

## Recent changes to the Finnish Hymenoptera checklist with respect to subtribes Hemitelina and Gelina (Ichneumonidae: Phygadeuontinae s. str.)

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Kokoelmanäytteitä 1900-luvun alusta aina nykypäivään saakka tutkittiin, mikä mahdollisti 102 aiemmin arvioimattoman lajin tarkastelun Suomen lajiston v. 2019 uhanalaisuusarvioinnissa. Työn yhtenä tuloksena päivitettiin Suomen lajiluettelo: lisättiin 16 lajia ja poistettiin 8 lajia. Kyseiset muutokset käsitellään tässä.

Collection specimens of Hemitelina and Gelina (Hymenoptera: Ichneumonidae) from the early 20th century to the present were examined, providing the foundation for conservation status assessment of 102 previously unassessed species in The 2019 Red List of Finnish Species. Another outcome was the addition of 16 species to the Finnish checklist, while eight species were removed. The changes are presented and discussed here.

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### Background

As a result of the project “Kätköpistiäisten uhanalaisuuden arviointi v. 2020: taksonomisen kattavuuden parantaminen” 2015–2017 (“The 2020 conservation status assessment of Hymenoptera Parasitica: improvement of taxonomic coverage”), funded by the Research Programme of Deficiently Known and Threatened Forest Species PUTTE (see Juslén et al. 2008), the number of hymenopteran species in the Finnish checklist increased by 469 (8.4%), despite multiple simultaneous deletions (Várkonyi 2018). The 2019 Red List of Finnish Species included 395 parasitoid wasp species (Várkonyi et al. 2019). 102 of these belonged to Hemitelina and Gelina, taxa that had not previously been assessed.

In this study the traditional taxonomic groupings Hemitelina and Gelina, as subtribes of Phygadeuontini (Ichneumonidae: Cryptinae; following Townes 1969), were used. It should be noted that Santos’ (2017) comprehensive phylogenetic study of tribe Cryptini caused refreshing upheaval of the entire Cryptinae taxonomy. Phygadeuontini, albeit polyphyletic in the current sense, was elevated to subfamily status, and on lower taxonomic levels quite a few delimitations will be subject to change, among them that of the apparently polyphyletic Hemitelina.

Phygadeuontinae is one of the dominant groups of Ichneumonidae in temperate regions (van Baarlen et al. 1996). Presently, the group is known to comprise close to 400 species in Finland (Paukkunen et al. 2020). The species are idiobiont ectoparasitoids of a diverse range of hosts in weak cocoons, often made from silk. Most hosts are insects in their (pre)pupal stage, but in branches of both Hemitelina and Gelina host switches to arachnid egg sacs have occurred (Townes 1969: 2, Goulet & Huber 1993: 439, Schwarz 1995, 1998).

### Material and methods

In order to provide data for the regional conservation status assessment (according to the IUCN criteria) of Finnish Hemitelina and Gelina, more than 3000 specimens from the Finnish Museum of Natural History of Helsinki University (MZH), the research collections of Reijo Jussila (RJ) and I. Österblad (IÖ) were examined. Additional voucher specimens mentioned in this paper were obtained from the collections of Niclas R. Fritzén (NRF), Gergely Várkonyi (GV) and Veli Vikberg (VV).

This work has continued after the completion of the 2019 Red List, therefore the conservation status of some of the added species has not been assessed. Conservation status assessment was performed, and the IUCN categories applied, as a team work with Gergely Várkonyi. The Red List categories read as follows: Regionally Extinct (RE), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD); for criteria see Hyvärinen et al. (2019).

The specimens treated here were identified by the present author in 2017–2020 unless otherwise stated; using the keys and further descriptions by Čapek (1956), Horstmann (1973, 1976, 1980, 1986, 1991, 1993, 2010), Sawoniewicz (1978) and Schwarz (1994, 1998, 2001, 2002, 2016), Yoshida & Konishi (2008), and in some cases reference specimens identified by some of these authors.

Information on distribution was gathered from the above-mentioned works, Schwarz & Shaw (1999, 2000) and Fauna Europaea ([fauna-eu.org](http://fauna-eu.org)).

