

Cryptoserphus and Belytinae wasps (Hymenoptera, Proctotrupoidea) parasitizing fungus- and soil-inhabiting Diptera

Lars Huggert

Abstract

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Some new information is presented, which supports the view that the species of the genus *Cryptoserphus* Kieffer probably all parasitize fungus gnats (Mycetophiloidea). Published and unpublished host records, or observations indicating the host have been compiled for the subfamily Belytinae. The scant data available point to various groups of fungus- and soil-inhabiting midges as the hosts for the Belytinae. Three new combinations are proposed and one new synonym, viz. *Acropiesta flaviventris* Thomson (= *Anec-tata dispar* Brischke syn. n.). A lectotype is designated for *Cinetus lanceolatus* Thomson.

Author's address: L. Huggert, Sect. of Ecological Zoology, Dept. of Biology, Univ. of Umeå, S-901 87 Umeå, Sweden.

Introduction

Comparatively little is known about the hosts of the Proctotrupidae and the Belytinae. This is chiefly because the potential hosts are not easily collected. From the available host records it is fairly clear that the wasps of these two groups parasitize the larvae of beetles (Coleoptera), fungus gnats (Mycetophilidae, Sciaridae), winter gnats (Trichoceridae) and probably also other related midge families living in the same type of habitat. As these presumed hosts all lead a more or less hidden underground existence, they cannot be obtained without special effort and it is difficult to know where to start looking for them. The caterpillars, butterflies and sawflies, leafminers, galls on various parts of plants, insect eggs etc., which are the hosts of most parasitic wasps are much more easily found and brought indoors for rearing.

Proctotrupidae

Several papers have been published

on the bionomics of the Proctotrupidae, some of the more important review studies are: NIXON (1938), JANS-SON (1960), HEDQVIST (1963), WEIDE-MANN (1962, 1965) and PSCHORN-WALCHER (1971) (see also my references). From these papers, it is obvious that all Proctotrupidae are parasites on beetle larvae, except the members of the genera *Disogmus* Förster and *Cryptoserphus* Kieffer, which attack larvae of fungus gnats. Although there are several old records of Proctotrupidae living on fungus gnats (e.g. NEES AB ESENBECK, 1834), these reports were considered erroneous by some authors; fungal (especially decaying) sporophores are frequently inhabited by large numbers of imagines and larvae of beetles, mostly Staphylinidae, and these were supposed to be the true hosts of the Proctotrupidae. Actually this was probably correct for all the genera except *Disogmus* and *Cryptoserphus*, but NIXON (1938), SZELÉNYI (1940) and MASNER (1968) clearly recorded that species of these two genera were reared from pupae of fungus gnats.

I would now like to report some of my own observations of females of *Cryptoserphus* ovipositing in fungal sporophores.

Cryptoserphus laricis (Haliday, 1839)

This species has not yet been reared, but it is frequently found on fungi (PSCHORN-WALCHER 1971). I once observed numerous females ovipositing between the lamellae of an agaric in a mixed spruce forest. Sweden, Vb: Klabböle 1968-10-12, 3 ♀ preserved.

Cryptoserphus aculeator (Haliday, 1839)

As early as 1914 KIEFFER reported that this species was a parasite of fungus gnats, and this was one of the two species recorded by MASNER (1968) as having been reared from their pupae (from *Mycetophila ruficollis* Meig. and *Exechia contaminata* Winn.). I have twice seen females ovipositing between the lamellae of *Sarcomyxa serotina* (Schrader) growing on dying trunks of *Alnus incanus* L. in swampy deciduous woods. Sweden, Vb: Umeå, Teg 1974-09-06, 1 ♀; Finland, Oa: Isojoki 1977-09-04, 1 ♀.

Cryptoserphus foveolatus (Möller, 1882)

This species was also recorded from fungi (PSCHORN-WALCHER 1971), but has not been reared. In the autumn of 1978 I went to gather mushrooms in a very dry pine forest, with a field layer dominated by *Calluna* and *Gladonia* spp., just beyond Umeå. There, I was amazed to see unusually large numbers of Diptera and Hymenoptera flying around and creeping about on the sporophores of three boleti species. *Boletus pinicola* Vitt., which is typical of a biotope of this kind, had scattered occurrences, and its decaying sporophores were often crowded with larvae of mycetophilids, and imagines of a braconid and a eucoilid of the genus *Trybliographa* Förster. *Suillus bovinus* (L.) and *S. variegatus* (Swartz) were about equally common and very numerous throughout the forest, but Proctotrupidae and Belytinae were attracted almost solely to the latter. Several females of *Cryptoserphus foveolatus* were observed ovipositing on the underside of the sporophores. When ovipositing the females inserted not only the ovipositor, but the whole metasoma into the ducts of the spore layer. The metasoma was much prolonged, as the borders between the segments are not ringed (Fig. 1).

