

## Checklist and identification key of the Belgian snakeflies (Raphidioptera)

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### Abstract

Five species of Raphidioptera have been reported for Belgium: *Atlantoraphidia maculicollis* (Stephens 1836), *Phaeostigma (Phaeostigma) notata* (Fabricius, 1781), *Raphidia (Raphidia) ophiopsis ophiopsis* Linnaeus 1758, *Subilla confinis* (Stephens, 1836) and *Xanthostigma xanthostigma* (Schummel, 1832). In the present study, one additional species is reported for the first time in Belgium: *Inocellia crassicornis* (Schummel, 1832). A checklist of the Belgian species is given and an identification key is presented containing all the species occurring in Belgium and the adjacent regions.

**Keywords :** Belgium, *Inocellia crassicornis*, species list.

### Samenvatting

Vijf soorten Raphidioptera werden reeds gemeld voor België: *Atlantoraphidia maculicollis* (Stephens 1836), *Phaeostigma (Phaeostigma) notata* (Fabricius, 1781), *Raphidia (Raphidia) ophiopsis ophiopsis* Linnaeus, 1758, *Subilla confinis* (Stephens 1836) en *Xanthostigma xanthostigma* (Schummel, 1832). In deze studie wordt één bijkomende soort voor het eerst gemeld voor België: *Inocellia crassicornis* (Schummel, 1832). Een soortenlijst met de Belgische kameelhalsvliegen wordt gegeven en een determinatiesleutel wordt voorgesteld die alle soorten bevat die voorkomen in België en de omliggende gebieden.

### Résumé

Cinq espèces de Raphidioptères étaient déjà rapportées pour la Belgique : *Atlantoraphidia maculicollis* (Stephens, 1836), *Phaeostigma (Phaeostigma) notata* (Fabricius, 1781), *Raphidia (Raphidia) ophiopsis ophiopsis* Linnaeus, 1758, *Subilla confinis* (Stephens, 1836) et *Xanthostigma xanthostigma* (Schummel, 1832). *Inocellia crassicornis* (Schummel, 1832) est rapportée pour la première fois de Belgique. Une liste des espèces belges est donnée et une clé d'identification est présentée pour toutes les espèces de Belgique et des régions limitrophes.

### Introduction

The combination of the elongated pronotum and the presence of four membranous wings is unique amongst the Belgian insects. Female snake flies also have a long, flexible, rather 'needle-like' ovipositor arising from the end of the abdomen (the name of the group is derived from the Greek 'raphidas' = a needle, relating to this ovipositor). Snake-flies have a length of 10 to 20 mm. The larvae are predators that live in litter amongst roots or under the bark of trees. Their development takes about two or three years and involves about 10 larval stages. Adults are

mainly found from May till July and are only active during the day and found on the sunny side of conifers, oaks and fruit trees. Worldwide, about 200 species have been described.

In Belgium, Raphidioptera have hardly been studied. The aim of the present study was to give an overview of the knowledge about the Belgian snakeflies. In addition, an identification key is presented here, containing all the species occurring in Belgium and in addition some species that might be expected.

### Material and methods

Most of the studied material belongs to the

Table 1. Checklist of the Belgian Raphidioptera.

**ORDER RAPHDIOPTERA**

**Family Inocelliidae**

*Inocellia crassicornis* (Schummel 1832)

**Family Raphidiidae**

*Atlantoraphidia maculicollis* (Stephens 1836)

*Phaeostigma (Phaeostigma) notata* (Fabricius 1781)

*Raphidia (Raphidia) ophiopsis ophiopsis* Linnaeus 1758

*Subilla confinis* (Stephens 1836)

*Xanthostigma xanthostigma* (Schummel 1832)

collections of the Gembloux Agricultural University and the Royal Belgian Institute for Natural Sciences. In addition, the Werkgroep Invertebraten Denderstreek (WID) delivered some unidentified snakeflies. All available material was identified according to ASPÖCK *et al.* (1980) (in German), which contains all the European species of Megaloptera, Raphidioptera and Neuroptera.