## Changes to the checklist

As a result of this study, the following changes were made to the Finnish checklist (label data slightly edited for consistency):

### Additions

#### Gelina

##### *Dichrogaster crassicornis* Horstmann, 1976

13 ♀♀: *N*: Helsinki, late July–early September 1966–1970,

V. J. Karvonen leg. (MZH)

1 ♀: *N*: Helsinki, 8.VIII.1978, O. Ranin leg. (MZH)

The specimens were previously determined as *D. heteropus* (Thomson, 1896). *Dichrogaster crassicornis* was synonymised with *D. heteropus* by Townes (1983) but removed from synonymy by Horstmann (1992). These Finnish specimens show variation in diagnostic characters, with some specimens firmly placed within the range of *D. crassicornis* (following Horstmann's key and compared to the *D. heteropus* lectotype which I have examined in Lund) and others more or less creating a continuum into *D. heteropus*. The males of *D. heteropus* are conspicuous, while the appearance of the *D. crassicornis* male has, to my knowledge, remained unknown. The status of the species should be subjected to further scrutiny. Other *Dichrogaster* species are known to parasitise *Chrysopa* cocoons. *Dichrogaster crassicornis* has previously been reported from Austria and Belarus. Red List category: EN.

##### *Gelis avarus* (Förster, 1850)

1 ♀: *Ab*: Nystad, Hellén leg. (white label, italic type, 2271, '2' by hand, '1' slightly offset) (MZH)

Females apterous, putative males macropterous. Known hosts are *Coleophora* spp. (Coleophoridae). The species occurs in open and mostly boggy habitats and has a Holarctic distribution. Red List category: CR.

##### *Gelis caudatulus* Horstmann, 1997

(= *G. caudator* Horstmann, 1993 praeocc.)

1 ♀: *Al*: Lemland, wgs84 59.9° N, 20.1° E, 11.VII.2004, dry meadow, N. R. Fritzén leg., M. Schwarz det. (NRF)

1 ♀: *Kb*: Lieksa, wgs84 63°10' N, 30°40' E, 17–20.VI.2013, window trap ("22. Open W."), Antonio Rodriguez leg. (GV)

Females brachypterous, males unknown. This rarely collected species is easily recognised by its stumped wings and long ovipositor (sheaths 1,7 × hind tibia length). It has been reported also from Italy, Austria, Switzerland, Germany, Poland and the UK. Red List category: DD.

##### *Gelis cayennator* (Thunberg, 1824)

1 ♀: *V*: Mynämäki, Karjala, Kalela, 675:323, 5.IX.1976, R.



**Figure 1.** *Gelis orbiculatus* (Gravenhorst) female. Photographed by Pekka Malinen.

Jussila leg. (pale red label, large type, line through, 757) (RJ)

1 ♀: *Ta*: Somero, Häntälä, 6742:3301, 5.VIII–7.IX.2000, A. Haarto & V.-M. Mukkala leg. (RJ)

1 ♀: *N*: Hanko, Tvärminne Zoological Station, wgs84 59.844° N, 23.44° E, 21.VII.2007, indoors, I. Österblad leg. (IÖ)

A macropterous species which occurs in the Palearctic, at least from Turkey through Central Europe to the UK and Sweden. Conservation status not yet assessed.

##### *Gelis curvicauda* Horstmann, 1993

2 ♀♀: *Ta*: Somero, Häntälä, 6744:3301, 13.VI–5.VIII.2000, A. Haarto & V.-M. Mukkala leg., RJ & IÖ det. (RJ)

Females brachypterous, males unknown. The species has been found in open habitats with meadow vegetation. It has been recorded in Italy, Austria, Germany, the UK and Sweden. Red List category: EN.

##### *Gelis declivis* (Förster, 1850)

1 ♀: *N*: Hanko, 664:327, 7.VIII.1976, E. Valkeila leg. (MZH)

1 ♀: *Ta*: Janakkala, Kalpalinna, 6756:3369, 7.IX.2017, V. Vikberg leg. (VV)

The MZH specimen had previously been determined as *G. fal-lax* (Förster).

Females apterous, males unknown. *G. declivis* is presumably



**Figure 2.** *Gelis shawi* Schwarz female, lateral view. Photographed by Pekka Malinen.

closely related to *G. festinans* (Fabricius, 1798), which develops in spider egg sacs. Distribution: Southern and Central Europe and also Sweden. Red List category: EN.

***Gelis falcatus* Horstmann, 1986**

1♀: *Li*: Utsjoki, Kevo, 774:350, 24–30.VII.1980, S. Koponen & E. T. Linnaluoto leg. (RJ)

The specimen was previously determined as *G. elymi* (Thomson, 1884).

