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Diplura of Belgium

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Abstract

A checklist of the Diplura occurring in Belgium is presented and the existing literature about the Belgian fauna is discussed. Thirteen species were found of which five are new to the Belgian fauna: *Campodea meinerti*, *C. plusiochaeta*, *C. remyi*, *C. rhopalota* and *C. wallacei*. An identification key to the Belgian Diplura was developed, which also includes several species that might be expected in Belgium.

Keywords : checklist, identification key, Belgian fauna, diversity.

Samenvatting

Een soortenlijst van de Belgische Diplura wordt voorgesteld en de literatuur over de Belgische fauna wordt bediscussieerd. Dertien soorten werden gevonden waarvan vijf nieuw zijn voor de Belgische fauna: *Campodea meinerti*, *C. plusiochaeta*, *C. remyi*, *C. rhopalota* en *C. wallacei*. Een determinatie-sleutel voor de Belgische Diplura werd opgesteld waarin ook verschillende soorten werden opgenomen die kunnen verwacht worden in België.

Résumé

Une liste des espèces belges de Diplura est présentée et la littérature sur la faune belge est discutée. Treize espèces ont été trouvées dont cinq sont nouvelles pour la faune belge : *Campodea meinerti*, *C. plusiochaeta*, *C. remyi*, *C. rhopalota* et *C. wallacei*. Une clé pour les Diplura belges est donnée dans laquelle nous tenons compte aussi des espèces suspectées de Belgique.

Introduction

Diplura is an order of wingless, blind arthropods belonging to the class of the Entognatha. The habitus of a representative of the genus *Campodea* is presented in Fig. 1. Most Diplura are inhabitants of damp, stable environments and can be found under stones on humid soil, in degrading lodges, in forest litter and in humid soils. Due to their small size, their subterranean lifestyle and the difficulty of their identification, they did not receive much

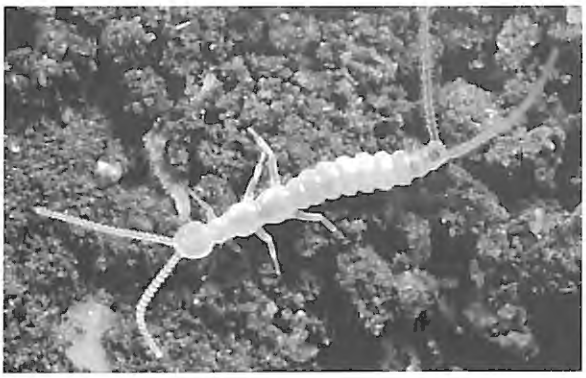

Figure 1. Habitus of *Campodea* species.

attention in Belgium and only a few scattered records were published by foreign specialists. In the present paper, the literature dealing with Diplura in Belgium is reviewed and the results are presented from the study of all available material encountered in collections and especially during recent field trips. A checklist of the Belgian Diplura is presented, the literature dealing with the Belgian fauna is discussed and an identification key is presented.

Material and methods

The material from the collection of the Royal Belgian Institute of Natural Sciences was studied and some specimens were kindly provided by Michel DETHIER. However, most of the studied Diplura were recently collected during field trips all over Belgium (2004-2008). Animals were sampled by turning stones and subsequently catching them with an aspirator, after which specimens were conserved in 70% alcohol until preparation. After the preparation of microscopic slides using Hoyer solution, animals were identified to species level.