**Results**

**Literature overview**

DE SELYS-LONGCHAMPS (1888) already listed seven species for Belgium: *Atlantoraphidia maculicollis* (Stephens 1836), *Phaeostigma (Phaeostigma) notata* (Fabricius 1781), *Raphidia (Raphidia) ophiopsis ophiopsis* Linnaeus 1758, *Subilla confinis* (Stephens 1836), *Xanthostigma xanthostigma* (Schummel 1832), *Phaeostigma (Magnoraphidia) major* (Burmeister 1839) and *Raphidia laticeps* (Wallengren 1871). However, the latter species is a junior synonym of *P. (P.) notata*. Investigation of the material present in the Royal Belgian Institute for Natural Sciences indicated that also the specimens identified as *P. (M.) major* actually belonged to *P. (P.) notata*. *P. (P.) notata* has often been identified by the presence of four discoidal cells in the fore wing, while *P. (M.) major* has only three discoidal cells. Also SÉMÉRIA & BERLAND (1988), still used the number of discoidal cells to distinguish these species. However, this is not a reliable characteristic since *P. (P.) notata* sometimes also has only three discoidal cells. To distinguish both species, the genitalia should be examined (Annex 1).

Since DE SELYS-LONGCHAMPS (1888) published his checklist, no additional species have been reported for Belgium. LAMEERE (1900) only reported four species for the Belgian

fauna: *A. maculicollis*, *P. (P.) notata*, *S. confinis* and *X. xanthostigma*, whereas NAVAS (1912) copied the list from DE SELYS-LONGCHAMPS (1888), but synonymised *R. laticeps* with *P. (M.) major* instead of *P. (P.) notata*.

**Recorded species**

In total, only 82 records of snakeflies belonging to six species were available for Belgium. Therefore, the knowledge of the distribution of the species occurring in Belgium is still fragmentary. Nevertheless, the known locations for each species are given below. A checklist of the species occurring in Belgium is presented in Table 1.

• *Raphidia (Raphidia) ophiopsis ophiopsis*

This species can be observed on conifers and has a preference for pine trees. It has been reported from Virton (DE SELYS-LONGCHAMPS, 1888) and has also been found in Geel, La Gleize and Seraing.

• *Phaeostigma (Phaeostigma) notata*

*P. (P.) notata* can be observed on broadleaved trees as well as coniferous trees and it is the most common species in Belgium. It has been found in Angleur, Bruxelles, Halloy, Marcinelle and Neufchâteau by DE SELYS-LONGCHAMPS (1888) and in Solwaster by ROSE (2000) and it also occurred in Achêne, Auderghem, Boitsfort, Bouillon, Ferage, Gembloux, Ghlin, Groenendael, Humain, Ivoz-Ramet, Malonne, Mariemont, Mazy, Mont-Gauthier, Munster-Bilzen, Rance, Rixensart, Rochefort, Saint-Hubert, Seneffe, Sint-Joris-Weert, Spa, Tenneville and Verviers.

• *Subilla confinis*

This species lives on broad-leaved trees, with preference for oaks and fruit trees such as apple and pear. It has been reported from Longchamps-sur-Geer, Orval and Angleur (DE SELYS-

LONGCHAMPS, 1888) and has also been caught in Cointe, Goffontaine, Grand-Leez, Pâturages, Sint-Martens-Latem and Viesville.

• *Atlantoraphidia maculicollis*

*A. maculicollis* prefers pine trees. It has been reported from Brugge and Diest (DE SELYS-LONGCHAMPS, 1888) and has also been found in Bruxelles, Casteau, Elsene, Embourg, Gembloux, Tilly and Munsterbilzen.

• *Xanthostigma xanthostigma*

This species can be observed on broad-leaved trees, with preference for oaks and fruit trees such as apple and pear. It has been collected in Berlare, Gedinne, Geraardsbergen, Honegem, Lillois, Lokeren, Loverval, Ooigem, Tourinnes-la-Grosse, Vekée, Villers-Perwin, Villers-sur-Lesse and Winenne.

• *Inocellia crassicornis*

In the present study, *I. crassicornis* is reported for the first time for Belgium. It was collected on 7.VI.1959 in Hauset and is preserved in the collection of the Gembloux Agricultural University (FSAG). So far, this is the only record of this species. The species can be found on conifers and has a preference for pine trees.

### Discussion

In the present study, six species of snakeflies are reported for Belgium. In the Netherlands and in Luxembourg, no additional species have been recorded. However, in Germany and northern France, also *Dichrostigma flavipes* (Stein 1863), *Phaeostigma (Magnoraphidia) major* (Burmeister 1839), *Puncha ratzeburgi* (Brauer 1876) and *Venustoraphidia nigricollis* (Albarda 1891) have been observed. Especially the latter species can be expected in Belgium since it has been found in Meurthe-et-Moselle in northern France (SÉMÉRIA & BERLAND, 1988) and in Nordrhein-Westfalen in Germany (SAURE,

2003). All the mentioned species can be identified with the presented identification key (Annex 1). The key can be used to identify all species occurring in Belgium, Luxembourg, the Netherlands, the UK, Ireland, Germany, Poland and Scandinavia.

