New data on Platypezidae and Opetiidae (Diptera) of Finland

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Six species of flatfooted flies, Platypezidae, are reported as new to Finland based on authors investigations during years 2003-2005. Detailed information of Finnish records as well as data on host fungus association and habitat of adults are given. This study reports the first confirmed breeding record for *Agathomyia lundbecki* from *Inonotus radiatus*, and recorded *Platypezina connexa* repeatedly as bred from strongly decayed and softened trunk of spruce.

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Introduction

The Platypezidae comprise about 250 species worldwide of which 44 occur in Europe (Rotheray *et al.* 2004). All known Platypezidae larvae develop in fungi, and the species exhibit a preference for lignicolous fungi. More than 30 species of Platypezidae have been reared from fungi in the Holarctic region, 20 European and 13 North American. Most Platypezidae are apparently monophagous or at the most oligophagous, and two or more closely related species may develop in the same fungus. The fungi that Platypezidae have been reared from belong to 30-31 genera all in the subclass Homobasidiomycetes. None of the larger Ascomycetes are known to be attacked by them, but few Diptera have been reared from these (Chandler 2001 and references therein). All *Platypeza* species are thought to develop in *Armillaria mellea* (Vahl: Fr.) Kummer (Chandler 2001). In Finland four other *Armillaria* species occur, *A. borealis* Marxm. & Korhonen, *A. ectypa* (Fr.: Fr.), *A. lutea* Gillet and *A. ostoyae* (Romagn.), but not *A. mellea* (Salo *et al.* 2005).

Adult Platypezidae of both sexes are commonly found sitting on or performing rapid erratic to-and-from movements on broad leaves of bushes, shrubs and trees, occasionally herbaceous plants (Qvick 1986, Chandler 2001). They are using the leaf surface as a food source of honeydew.

The family Opetiidae is a monogeneric family, with one Palaearctic species, *Opetia nigra*. Adult *Opetia* have been obtained sweep-netting vegetation.

Material and methods

The material presented in this paper was collected from southern Finland during the years 2003-2005 by hand netting from leaves of bushes, sweep-netting from vegetation, and in part from Malaise trap and eclector (emergence) trap catches. Hand netting activity was most frequent in August and September, as this is the flight period of most species of Platypezidae in Finland. Eclector traps were used only during 2005, and placed in the field

Figure 1. *Agathomyia vernalis*, male. (Ta:Hartola, Korvenpohja, 68396:4497, 14.5.2006, J. Kahanpää leg.). The diagnostic characters of tibia III enlargened and somewhat compressed apically and first tarsomere of tarsus III broader than tibia visible. Photo: J. Kahanpää

in late April/early May, and removed in late September.

Nomenclature follows Chandler (1991, 2001). Specimens are deposited in the Zoological Museum (MZH), Helsinki, unless otherwise stated. Specimens were pinned, and examined and identified using a stereomicroscope. Male genitalia were either teased out with a needle, or detached and treated with 10% KOH before examination. The keys in Chandler (2001) were used for species identification, all specimens were determined to species by G. Ståhls. Species new to Finland were sent to P. J. Chandler for confirmation.

Results

Platypezidae

Subfamily Microsaniinae

Genus *Microsania*

Cosmopolitan, 21 described species, 5 recorded from Scandinavia, 3 from Finland. The adults of all *Microsania* spp. are rarely recorded except in the vicinity of bonfires, where they may be numerous (fumotropic behaviour). The males swarm in the smoke and the females are attracted to these swarms (Chandler 2001, Falk & Chandler 2005). Tuomikoski (1960) suggested that the larvae might develop under bark of burnt tree stumps, while Collart (1954) suggested they develop in forest soil where larvae might be feeding on fungal mycelium, but the biology is still unknown. Falk & Chandler (2005) indicated that at present there is no reason to believe that *Microsania* larvae are fungus feeders.

Only one new record: *Microsania pallipes* (Meigen, 1830), *Obb*: Tervola, Karhakkamaa (7346879:415620), 28.6.-2.8.2004, malaise trap, J. Salmela & J. Ilmonen leg., 1 male.

Subfamily Callomyinae

Genus *Agathomyia*

The *Agathomyia viduella* - group

Agathomyia antennata (Zetterstedt, 1819)

N: Espoo, Suomenoja (66736:3730), 10.6.2003, J. Kahanpää leg., 1 female. Recorded as visitor of *Trametes versicolor* (L.: Fr.) Pilát but the only rearing record of this species is from the fungus *Bjerkandera adusta* (Willd.: Fr.) P. Karst. (Ševčik 2004) so an association with *Trametes* requires confirmation.