Ovipositing individuals of *C. foveolatus* and belytins (see below) were observed only on relatively young, still growing, sporophores of *S. variegatus* and never on old ones or on those that were slightly collapsed. Only very small larvae of fungus gnats could be found in the fungi attacked and no imagines or larvae of beetles were present. Thus, probably all the species of the genus *Cryptoserphus* are parasites on larvae of Mycetophilidae. Sweden,

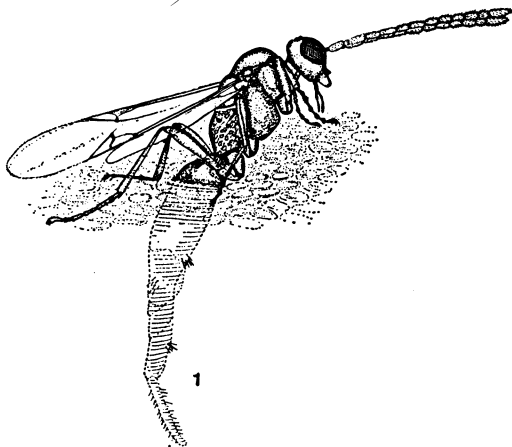


FIG. 1. Female of *Cryptoserphus foveolatus* (Möller) ovipositing into the spore duct of *Suillus variegatus* (Swartz). Sweden, Vb: Umeå, Kulla 1978-09-18. Redrawn from a photo.

Vb: Umeå, Kulla 1978-09-16, 6 ♀; 1978-09-18, 2 ♀.

Diapriidae: Belytinae

Although several hundreds of species of Belytinae are known from Europe and abundant collections are frequently made, only a few species have ever been reared, and the circumstances of their collection seldom indicate the host. The few species that have been successfully reared were all parasites on larvae of fungus and winter gnats living in mushrooms or in rotten wood. Several species have been reported from ant nests, but none have definitely been bred from the ants. They may in fact be parasites of the ants but it is more likely that they simply happened to be collected together with them. The wasps were probably looking for hosts connected with the material of the ant nests, with rotten wood, in which, for instance, *Lasius brunneus* Latr. always has its nest. Numerous specimens of several genera of belytins may often be collected in a locality where no sporophores occur, or if they occur

then usually no belytins are to be seen on them. The reason why the few host records that we know are connected with the fruit bodies of macrofungi may be that such habitats are easily found. The majority of the belytins probably parasitize midge larvae living on mycelium, decaying plant remains, etc., down in the humus layer (CHAMBERS, 1971).

Contrary to the case with Proctotrupidae, nobody seems to have summarized the published records of rearings of Belytinae or observations of potential hosts. I present here a compilation of the records and observations known to me.

Anommatium ashmeadi Mayr, 1904

England, Herts., King's Langley 1936-09-27, 1 ♀, taken in the nest of *Lasius flavus* F. (NIXON 1957). It is unlikely that the species is a parasite of this ant.

Synacra brachialis (Nees, 1834)

England, Berks., Windsor Forest, with *Lasius brunneus* Latr. (DONISTHORPE 1927).

Synacra brevipennis Kieffer, 1910

England, Kent, Charing, 1 ♀ labelled emerged 1903-09-15 from *Ponera coarctata* (Latr.) (NIXON 1957). Possibly really bred from this ant.

Synacra holconota Kieffer, 1910

England, Kent, 2 ♀ 2 ♂ bred from sciarid larvae in a mushroom (NIXON 1957).

Synacra inquilina (Kieffer, 1905)

Luxemburg, June 1904, in a nest of *Formica sanguinea* Latr. (KIEFFER 1916; PSCHORN-WALCHER 1957; DESSART 1975).

Synacra picea Kieffer, 1910

Luxemburg, May 1905, in a nest of *Lasius fuliginosus* (Latr.) (KIEFFER 1916; PSCHORN-WALCHER 1957; DESSART 1975).

Synacra sociabilis (Kieffer, 1904)

Netherlands, Exaeten, June 1898, collected in a nest of *Formica fusca* L., Luxemburg, May 1903, in a nest of *Formica rufa* L. (KIEFFER 1916; PSCHORN-WALCHER 1957; DESSART 1975).