### Acknowledgements

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**Annex 1. Identification key of the Belgian Raphidioptera (species reported for Belgium are indicated in bold).**

- 1 Head rectangular, not narrowed towards basis, without ocelli (Fig. 1). Pterostigma without cross-veins (Inocelliidae) (Fig. 10)..... **Inocellia crassicornis**
- Head narrowed towards basis, with three ocelli (Fig. 2). Pterostigma with at least one cross-vein (Raphidiidae) (Fig. 11-19)..... **2**
- 2 In hind wing, media anterior (vein between base of radius and media) is long, not at all like a cross-vein (Fig. 3, 11-15)..... **3**
- In the hind wing, media anterior (vein between base of radius and media) is short and straight, resembling a cross-vein (Fig. 4, 16-19) ..... **7**
- 3 Pterostigma two-coloured: proximally brown and distally yellow (Fig. 11)..... **Dichrostigma flavipes**
- Pterostigma uniformly coloured (Fig. 12-15) ..... **4**
- 4 In fore wing, basal vein of pterostigma more or less coincides with basal vein of cell 1 (Fig. 5, 12)..... **Subilla confinis**
- In fore wing, pterostigma starts at about a third or halfway along cell 1 (Fig. 6) ..... **5**
- 5 In fore wing, pterostigma with only one cross-vein; costal space with less than 10 costal cross-veins (Fig. 13)..... **Raphidia (Raphidia) ophiopsis ophiopsis**
- In fore wing, pterostigma usually contains usually at least two cross-veins; costal space usually with at least 12 costal cross-veins (Fig. 14-15) ..... **6**
- 6 Males: parameres present (best seen from behind); coxopodites with distinct hooks (best seen from below) (Fig. 7). Females: sternite 7 without an incision caudally ..... **Phaeostigma (Phaeostigma) notata**
- Males: parameres absent (best seen from behind); coxopodites without distinct hooks (best seen from below) (Fig. 8). Females: sternite 7 with an incision caudally (Fig. 9) ..... **Phaeostigma (Magnoraphidia) major**
- 7 In fore wing, basal vein of pterostigma more or less coincides with basal vein of cell 1 (Fig. 5, 16-17)..... **8**
- In fore wing, pterostigma starts at about a third or halfway along cell 1 (Fig. 6, 17-18) .. **9**
- 8 Pterostigma bright yellow; usually 2 radial cells (Fig. 16) .. **Xanthostigma xanthostigma**
- Pterostigma brown, not yellow; usually 3 radial cells (Fig. 17)..... **Puncha ratzeburgi**
- 9 In fore wing, distal vein of cell 1 coincides with pterostigma and apical vein ends in front margin (Fig. 18). Posterior part of head with longitudinal red bands, also posterior part of pronotum with three longitudinal red bands ..... **Atlantoraphidia maculicollis**
- In fore wing, distal vein of cell 1 does not coincide with the pterostigma and apical vein ends in outer margin (Fig. 19) ..... **Venustoraphidia nigricollis**



Figure 1. Head Inocelliidae.



Figure 2. Head Raphidiidae.

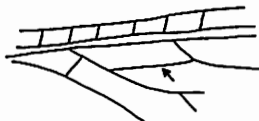


Figure 3. Base hind wing: MA long.



Figure 4. Base hind wing: MA short.

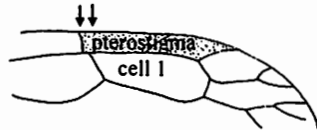


Figure 5. Basal veins coincide.



Figure 6. Basal veins do not coincide.

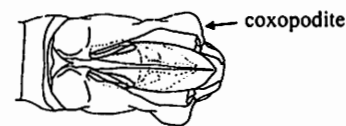


Figure 7. Male genitalia *Phaeostigma notata*: lateral (top) and ventral (bottom).



Figure 8. Male genitalia *Phaeostigma major*: lateral (top) and ventral (bottom).



Figure 9. Sternite 7 female *Phaeostigma major* with incision.

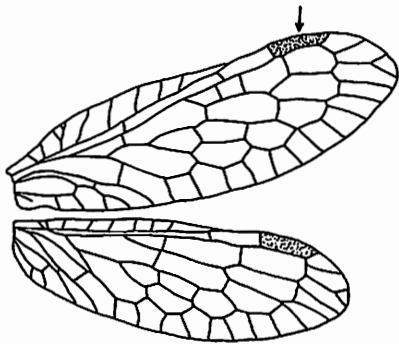


Figure 10. Right wings *Inocellia crassicornis*.