Results

Campodeidae

LAMEERE (1895) cited only one species of Diplura in his Fauna of Belgium: *Campodea staphylinus*. At that time, however, all species of *Campodea* were called either *C. staphylinus* or *C. fragilis*. LAMEERE (1935) himself already indicated that different species were probably confounded under the name *C. staphylinus*. GEYSKENS (1945) also reported only *C. staphylinus* from Belgium. In the caves of Goyet (Mozet), COLLART found two specimens of Diplura, which were identified as *C. giardi* by DENIS (1937), despite not all characteristics were conform to the description. LERUTH (1939) mentioned this capture in his work on the Belgian cave fauna. CONDÉ (1947) reported that these records of *C. giardi* actually belonged to *C. lankesteri*. LELEUP (1948a), DELHEZ *et al.* (1999) and DETHIER (1998), ignorant of this correction, still mentioned *C. giardi* from Mozet. Besides *C. lankesteri*, LELEUP (1948 a,b) also reported *C. fragilis* from Belgium. From the caves of Ramioul (Flémalle), HUBART (1982) reported *Litocampa humilis*. DETHIER (1998), BARETH (1999) and DELHEZ *et al.* (1999) mentioned this observation. Also from the caves of Ramioul (Flémalle), BARETH (2000) reported three species: *C. lankesteri*, *L. humilis* and *C. lubbocki*. DETHIER and HUBART found a new species in the caves of Lyell (Engis), which was recently described by BARETH (1999) under the name *Litocampa hubarti*. This observation was mentioned by BARETH (2000) and DETHIER & HUBART (2000). BARETH (2007) and DETHIER (2007) also reported *C. lubbocki* from a cave in Lanaye. During the present study, the occurrence of *C. staphylinus* in Belgium could be confirmed. In addition, *C. meinerti*, *C. plusiochaeta*, *C. remyi*, *C. rhopalota* and *C. wallacei* could be added to the Belgian fauna.

Japygidae

LAMEERE (1908) reported the observation *Japyx solifugus* from Beez by BONDROIT. BONDROIT (1909) mentioned the capture of several additional specimens of *Japyx solifugus* from Beez. BONDROIT (1911) reported *Japyx solifugus* from different localities (Beez, Samson, Yvoir) in the valley of the Meuse. LELEUP (1947) also reported this species in Nismes. However, due to the reported big size, SILVESTRI (1948) concluded that all these records probably belonged to the species *Dipljapyx humberti* instead of *J. solifugus*. In Hermalle-sous-Argenteau, LERUTH sampled two specimens of a new species, which was described by SILVESTRI (1948) under the name *Metajapyx leruthi*. SILVESTRI (1948) also mentioned *D. humberti*, collected by LELEUP from Nismes. During the present study, *D. humberti* was also found on a railway in Oignies. The latter species has so far only been found in the valley of the Meuse, while *M. leruthi* was also restricted to the valley of the Meuse, but more to the north, close to the border with the Netherlands.

Identification

So far, 13 species of Diplura have been found in Belgium, a checklist is presented in Table 1. An identification key for Belgian species was developed, which also includes several species that might be expected (Annex 1).

Table 1. Checklist of the Belgian Diplura.

ORDER DIPLURA
Family Campodeidae
Campodea (Campodea) fragilis MEINERT 1865
Campodea (Campodea) lankesteri SILVESTRI 1912
Campodea (Campodea) lubbocki SILVESTRI 1912
Campodea (Campodea) meinerti BAGNALL 1918
Campodea (Campodea) plusiochaeta SILVESTRI 1912
Campodea (Campodea) remyi DENIS 1930
Campodea (Campodea) rhopalota DENIS 1930
Campodea (Campodea) staphylinus WESTWOOD 1842
Campodea (Campodea) wallacei BAGNALL 1918
Litocampa hubarti hubarti BARETH 1999
Litocampa humilis (CONDÉ 1948)
Family Japygidae
Dipljapyx humberti (GRASSI 1886)
Metajapyx leruthi SILVESTRI 1948

Discussion

In the Netherlands and in Luxembourg, Diplura have not yet been studied. Hopefully, this will change with the publication of the presented identification key. Already 16 species of Diplura were observed in Germany of which only 7 were also found in Belgium and 13 species were observed in the United Kingdom of which 7 species were also found in Belgium (FAUNA EUROPAEA, 2008). However, more than 80 species have already been reported for France, which has 12 species in common with Belgium (FAUNA EUROPAEA, 2008). These numbers indicate that some additional species might occur in Belgium, however, due to its latitude and size, probably only a few additional species can be expected.

Acknowledgements

I would like to thank Jérôme CONSTANT for his help with the collection of the Royal Belgian Institute of Natural Sciences and Michel DETHIER for sending some specimens.

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Annex 1. Identification key of the Belgian Diplura.