Schwarz & Shaw (1999) wrote: “The four known specimens of this species are all macropterous females and all were collected in Scotland”, and suggested the possibility that the species may be a northern form of *G. longicauda* (Thomson, 1884), an opinion which Schwarz (2016) maintains while still, in absence of hard evidence, treating it as a separate species. Red List category: DD.

***Gelis forticornis* (Förster, 1850)**

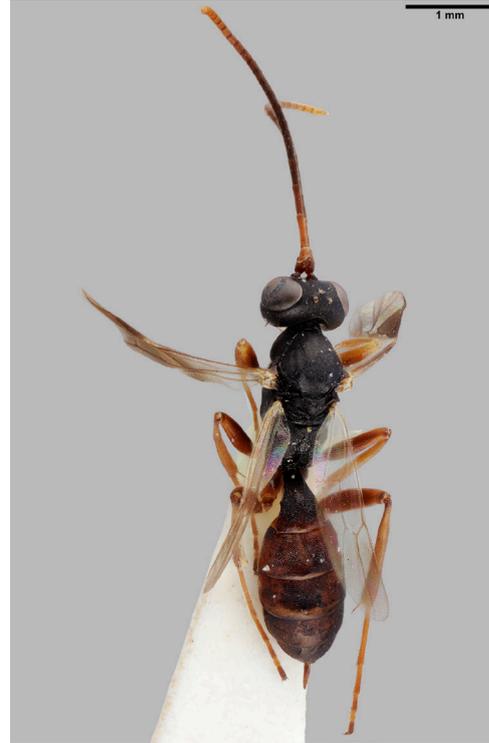
1♀: *N*: Nurmijärvi, 6715:3373, 17.VII.1981, M. Koponen leg. (MZH)

***Gelis cf. forticornis***

1♀: *Ab*: Nystad, Hellén leg. (grey label, italic type, black underline, 428) (MZH)

1♀: *Sa*: Joutseno, Rutanen, 6772382:3592421, 3–31.VIII.2013, Jussi Vilén leg. (“KOPÖ WT JV I.”) (GV)

The Nystad specimen was previously determined as *G. rufipes* (Förster). A morphologically variable species. Schwarz (1998) noted that the species delimitation may incorporate several species and furthermore that some specimens are very difficult to discern from either *G. heidenreichi* Habermehl, 1930 or *G. pilosulus* (Thomson, 1884). In this case, the possible confusion would be with *G. pilosulus*. Females are apterous, males unknown. Known hosts are *Cryptocephalus moraei* (Chrysomelidae) and *Bracon terebella* (Braconidae) (in the latter case the primary host was *Cephus pygmeus* (Cephidae)). The species seems to prefer open habitats. It is distributed throughout Europe, including Sweden. Red List category: VU.



**Figure 3.** *Gelis shawi* Schwarz female, dorsal view. Photographed by Pekka Malinen.

***Gelis leptogaster* (Förster, 1850)**

2♀♀: *N*: Hangö, Hellén leg. (white labels numbered 281 and 2735 respectively) (MZH)

The specimens were previously determined as *G. micrurus* (Förster, 1850). The MZH collection contains two additional female specimens collected by Hellén on Tytärsaari (now Russian territory) in the Gulf of Finland. Females apterous, males unknown. The species is very similar and presumably closely related to *G. festinans*, which develops in spider egg sacs. Known from Central Europe, Central European Russia, Sweden, Eastern Palearctic. Red List category: EN.

***Gelis obscuripes* Horstmann, 1986**

1♀: *Ab*: Turku, Paattinen, 672:324, 3.IX.1987, R. Jussila leg. (white label, 7518) (RJ)

The specimen was previously determined as *G. gibbifrons* (Thomson, 1884). Macropterous species. Known hosts: one female reared from *Coleophora lineariella*. Previously reported from the UK, Germany, Austria and Italy. Red List category: DD.