Agathomyia vernalis Shatalkin, 1981 (Fig. 1)

New to Finland: Ta: Hartola, Hirtesalo (6839:451), 4.6.2004, sweep-netted, J. Kahanpää leg., 1 female; Ta: Hartola, Korvenpohja (68396:4497), 14.5.2006, J. Kahanpää leg., 1 male. The former site is a small nature reserve with numerous dead and dying birches in various states of decay. The early sta-

ges and larval habitat are unknown (Chandler 2001).

The *Agathomyia falleni* – group

Agathomyia unicolor Oldenberg, 1928

New to Finland: *Ta*: Hartola (68404:4496), Suppakuusikko, 31.8.2002, sweep-netted from *Vaccinium myrtillus* in a spruce forest, J. Kahanpää leg, 1 female; *Ta*: Hämeenlinna, Aulangon puistometsä (6768:252), 20.9.2004, on leaves of *Rubus idaeus* sp., G. Ståhls leg., 1 female. Host fungus is *Bjerkandera adusta* (Chandler 1981), final stage larvae described in Rotheray *et al.* (2004).

The *Agathomyia elegantula* – group

Agathomyia cinerea (Zetterstedt, 1852)

Ab: Karjalohja, Karkalinniemi (6681:248), 18.8.2005, on leaves of *Lonicera xylosteum,* handnetted, G. Ståhls leg., 1 male.

Agathomyia lundbecki Chandler in Shatalkin, 1985

New to Finland: *Ab*: Karjalohja, Karkalinniemi (6681:248), Ex. *Inonotus radiatus* (Sowerby: Fr.) P. Karsten, collected 26.9.2004 for rearing, multiple males and females flies emerged 8-19.1.2005, G. Ståhls leg. First confirmed breeding record for *A. lundbecki* from *I. radiatus*, although the probable association was noted by Chandler (2001); *Ab*: Karjalohja, Karkalinniemi (6681:248), 18.8.2005, on leaves of *Lonicera xylosteum*, handnetted, G. Ståhls leg., 1 male and 1 female; ibidem 25.8.2005, 1 male on leaves of *Lonicera xylosteum*.

Agathomyia wankowiczii (Schnabl, 1884)

New to Finland: *N*: Helsinki, Pakila, 4-23.6.2005, emergence trap, G. Ståhls leg. 34 males and 23 females; *Ta*: Lammi biological station (6771:255), VI.2005, emergence trap, G. Ståhls leg. Host fungus is *Ganoderma lipsiense* (Batsch) Atk. (= *applanatum* (Pers.) S.F. Gray) (Niemelä 2005). Niemelä & Kotiranta (1986) observed that up to 11.8% of *Ganoderma* brackets were infested, and that fungi with galls occur frequently in southern Finland, and our observations support this finding. These are the first records of adult specimens from Finland. Adult flies presumably are very restricted in their movements as a window-trap placed next to the infested bracket of *G. lipsiens*e in Lammi did not collect a single adult specimen during summer of 2004. The emergence trap was placed to cover an area on the ground beneath this fungus, and multiple specimens that emerged from pupae in the ground were trapped during June 2005. Final stage larvae described in Rotheray *et al.* (2004).

Agathomyia woodella Chandler in Shatalkin, 1985

Ab: Karjalohja, Karkalinniemi (6681:248), 18.8.2005, on leaves of *Corylus avellana*, handnetted, G. Ståhls leg. 1 male, new provincial record; Ibidem, 25.8.2005, 2 males, on leaves of *Lonicera xylosteum*; *Ta*: Hämeenlinna, Aulangon puistometsä (6768:252), 9.9.2005, handnetted, on leaves of *Rhododendron* sp., 1 male, new provincial record. We report first record of this species visiting leaves of *Corylus avellana*. The early stages and larval habitat are unknown.

Agathomyia zetterstedti (Wahlberg in Zetterstedt, 1844)

New to Finland: *Ab*: Karjalohja, Karkalinniemi (6681:248), 18.8.2005, on leaves of *Corylus avellana*, handnetted, G. Ståhls leg. 2 females; Ibidem, 25.8.2005, 2 females, on leaves of *Lonicera xylosteum*.

Genus *Callomyia*

Callomyia amoena Meigen, 1824

Ab: Karjalohja, Karkalinniemi (6685:332), 26.7.-23.8.2004, malaise trap, J. Jakovlev leg. 1 male, 1 female; *Ab*: Karjalohja, Karkalinniemi (6681:248), 18.8.2005, on leaves of *Corylus avellana*, handnetted, G. Ståhls leg. 1 female; *Al:* Lemland, Nåtö, nr. biol. station, 4.-5.6.2004, G. Ståhls leg. 1 female. The third stage larva is described in Rotheray et al. (2004). The larva apparently feeds on the surface of fungi encrusting rotting wood, like *Corticium* or fungal mycelium under bark, but no precise observations have been made on larval habits (Chandler 2001).