1 Cerci with one segment, forcipiform (Fig. 1). Body length always exceeding 4 mm (Japygidae) 2
- Cerci multisegmented, filiform (Fig. 2). Body length never exceeding 6 mm (Campodeidae) 3

2 Right cercus strongly denticulated (Fig. 3). Antennae with 30-32 articles. Body length 4.5-11.5 mm. ..... ***Dipljapyx humberti***
- Right cercus only moderately denticulated (Fig. 4). Antennae with 28 articles. Body length 4-5.5 mm. ..... ***Metajapyx leruthi***

3 Claws striated (Fig. 5). Restricted to caves (*Litocampa*) 4
- Claws not striated (Fig. 6). Not restricted to caves (*Campodea*) 5

4 Abdominal tergites 3-4 with one pair of macrosetae on posterior edge, abdominal tergites 5-7 with two pairs of macrosetae on posterior edge (chaetotaxy of tergites explained in Fig. 7) ..... ***Litocampa hubarti***
- Abdominal tergites 3-4 without macrosetae on posterior edge, abdominal tergites 5-7 with one pair of macrosetae on posterior edge (chaetotaxy of tergites explained in Fig. 7) ..... ***Litocampa humilis***

5 Mesonotum without postero-lateral macrosetae (chaetotaxy of thorax explained in Fig. 7) 6
- Mesonotum with postero-lateral macrosetae (subgenus *Campodea*) (chaetotaxy of thorax explained in Fig. 7) 7

6 Mesonotum with two pairs of anteral macrosetae (subgenus *Dicampa*) ..... ***Campodea boneti***
- Mesonotum with one pair of anteral macrosetae (subgenus *Monocampa*) ..... ***Campodea denisi***

7 Abdominal tergites with antero-median macrosetae or postero-median macrosetae (chaetotaxy of tergites explained in Fig. 7) 8
- Abdominal tergites without antero-median macrosetae or postero-median macrosetae (chaetotaxy of tergites explained in Fig. 7) 13

8 Abdominal tergites with antero-median macrosetae 9
- Abdominal tergites with postero-median macrosetae ..... ***Campodea giardi***

9 Antero-median macrosetae present on tergites 1-9 10
- Antero-median macrosetae present on tergites 1-7 11

10 Setae and macrosetae relatively short and stout (Fig. 8). Antennae with up to 23 articles (attention: closely resembles *C. meinerti*, from which can be differentiated by the absence of macrosetae on cerci that are spatulately widened apically) ..... ***Campodea lubbocki***
- Setae and macrosetae relatively long and slender (Fig. 9). Antennae with up to 28 articles ..... ***Campodea lankesteri***

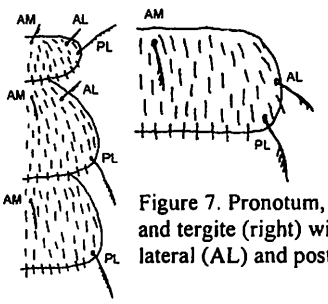

Figure 7. Pronotum, mesonotum and metanotum (left) and tergite (right) with antero-median (AM), antero-lateral (AL) and postero-lateral (PL) macrosetae.

Figure 1. Habitus Japygidae.

Figure 2. Habitus Campodeidae.

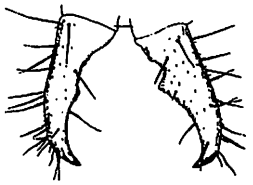

Figure 3. Cerci *Dipljapyx humberti*.

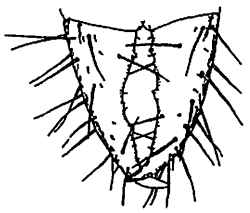

Figure 4. Cerci *Metajapyx leruthi*.

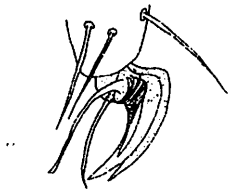

Figure 5. Claw *Litocampa*.

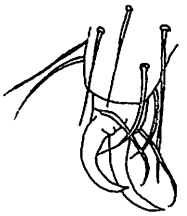

Figure 6. Claw *Campodea*.

Figure 8. Setae *Campodea lubbocki*.