Sundholmiella giraudi (Kieffer, 1910)

France, Mont de Marsan, from larvae of *Tomicus piniperda* (L.) and *Orthotomicus laricis* (F.) (KIEFFER 1916). This species may in fact have been reared from Scolytidae (Col.), but the true host is more likely to be some midge, e.g. the sciarid *Corynoptera fla-*

vicauda (Zett.), which is known to live in the galleries of scolytids in conifers (BRAUNS 1954; TUOMIKOSKI 1960).

Rhynchopsilus donisthorpei (Nixon, 1931)

England, Berks., Windsor Forest, in a nest of the ant *Lasius brunneus* Latr. (NIXON 1957).

Acanosema reitteri Kieffer, 1909

England, Berks., Windsor Park 1924-06-29, 2 ♀ in a nest of the ant *Lasius brunneus* Latr. (NIXON 1957).

Acanosema nervosa (Thomson, 1858)

England, SE London, Tulse Hill, 28 ♂ 15 ♀ taken running on a rotten *Prunus* log in which a species of *Sciara* was breeding (NIXON 1938, 1957).

Acropiesta sciarivora Kieffer, 1907

France, Bitche, reared from larvae of a *Sciara* species (Kieffer 1916).

Acropiesta flaviventris Thomson, 1858

Anectata dispar Brischke, 1891. n. syn.

This species was reared from larvae of *Trichosia caudata* Walk. living in dark brown, rotten alder wood in Finland (TUOMIKOSKI 1957; HELLÉN 1964). In the spring of 1976 I found bright yellow *Trichosia* larvae, probably of the above species, with black heads, in dark brown rotten logs of *Alnus incanus* L. near Umeå. *A. flaviventris* and a *Conostigmus* sp. were bred in numbers from pieces of these logs. Sweden, Vb: Umeå, Grösjön 1976-05-02, 9 ♂ 7 ♀; 1976-05-28, 4 ♂ 7 ♀.

In 1891 BRISCHKE described *Anectata dispar* of both sexes reared by him in Langfuhr, Germany, from larvae of *Sciara ligniperda* Brischke living in dark brown, rotten alder wood. Judging from the description (which is, however, rather poor), from the very large size of the species and from its bionomics, it seems clear that Brischke's species is conspecific with *A. flaviventris* Th.

Acanthopsilus marshalli (Kieffer, 1907)

England, Weybridge, with *Lasius fuliginosus* (Latr.) (DONISTHORPE 1927).

Oxylabis bisulca (Nees, 1834)

Netherlands, Valkenburg 1911-06-28, with *Formica rufa* L. (KIEFFER 1916; DESSART 1975). In Germany, WALL (1968) reared this species several times from agarics. The mushrooms were probably attacked by Mycetophilidae.

Belyta boleti Nees, 1834

Germany, Sickershausen 1810-10-10, numerous individuals of both sexes seen on the underside of *Boletus edulis* Bulliard. From the description this seems to be a *Cinetus* species

of the *iridipennis* group. Unfortunately, Nees's collection is believed to be destroyed, but if belytins are collected on boleti in the vicinity of Sickershausen there is a fair possibility that this species might be recognized. In fact, it might be conspecific with the *Cinetus* sp. below.

Belyta depressa Thomson, 1858

England, Darenth Wood, with *Lasius fuliginosus* (Latr.) (DONISTHORPE 1927).

Pantoclis scotica (Kieffer, 1909)

England, Berks., Windsor Forest, with *Lasius brunneus* Latr. (DONISTHORPE 1927).

Zygota hemiptera (Thomson, 1858)

England, Berks., Windsor Forest, three times, once in numbers with *Lasius brunneus* Latr. (DONISTHORPE 1927).

Zygota myrmecophila (Kieffer, 1904)

Germany, Linz am Rhein, September 1893, in a nest of *Formica exsecta* (Nyl.) (KIEFFER 1908; DESSART 1975).

Zygota lasiorum (Kieffer, 1904)

Austria, Wien, Lainz July 1892, with the ant *Lasius brunneus* Latr. (KIEFFER 1916; DESSART 1975). NIXON (1957) synonymized this species with *Z. fuscata* (Thomson, 1858), but according to DESSART (1975) this is incorrect. DESSART was also uncertain about the generic position of this species.

Aclista bitensis (Kieffer, 1909)

One female reared in England from a pupa of Mycetophilidae (NIXON 1957). Kent, Pond Wood, Chislehurst em. 1971-12-18, 1 ♂, bred from Mycetophilidae in *Armillariella mellea* (Vahl ex Fr.). This male was determined by Nixon with a query, as the keel on the first flagellar segment seemed rather short (CHANDLER, in litt.).