***Gelis orbiculatus* (Gravenhorst, 1829)**

1♀: *Kl*: Parikkala, Hellén leg. (yellow label, 8382, '8' by hand; "var orbiculatus Grav") Determined by ?Hellén, IÖ conf. (MZH)

1♀: *Ab*: Sauvo, Karuna, 6693:[3]256, 18–28.VII.1999, R. Jussila leg. (pale green label, 2028) (RJ)

The species was removed from synonymy with *Gelis areator* (Panzer, 1804) by Schwarz (2016) and is a re-introduction to



**Figure 4.** *Gelis meuseli* (Lange) female, lateral view. Photographed by Pekka Malinen.

the Finnish checklist. The examined MZH specimen (fig. 1) was, however, encountered in the *G. cinctus* (Linnaeus, 1758) unit box. The RJ specimen was previously determined as *G. ornatulus* (Thomson, 1884). Macropterous species. *Gelis orbiculatus* is known to occur also in Poland, the Czech Republic and Austria. Red List category: VU.

#### ***Gelis shawi* Schwarz, 2016**

1♀: *St*: Merikarvia, 6860:3221, 26.VI.1978, M. Koponen leg., M. Schwarz det. (MZH)

The specimen was identified from P. Malinen's photographs by Dr Schwarz and subsequently double-checked by the present author for characters not visible in the photographs. *Gelis shawi* (figs 2–3) resembles *G. balteatus* (Thomson, 1885) and *G. rugifer* (Thomson, 1884), but its ovipositor is straight rather than curved downwards at the node. Up until this specimen was identified, the holotype was the sole known representative of the species. The type specimen was collected in northern Sweden (Vb: Romelsön) in 2003. Both specimens were thus collected on the coast of the Gulf of Bothnia, although the Finnish one at some distance from the shore. According to field notes it was swept in a forest habitat with *Picea abies* and *Pinus sylvestris*, as well as *Rubus arcticus* in blossom, some with unripe fruit (M. Koponen, pers. comm.). Schwarz named the species for Mark R. Shaw, who has greatly contributed to the knowledge of parasitoid wasps and their natural history. Conservation status not yet assessed.

#### ***Gelis zeirapherator* (Aubert, 1966)**

1♀: *Li*: Utsjoki, Kevo, wgs84 69°46' N, 26°56' E, 9.VI–17.IX.1971, paljakka (alpine heath), pitfall traps, elev. ~320 m, S. Koponen leg. (RJ)

2♀♀: *Le*: Enontekiö, Anjaloojani, 7686:3279, 11–16.VII.2007, A. Haarto leg. (RJ)

2♀♀: *Le*: Enontekiö, Urttasvárri, 7692:3264, 9–15.VII.2009, A. Haarto leg. (RJ)

The specimens were previously determined as *G. melanogaster* (Thomson). Schwarz (2016) noted that the lectotype of *G. elymi* (image accessible on flickr.com; Biological Museum, Lund University: Entomology: Hemiteles elymi Thomson, 1884.



**Figure 5.** *Gelis meuseli* (Lange) female, dorsal view. Photographed by Pekka Malinen.

Lectotype 5020:1) is very similar to the holotype of *G. zeirapherator*. They differ slightly in colouration, frons hair length, the proportions of the first flagellomere and the proportions of the area supermedia. Because of the sparse available material, it is uncertain whether these differences represent variation within a single species. Furthermore, Schwarz remarked that the colour character is a weak one. Pale colouration, as in the Swedish *G. elymi* type specimen compared to Aubert's Austrian *G. zeirapherator* type, is typical of Scandinavian individuals compared to conspecifics from the Alps. However, Schwarz decided to continue treating the pair as separate species until further Scandinavian material can be examined. Interestingly, the characters of these Finnish specimens are consistent with the characters given for *G. zeirapherator* in Schwarz (2016) – with the possible exception of frons hair length which cannot be evaluated in the absence of given measures; moreover, the hairs of the *G. elymi* type is assumed to have suffered some abrasion; and I have not seen the *G. zeirapherator* type. The Finnish specimens also differ from the *G. elymi* lectotype in their mesopleura being granulated and matt rather than striate and partly polished; there is also somewhat more extensive granulation on pronotum and tergites. *G. zeirapherator* has been reported from Austria, Switzerland and the UK (Scotland). Conservation status not yet assessed.

#### ***Thaumatogelis aloiosa* Schwarz, 2001**

1♀: *N*: Esbo, Hellén leg. (white label, italic type, 262, “hortensis Grav”, “hortensis (Grav.) Schmied”) (MZH)

Previously determined as *Gelis hortensis* (Christ, 1791). Females apterous, males unknown. Hosts also unknown but all *Thaumatogelis* species for which hosts are known develop in spider egg sacs. As for habitat, Schwarz collected one speci-

men in a dry meadow pasture. The species was previously known only from Austria. Very few specimens have been collected. Red List category: CR.