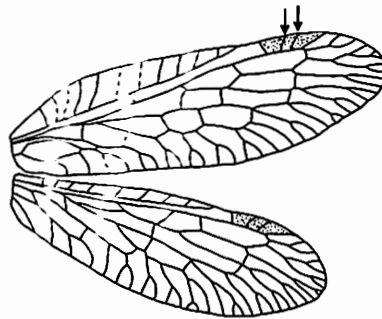


Figure 15. Right wings *Phaeostigma major*.

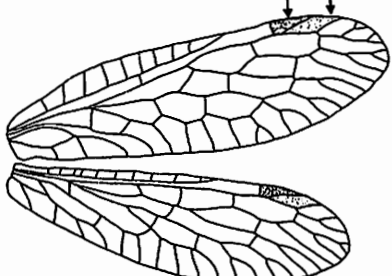


Figure 11. Right wings *Dichrostigma flavipes*.

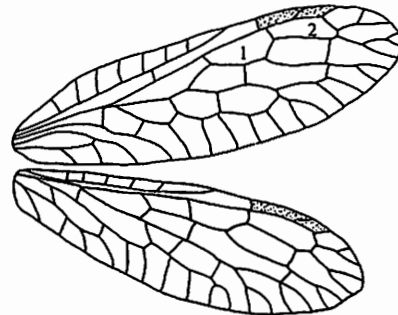


Figure 16. Right wings *Xanthostigma xanthostigma*.

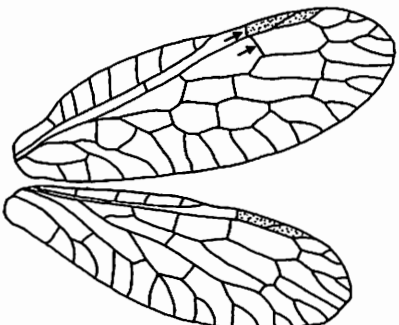


Figure 12. Right wings *Subilla confinis*.

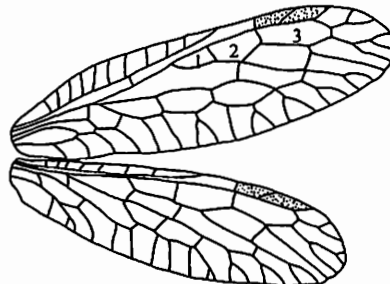


Figure 17. Right wings *Puncta ratzeburgi*.

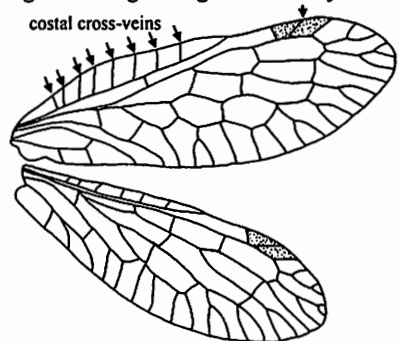


Figure 13. Right wings *Raphidia ophiopsis ophiopsis*.

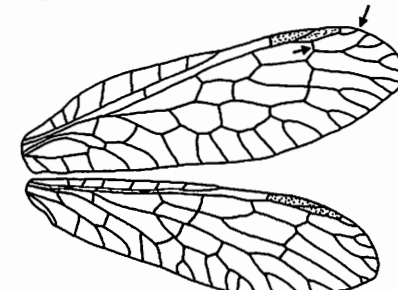


Figure 18. Right wings *Atlantoraphidia maculicollis*.

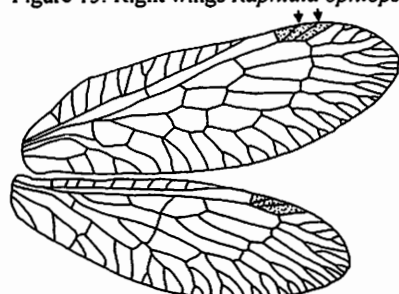


Figure 14. Right wings *Phaeostigma notata*.

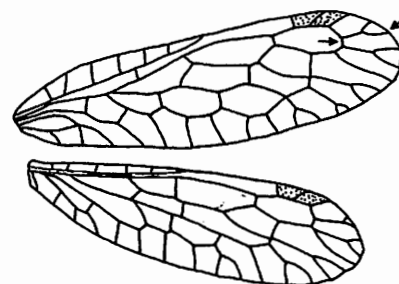


Figure 19. Right wings *Venustoraphidia nigricollis*.