Aclista haemorrhoidalis (Kieffer, 1910)

England, Surrey, Bookham, 4 ♂ 10 ♀ bred in November from Mycetophilidae (NIXON 1957); Bedfordshire, Aspley Heath, one individual was once seen inspecting an agaric (CHAMBERS, 1971).

Miota fungorum (Kieffer, 1910)
comb. n.

Collected on fungal sporophores (KIEFFER 1916).

Miota monilicornis (Kieffer, 1910)
comb. n.

France, Bitche, reared in numbers from a *Boletus edulis* Bulliard (Kieffer, 1916). Germany, Schwarzwald 1964-08-23, 2 ♀ reared from the foot of a *Boletus* sp. (WALL 1968). England, Wellington College with *Lasius fuliginosus* (Latr.) (DONISTHORPE 1927. *Leptorhaptus myrmecophilus* Kieffer = n. nudum).

Cinetus atriceps (Kieffer, 1910)

England, Berks., Windsor Great Park 1971-10-23, 3 ♀ em. 1971-11-20 bred from *Exechia fusca* Meig. in a *Hygrophoropsis aurantiaca* (Wulfen ex Fr.) (CHANDLER, in litt.).

Cinetus iridipennis Lapeletier, 1825

WALL (1968) reared this species in Germany from various agarics.

Cinetus lanceolatus Thomson, 1858

Type material: Lectotype ♀ (here designated), labelled "Sm", "Bhn", "Type". Only the mesosoma, the wings and parts of the legs are left, but careful comparison with fresh specimens revealed that it is evidently *C. lanceolatus* Th. as it is now understood. I should point out here that the suture between tergites 2 and 3 is always visible, which is in contradiction with what NIXON (1957) states, but in agreement with WALL (1968, fig. 1b). Type in Riksmuseum, Stockholm. The second syntype in coll. Boheman, also in poor condition, is labelled as above and "*Leptorhaptus compressus* Th. ♀", probably in A. Jansson's handwriting. As the remnants agree well with that species, I have labelled it "*Miota compressa* (Th.) n. comb. In coll. Thomson, Lund, there are two females from Austria and Germany, one of them determined by Nixon. They are *C. lanceolatus* Th., but one male seems to be *C. excavatus* Kieff.

Switzerland, 2 ♀ were bred from a mycetophilid fly in a *Boletus* sp. (NIXON 1957). Sweden, Vb: Umeå, Kulla 1978-09-16, 9 ♀. The Swedish females were observed ovipositing into the spore ducts of *Suillus variegatus* (Swartz) under the same conditions as *Cryptoserphus foveolatus* (Möller) (see above).

When the female is ovipositing, the last three metasomatic segments, which at rest are telescoped inside the metasomatic body formed by segments II and III, are fully extruded to form a semihyaline tube.

Cinetus piceus Thomson, 1858

England, Bedfordshire, Aspley Heath. One individual was once seen inspecting an agaric (CHAMBERS 1971).

Cinetus sp.

Sweden, Vb: Umeå, Kulla 1978-09-16, 3 ♀; 1978-09-18, 1 ♀. The females were collected on sporophores with *C. lanceolatus* Th., but no oviposition was seen. This species may be the same as *Belyta boleti* Nees (see above).

Scorpioteleia longiventris (Kieffer, 1910)

Sweden, Vb: Umeå, Kulla 1978-09-16, 12 ♀; 1978-09-18, 6 ♀. Females of this species were collected under the same circumstances as *Cryptoserphus foveolatus* and *Cinetus lanceolatus* (see above). The specimens were observed creeping on the underside of *Suillus variegatus*. When a suitable host was detected, the female bent the metasoma at a right angle and inserted the whole of it into the spore

duct. The last four metasomatic segments, which at rest are telescoped inside the large second one, are somewhat prolonged at oviposition, forming a compressed tube.

Although fruit bodies of three species of boleti, or at least two, were very common in the pine forest at Kulla, the three belytins (and the proctotrupid) were only rarely encountered on the fungi. Consequently, I arrive at the same conclusion as CHAMBERS (1971), viz. that the main hosts of these wasps are not the fungus gnats living in the sporophores of macrofungi but rather midges living in the humus and subsoil. That the wasps nevertheless occurred frequently enough on the fungi to attract my attention may be due to a lack of the usual hosts, caused by the dry biotope.

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514.

Referat

Proctotrupidsteklar som parasiter i svamp- och marklevande mygglarver

Steklar som hör till Proctotrupidae och Diapriidae: Belytinae parasiterar på larver av skalbaggar samt svamp-, sorg- och vintermyggor. På grund av larvernas relativt undanskymda liv har vi ganska få exakta värddata, men det förefaller som om alla proctotrupider skulle parasitera på skalbaggs-larver med undantag för *Disogmus* och *Cryptoserphus* vilka angriper larver av svampmyggor (Mycetophilidae).