### Hemitelina

#### *Aclastus pilosus* Horstmann, 1980

Numerous specimens from the southern half of Finland (*Al*, *Ab*, *N*, *Sb*, *St*), the oldest ones collected by Hellén and a good few from year 2000 onwards (RJ, MZH) The specimens had previously been identified as various other *Aclastus* species. The pilosity of the metasomal tergites sets the species apart from most other representatives of the genus. Only *A. transversalis* Horstmann, 1980 and *A. micator* (Gravenhorst, 1829) are similar in this respect. The former can be discerned by a few characters, such as the area superomedia being wider than long. The latter presents more of a challenge, and especially males cannot always be confidently assigned one species epithet. *Aclastus* larvae develop in spider egg sacs. Known to occur in Central and Northern Europe, including Sweden. Conservation status: LC.

#### *Xiphulcus szujeckii* Sawoniewicz, 1978

1♂: *Li*: Inari, Lemmenjoki, Morgam Vibus, 761:345, 2.VII.1937, Hellén leg. (white label, 8683, first '8' by hand) (habitat description in field notebook: "fjäll ovan trädgränsen", i.e. above the tree line of a fell) (RJ)  
3♀, 7♂♂: *Kb*: Lieksa, wgs84 63°10' N, 30°40' E, window traps during May–August in 2013 and 2014, Antonio Rodriguez leg. IÖ & GV det. (GV)

The specimen collected by Hellén was previously labelled as *X. floricator* (Gravenhorst, 1807). An additional male from Lieksa is currently labelled *Xiphulcus floricator/szujekii* due to ambiguous characters. Females of these two species are more easily told apart than are males. The species was previously known only from Poland. Red List category: NT.

### Erroneous and doubtful records

*Gelis elymi* (Thomson, 1884) was represented by male specimens only. Thus, species identity could not be confirmed, but the species remains in the checklist for the time being (see also discussion on *G. zeirapherator*, above).

*Gelis brevicauda* (Thomson, 1884), *Gelis edentatus* (Förster, 1850), *Gelis intermedius* (Förster, 1850), *Gelis rubricollis* (Thomson, 1884), *Gelis rufipes* (Förster, 1850) and *Thaumatogelis lichtensteini* (Pfankuch, 1913) were removed from the checklist since no voucher specimens could be found.

*Gelis alpivagus* (Strobl, 1901) and *Gelis limbatus* (Gravenhorst, 1829) were removed due to being listed as nomina dubia by Schwarz (1995). The collections provided no compelling arguments for these taxa.

### Other noteworthy specimens

#### *Gelis meuseli* (Lange, 1911)

1♀: *N*: Hangö, Tvärminne, year 1923, A. Wegelius leg. (turquoise label, 675, red underline, text facing down; "Rhadiurginus?" "sp. ?") (MZH)

1♀: *St*: Yläne, 676:325, 9.VIII.1977, R. Jussila leg. (RJ)

1♀: *St*: Pori, Yyteri, 6839–6840:3209, 4.VI.1995, V.-M. Mukkala leg. (RJ)

The note "Rhadiurginus sp.?" on a label of the MZH specimen (figs 4–5) was arguably written by W. Hellén, from whose collection it originates. Hellén (1967) transferred several *Gelis* species to a new genus, *Rhadiurginus*. Under the new combination *R. plumbeus* (Thomson) Hellén mentioned at least six Finnish specimens: "Ab: Runsalä, Nystad, Dragsfjärd. N: Hangö (M. H., Hellén), Tvärminne (Nordman). Tb: Keuruu." At least one of these has been studied by Horstmann, who subsequently synonymised Hellén's *R. plumbeus* forma brachyptera with *G. meuseli*, which was added to the Finnish checklist (Horstmann 1993, Silfverberg 1996). None of these specimens were found during the present examination. The encountered MZH specimen was found in the *G. gibbifrons* unit box. Females macropterous or brachypterous, males and hosts unknown. Few specimens collected throughout its known area of distribution, Finland and Croatia. Hellén also mentioned Sweden but that statement is unverified. Red List category: VU.