Callomyia speciosa Meigen, 1824

Ab: Karjalohja, Karkalinniemi (6685:332), 5-26.7.2004, malaise trap, J. Jakovlev leg. 1 female; Ibidem, 26.7.-23.8.2004, malaise trap, 1 female; *Ta*: Lammi, 12 females, eclector trap 8, *Alnus incana*, piece of soft trunk

in advanced stage of decay (brown-rot), 27.7-26.8.2005, J. Jakovlev leg. Fruiting bodies of *Fomitopsis pinicola* (Swartz: Fries) P. Karsten were present during the whole trapping period inside the trap as well as outside the trap on the rest of the trunk. The early stages are unknown, but the present findings suggest larval feeding in the decaying *Alnus* trunk.

Genus *Platypezina*

Platypezina connexa (Boheman, 1858)

N: Pyhtää, Valkmusa (6717: 483), 30.8.2003, J. Kahanpää leg. Sweep-netted, 1 male; *Ta*: Lammi, Kotinen Nature Reserve (67944:3964), 4 males in eclector trap (no 11) placed over strongly decayed (brown-rot) and softened trunk of spruce (*Picea abies*), covered with moss, 27.7-26.8.2005, J. Jakovlev leg; *Ta*: Padasjoki, Vesijako Nature Reserve (68057:2559), J. Jakovlev. 1 male in eclector trap (no 16) placed over strongly decayed (brown-rot) and softened trunk of spruce covered with moss. Based on this finding it seems evident that the larvae would feed on fungal growth of the *Picea* trunk, but there were no signs of wood encrusting fungi. The early stages are unknown. Both findings are new provincial records.

Subfamily Platypezinae

Genus *Paraplatypeza*

Paraplatypeza atra (Meigen, 1804)

Ab: Karjalohja, Karkalinniemi (6681:248), 18.8.2005, on leaves of *Corylus avellana*, handnetted, G. Ståhls leg., 1 male. *Pluteus cervinus* appears to be a regular host fungus (Chandler 2001). The final stage larva was described in Rotheray *et al.* (2004).

Genus *Platypeza*

Platypeza aterrima Walker, 1836

Ta: Lammi biological station (6771:255), 11.09.2004, handnetted, on leaves of *Rubus idaeus*, G. Ståhls leg. 1 male, 2 females, new provincial record; *Ta*: Hämeenlinna, Aulangon puistometsä (6768:252), 20.9.2004, handnetted, on leaves of *Rubus idaeus*. 9 females. Ibidem, 9.9.2005, handnetted on *Rhododendron* sp. 1 female.

Platypeza consobrina Zetterstedt, 1844

Ta: Hämeenlinna, Aulangon puistometsä (6768:252), ex *Armillaria borealis* collected 17.9.2003, flies emerged 3.-7.2.2004, G. Ståhls leg., 3 males and 14 females. New provincial record. Hyvärinen & Winqvist reported this species as new to Finland (one female from *Ab*: Turku) in 2003 (http://www.iki.fi/kahanpaa/diptera/list/, 24.5.2006). The only confirmed fungus host is *Armillaria mellea* sensu lato (Chandler 2001 and references therein). The final stage larva was described in Rotheray *et al.* (2004).

Platypeza fasciata Meigen, 1804

Ta: Hämeenlinna, Aulangon puistometsä (6768:252), ex *Armillaria borealis* collected 17.9.2003, flies emerged 3.-7.2.2004, G. Ståhls leg. 2 male, 5 females; *Ta*: Lammi biological station (6771:255), 11.09.2004, handnetted, on leaves of *Rubus idaeus*. G. Ståhls leg., 1 female.

Platypeza hirticeps Verrall, 1901

New to Finland: *Ta*: Lammi biological station (6771:255), 11.09.2004, handnetted on leaves of *Rubus idaeus*, G. Ståhls leg. 1 male; *Ta*: Hämeenlinna, Aulangon puistometsä (6768:252), 20.9.2004, handnetted, on leaves of *Rubus idaeus*. G. Ståhls leg.; Ibidem, 9.9.2005, handnetted, on leaves of *Rhododendron* sp., 2 females. This is the first record of this species visiting leaves of *Rubus idaeus*.

Genus *Seri*

Seri obscuripennis Oldenberg, 1916

Ab: Karjalohja, Karkalinniemi (6685:332), 26.7.-23.8.2004, malaise trap, J. Jakovlev leg. 1 female. Earlier records of this species comprise one male specimen in MZH labelled ”Lojo”, ”R. Frey”, “P. J. Chandler det”, and one male from *Kb*: Joensuu, Liperi, Liperinsalo, 23-24.VII.1976, O. Martin (ZMUC). This taxon is very rarely encountered in Scandinavia.