11 Postero-lateral macrosetae from tergite 5 12
- Postero-lateral macrosetae from tergite 6 ..... ***Campodea basiliensis***

12 Postero-lateral macrosetae on metanotum not much longer than setae on posterior edge (attention: closely resembles *C. lubbocki*, from which it can be differentiated by the presence of macrosetae on basal segments of cerci that are partly spatulately widened apically) ..... ***Campodea meinerti***
- Postero-lateral macrosetae on metanotum three times as long as setae on posterior edge ..... ***Campodea ilixonis***

13 Metanotum without postero-lateral macrosetae 14
- Metanotum with postero-lateral macrosetae 16

14 Abdominal tergites 6-7 with antero-lateral macrosetae. Antennae with 21-30 articles. Cerci not always longer than body 15
- Abdominal tergites 6-7 without antero-lateral macrosetae. Antennae with 29-36 articles. Cerci at least as long as body ..... ***Campodea grassii***

15 Mesonotum and metanotum with antero-median macrosetae (attention: these macrosetae are only 1.5 times as long as surrounding setae, but can often be recognised because they are bifurcated). Antennae with up to 24 articles. Cerci about half as long as body ..... ***Campodea staphylinus***
- Mesonotum and metanotum without antero-median macrosetae. Antennae with up to 30 articles. Cerci about as long as body ..... ***Campodea remyi***

16 Postero-lateral macrosetae present on tergites 5-9 17
- Postero-lateral macrosetae present on tergites 6-9 19

17 Setae on posterior edge of pronotum next to postero-lateral macrosetae short and blunt (Fig. 10). Comparatively short stout setae on surface of tergites (Fig. 10) .. 18
- Setae on posterior edge of pronotum next to postero-lateral macrosetae long and pointed (Fig. 11). Long slender setae on surface of tergites (Fig. 11) ..... ***Campodea wallacei***

18 Apical setae on styli not branched near base. Small species of maximum 2.3 mm... ***Campodea gardneri***
- Apical setae on styli branched near base (Fig. 12). Bigger species of maximum 3.5 mm ..... ***Campodea plusiochaeta***

19 Distal segments of cerci with numerous short, fine setae (Fig. 13) ..... ***Campodea fragilis***
- All segments of cerci with long setae (Fig. 14) 20

20 Macrosetae on basal segments of cerci partly spatulately widened apically (Fig. 15) ..... ***Campodea rhopalota***
- All macrosetae on all segments of cerci pointed 21

21 Antero-lateral macrosetae absent on tergite 5 ..... ***Campodea augens***
- Antero-lateral macrosetae present on tergite 5 22

22 Postero-lateral macrosetae on metanotum about 4 times as long as setae on posterior edge. Antennae with 25-27 articles ..... ***Campodea silvicola***
- Postero-lateral macrosetae on metanotum maximum 3 times as long as setae on posterior edge. Antennae with less than 25 articles 23

23 Postero-lateral macrosetae on metanotum about 1.5 times as long as setae on posterior edge ..... ***Campodea westwoodi***
- Postero-lateral macrosetae on metanotum 2-3 times as long as setae on posterior edge. ..... ***Campodea silvestrii***

Figure 9. Setae *Campodea lankesteri.*

Figure 10. Pronotum (left) and setae (right) of *Campodea plusiochaeta.*

Figure 11. Pronotum (left) and setae (right) of *Campodea wallacei.*

Figure 12. Stylus of *Campodea plusiochaeta.*

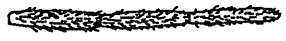

Figure 13. Distal segments of cercus of *Campodea fragilis.*

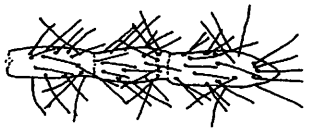

Figure 14. Distal segments of cercus of *Campodea silvicola.*

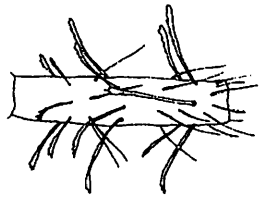

Figure 15. Segment of middle region of cercus of *Campodea rhopalota.*