#### *Polyaulon stiavnicensis* (Čapek, 1956)

1♀: *Ab*: Karislojo, J. Sahlberg leg. (blue label, 1001) (MZH)

The species was first reported from Finland based on a female collected in Hanko 1980 (Koponen et al. 1999). During the present study this second specimen turned up, labelled as *Thaumatogelis lichtensteini* (Pfankuch, 1913). Known to occur also in Central European Russia, Poland, Slovakia and the UK. Red List category: EN.

### Discussion

A substantial part of the studied collection specimens turned out to be misidentified. If this is the case also in other collections, occurrence data – particularly abundance data – for the concerned species may be skewed. Similar implications for reported host connections exist, but Schwarz (1998) recognised the problem and has taken care to list only reliable host data rather than repeating flawed lists. Species determination of representatives of this group is notoriously tricky because of substantial morphologic variation within species and, on the other hand, in some cases only subtle differences between species. Also, before the impressive work on *Gelis/Thaumatogelis* by Schwarz (1993, 1995, 1998, 2001, 2002, 2009, 2016), determination keys were quite incomplete, and even Schwarz' keys

are best used after getting acquainted with the reference collection at Biologiezentrum Linz. To some extent this applies also to the other genera concerned: studying types or reliable reference specimens is often crucial. The technical development which facilitates publication of high-quality photographic images, be it on paper or web sites, greatly improves premises.

Some species have apparently caused more trouble than others. Notably, the common species *Gelis spurius* (Förster, 1850) seemed to not be represented in the MZH collection at all – until several specimens were found among *G. acarorum* (Linnaeus, 1758) and *G. agilis* (Fabricius, 1775), as well as in previously undetermined material.

Specimens belonging to the *G. bicolor* species complex are, quite understandably, often confused with other species within the complex, but sometimes also with species not belonging to this species complex. It is therefore not particularly surprising that the occurrences of two common species, *Gelis bicolor* (Villers, 1789) and *Gelis discedens* (Förster, 1850), were not published until 1999 (Koponen *et al.*).

When the majority of the 118 specimens labelled as *G. mutilatus* (Gmelin, 1790) (MZH, RJ) had been redetermined, most of them as *G. discedens* (97 exx.), only two specimens of *G. mutillatus* remained; both collected by Hellén in the early 20th century in the very southeast of Finland (*Kl*: Parikkala). The species was subsequently classified as Critically Endangered.

The ranks of *G. acarorum* were reinforced with specimens of *G. rufogaster* Thunberg, 1827, *G. hortensis*, *G. spurius*, *G. trux* (Förster, 1850) and *G. viduus* (Förster, 1850). As a result of the present examination, *G. acarorum* numbers dropped from 105 specimens to 19 and, while it can still be considered a fairly common species, it is no longer one of the most numerous in the collections.

Other typical confusions were *G. longicauda* mistaken for *G. cinctus*, *G. proximus* (Förster, 1850) mistaken for *G. venatorius* (Förster, 1850), and *Aclastus micator* and *A. pilosus* mistaken for *A. gracilis* (Thomson, 1884).

In sum, 16 species were added to the Finnish checklist while eight were removed. The genera representing *Gelina* and *Hemitelina* in Finland are shown in Table 1. Most of the species added to the checklist were subsequently red-listed, most often according to criterion B2ab(ii,iii), i.e. considered threatened due to a severely fragmented area of occupancy or to occurrence at a very low number of locations, and furthermore a continuing decline in area of occupancy or extent and/or quality of habitat can be inferred.

The results of this work accentuate the value of re-examining collections and identifying previously undetermined museum specimens. It is an efficient way of gathering information

**Table 1.** The genera of *Gelina* and *Hemitelina* (sensu Townes) occurring in Finland, and the number of species within each.

<b>Gelina</b>		<b>Hemitelina</b>	
<i>Agasthenes</i>	2	<i>Aclastus</i>	11
<i>Blapsidotes</i>	1	<i>Arotrepes</i>	6
<i>Dichrogaster</i>	9	<i>Gnyptomorpha</i>	1
<i>Gelis</i>	57	<i>Hemiteles</i>	4
<i>Thaumatogetelis</i>	5	<i>Obisiphaga</i>	1
<i>Xenolytus</i>	1	<i>Pleurogyrus</i>	2
		<i>Polyaulon</i>	2
		<i>Xiphulcus</i>	3

which, together with more recent data, benefits the interpretation of the current situation for the species concerned.

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