This species has been bred from *Polyporus durus* (Timmerm.) Kriesel (=*P. badius*) in England (Webb 2004). The final stage larva was described in Rotheray *et al.* (2004).

Opetiidae

Opetia nigra Meigen, 1830

N: Mäntsälän Mustametsä (6724:398), 19.8.2003, sweep-netted from low vegetation among spruce (*Picea abies*) trunks in various but mostly late stages of decay, J. Kahanpää leg. 1 female; *Ta*: Padasjoki, Vesijako Nature Reserve (67944:3964), eclector trap, 28.7.-27.9.2005, J. Jakovlev leg., 1 male. Eclector trap placed over a strongly decayed (brown-rot) and softened piece of trunk of spruce (*Picea abies*) that was covered with moss. Until now the single reported rearing of *Opetia nigra* was from rotten birch (Speight *et al.* 1990). It has been reported from emergence traps on open grounds away from trees (Chandler 2001 and references therein) but the early stages remain unknown.

Discussion

Hand netting seems to be the most efficient way of catching Platypezidae, based on the findings of present study, agreeing with conclusion in Qvick (1986). Only *Callomyia amoena* (multiple specimens) and *Seri obscuripennis* (one specimen) were obtained from malaise traps. Eclector traps were only used during 2005, but showed great promise.

The platypezid specimens recorded in this paper were handnetted on leaves of *Corylus avellana* L. (Betulaceae), *Rhododendron* sp. (Ericaceae), *Rubus idaeus* L. (Rosaceae) and *Lonicera xylosteum* L. (Caprifoliaceae). While the three first mentioned plants are repeatedly reported as collecting sites for platypezids, *Lonicera xylosteum* was not listed as a plant visited by Platypezidae by Chandler (2001) or Qvick (1986). Qvick (1986) listed *Quercus robur*, *Rubus idaeus* and *Corylus avellana* as the most frequent plants from which Platypezidae were collected in Sweden. In the present survey *Rubus idaeus* and *Corylus avellana* were the most frequently visited plants, while no findings were made from *Quercus robur* although consistently looked for.

Qvick (1986) provided data on the phenology of Swedish platypezids based on observations during a three-year period. The occurrences of platypezids reported for in the present paper do not deviate from the patterns of occurrences outlined in Qvick's paper, except that there are no findings of Platypezidae from mid October onwards in Finland.

Recordings of *Agathomyia unicolor* and A. *lundbecki* as new to Finland could be expected, as they were previously known from Denmark, Norway and Sweden. *A. vernalis*, on the other hand, was not previously recorded from Fennoscandia. Previous records of *A. zetterstedti* from Scandinavia comprise only two provinces in Sweden (GS and UP). No records of *A. viduella* (Zetterstedt) were obtained for the present study, but this is explained with scarce collecting during the flight period for this species (June-July). Chandler (1991) described the species as widespread and frequent throughout Scandinavia. This taxon is known from provinces *Al*, *Ab*, *N*, *Sa*, *Om* and *Ks*. Neither was *A. elegantula* recorded during this study, earlier recorded from *Ab*, *N*, *Sb*, *Ob*, *Ks* and *LkW*.

The repeated rearing of *Platypezina conneza* from strongly decayed spruce indicates that this is the larval habitat. Further studies will concentrate on repeating this finding and looking for larvae. Results of rearings of the fungus *Armillaria borealis* (by GS) in the present paper produced *Platypeza consobrina* and *P. fasciata* from the same fungal specimen. No other *Platypeza* species were obtained by rearing, although it is hypothesized that *Armillaria* spp. could be the host fungus for all or most *Platypeza* spp. Larvae tentatively identified as *Protoclythia modesta* (Zetterstedt, 1844) were observed in *Armillaria borealis* collected in Ta: Hämeenlinna, Aulangon puistometsä, but could not be reared for confirmation. *Platypeza hirticeps* recorded as new to Finland in the present study, was previously known from

Sweden and Norway, but the species appears scarce throughout its distribution. Females of *P. hirticeps* are hard or impossible to separate from females of *P. aterrima*.

Platypezidae are generally not frequent, the exception being *Callomyia amoena* and *C. speciosa*. Most Platypezidae are strongly dependent on standing or fallen fungal infested and/or decaying trees and stumps. Potential threats to scarce or threatened flat-footed flies of Great Britain listed by Falk & Chandler (2005) include loss of woodland to agriculture or intensive forestry, and the removal of dead wood and old or diseased trees, which may support suitable fungi.

Chandler (2001) covered 21 (the listed number was 20, but *Protoclythia modesta* was excluded by accident) species of Platypezidae for Finland, the present number of species is 28. The greatest numbers of species are found in the south of Finland, 17 species in provinces *Ab* and *N*, and 16 in *Ta*.

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