscript considerably. Várkonyi also provided essential literature. The several *Xylophrurus* specimens collected by Ali Karhu, complemented the limited material available for this study. Vuokon Luonnonsuojelusäätiö funded a species inventory during which a female of *Xylophrurus tumidus* was found, which led to the preparation of this article.

References

- Adriaanse, A. 1941: *Kaltenbachia augusta* Dalm. und dentata Taschbg. (Hym.). — Entomologische Berichten 10: 345–348.
- Broad, G., Shaw, M. & Fitton, M. 2018: Ichneumonid wasps (Hymenoptera: Ichneumonidae). — Handbooks for the Identification of British Insects 7 (12): 1–418.
- Cramer, H. 1954: Untersuchungen über den grossen Pappelbock *Saperda carcharias* L. — Zeitschrift für Angewandte Entomologie 35: 425–458.
- Dalman, J. 1823: *Analecta Entomologica. Insectorum Sveciae Novae Species Insigniores.* — Holmiae Typis Lindhianis. 92–99.
- Georgiev, G., Raikova, M., Ljubomirov, T., & Ivanov, K. 2004: New parasitoids of *Saperda populnea* (L.) (Col. Cerambycidae) in Bulgaria. — Journal of Pest Science 77(3): 179–182.
- Giraud, J.-É. & Laboulbène, A. 1877: Liste des eclosions d'insectes observés par le Dr. Joseph-Étienne Giraud, membre honoraire. — Annales de la Société Entomologique de France 5(7): 397–436.
- Habermehl, H. 1922: Beiträge zur Kenntnis der palaerktischen Ichneumonidenfauna. — Konowia 1: 266–282.
- Hedwig, K. 1940: Alte und neue Hymenopteren. — Deutsche Entomologische Zeitschrift 1–4: 190–203.
- Hellén, W. 1956: Zur Ichneumoniden Finnlands IX (Hym.). — Notulae Entomologicae 36: 125–141.
- Horstmann, K. 1993: Revision der von Ferdinand Rudow beschriebenen Ichneumonidae I. (Hymenoptera). — Beiträge zur Entomologie 43(1): 3–38.
- Jonaitis, V. 1981: Subfamily Cryptinae. In: Kasparyan, D. (ed.), A guide to the insects of the European part of the USSR. Vol. III Hymenoptera, Part 3 Ichneumonidae (In Russian). Opredeliteli Faune SSSR 129: 175–274. Nauka, Leningrad.
- Koponen, M., Jussila, R., & Vikberg, V. 1999: Suomen loispistiäisluetello (Hymenoptera, Parasitica) Osa 3. heimo Ichneumonidae, alaheimo Cryptinae. — Sahlbergia 4: 19–52.
- Kriechbaumer, J. 1891: Cryptiden-Studien. — Entomologische Nachrichten 17(15): 225–228.
- Meyer, N. 1933: [Tables systematiques des hymenopteres parasites (Fam. Ichneumonidae) de l'URSS et des pays limitrophes. Vol. 2. Cryptinae.] (In Russian). — Leningrad. 325 pp.
- Meyer, N. 1934: Schlupfwespen, die in Rußland in den letzten Jahren aus Schädlingen gezogen sind. — Zeitschrift für Angewandte Entomologie 20(4): 611–618.
- Mocsáry, A. 1895: Hymenoptera parasitica educata in collectione Musaei nationalis Hungarici. — Természetrázi Füzetek 18: 67–72.
- Rudow, F. 1882: Einige neue Hymenoptera. — Entomologische Nachrichten 8: 279–289.
- Sawoniewicz, J. 2003: Zur Systematik und Faunistik Europäischer Ichneumonidae II (Hymenoptera, Ichneumonidae). — Entomofauna 24: 209–227.
- Schmiedeknecht, O. 1904: Opuscula Ichneumonologica. Fasc. VI — Blankenburg in Thüringen. 411–482.
- Schmiedeknecht, O. 1931: Opuscula Ichneumonologica. Supplement-Band. Fasc. XI. — Blankenburg in Thüringen 31–43.
- Schwarz, M., & Shaw, M. 1998: Western Palaearctic Cryptinae (Hymenoptera: Ichneumonidae) in the National Museums of Scotland, with nomenclatural changes, taxonomic notes, rearing records and special reference to the British check list. Part 1. Tribe Cryptini. — Entomologist's Gazette 49: 101–127.
- Seyrig, A. 1926: Observations sur les Ichneumonides. Ire serie. — Annales de la Société Entomologique de France 95: 157–172.
- Shaw, M. 2019: Host associations of Ichneumonids (and other parasitoids). — Identifying the next challenges in ichneumonid systematics and evolutionary ecology. Basel, Switzerland 24.–28.6.2019. <http://doi.org/10.5281/zenodo.3395675>.
- Speiser, P. 1908: Notizen über Hymenopteren. — Schriften der Naturforschenden Gesellschaft Danzig 12(2): 31–57.
- Townes, H. & Townes, M. 1962: Ichneumon-Flies of America North of Mexico: 3. Subfamily Gelineae, Tribe Mesostenini. — United States National Museum Bulletin 216(3): 1–602.
- Townes, H. 1970: The Genera of Ichneumonidae. Part 2. — Memoirs of the American Entomological Institute 12: 1–537.
- Vás, Z. 2015: New records of ichneumon wasps in Hungary, Romania, Serbia and Slovakia with a key to the Western Palaearctic *Xylophrurus* species (Hymenoptera: Ichneumonidae) — Folia Entomologica Hungarica 76: 223–240.
- Yu D., van Achterberg C. & Horstmann K. 2012: Taxapad 2012, Ichneumonoidea 2011. — Database on a flash-drive.