Trots att vi känner hundratals europeiska arter av Belytinae har man lyckats kläcka bara några få arter. De levde alla som parasiter på mygg-larver i svamp eller förmultnande ved. Flere arter har visserligen rapporterats från myrbon, men ingen har med säkerhet kläckts ur myror. Alla kända kläckningar och observationer av potentiella värdar för belytiner förtecknas.

Tre arter flyttas till andra släkten och en art synonymiseras d.v.s. *Acropiesta flaviventris* Thomson = *Anectata dispar* Brischke syn. n.

Selostus

Keripistiäisiä sienissä ja maassa elävien sääskentoukkien loisina

Ryhmiin Proctotrupidae ja Diapriidae: Belytinae kuuluvat pistäiset loisivat kovakuoriaisten, sekä sieni-, harso- ja talvisääskien toukissa. Koska toukat elävät kätkössä on meillä vain harvoja tarkkoja tietoja isäntäeläimistä, mutta vaikuttaa siltä että proctotrupidit loisivat kovakuoriaistoukissa, lukuunottamatta sukuja *Disogmus* ja *Cryptoserphus*, jotka elävät sienisääskien (Mycetophilidae) loisina.

Vaikka alaheimosta Belytinae tunnetaan saatoja eurooppalaisia lajeja on vain harvan lajin kasvattaminen onnistunut. Kaikki loisivat sienissä tai lahossa puussa elävissä sääskentoukissa. Tosin on eräitä lajeja ilmoitettu muurahaispesistä, mutta ainoatakaan ei ole saatu kuoriutumaan muurahaisista. Kaikki tunnetut kasvatukset ja havainnot belytiniin todennäköisistä isäntäeläimistä luetellaan.

Kolme lajia siirretään toisiin sukuihin, ja yksi laji synonymisoidaan — *Acropiesta flaviventris* Thomson = *Anectata dispar* Brischke syn. nov.

Symposio – Symposium

Symposium över förändringar i Insektfaunan i Finland under senaste tid

Symposiet arrangeras av Entomologiska Föreningen i Helsingfors på Lammi Biologiska Station fredag-lördag 11–12 april 1980. Föreningen inbjuder alla landets entomologer att diskutera de förändringar som noterats och deras orsaker. Symposiet inleds med en översikt över klimatet under senaste tid samt de ekologiska faktorer som åstadkommer populationsförändringar hos insekter. Ämnen som kommer upp är registreringsmetodik, migration, nykomlingar i faunan, förändring på grund av nya agrikulturella och forsttekniska metoder och förändringar i lokala fjärlsfaunor som registrerats under en längre tid.

Intresserade kan anmäla sig antingen till doc. Martin Meinander, Zoologiska Museet, Helsingfors, tel. 40 27 261 eller doc. Kauri Mikkola, Zoologiska institutionen, Helsingfors, tel. 40 27 251. Föredrag bör anmälas inom januari. Alla som anmält sitt intresse kommer att erhålla ett detaljerat program under sen-vintern 1980.

Symposio Suomen hyönteisfaunan viimeaikaisista muutoksista

Symposion järjestää Helsingin Hyönteistieteellinen Yhdistys Lammin Biologisella Asemalla perjantaina-lauantaina 11–12 huhtikuuta 1980. Yhdistys kutsuu maan kaikki entomologit keskustelemaan todetuista muutoksista ja niiden syistä. Aluksi esitetään katsaus viimeaikaiseen ilmastoon ja niihin ekologiisiin tekijöihin, jotka aiheuttavat muutoksia hyönteispopulaatioissa. Edelleen käsitellään rekisteröintimenetelmiä, migraatiota, faunan uutuuksia, uusista maa- ja metsätaloudellisista menetelmistä johtuvia muutoksia sekä pitkään seuratuissa paikallisissa perhosfaunoissa havaittuja muutoksia.

Symposiosta kiinnostuneet voivat ilmoittautua joko dos. Martin Meinanderille, Eläinmuseo, Helsinki, puh. 40 27 261 tai dos. Kauri Mikkolalle, Eläintieteen laitos, Helsinki, puh. 40 27 251. Esitelmät on ilmoitettava tammi-kuun loppuun mennessä. Kaikki jotka ovat ilmoittaneet olevansa kiinnostuneita saavat yksityiskohtaisen ohjelman loppupalvelilla 1980.