

***Dytiscus latissimus* Linnaeus, 1758 and *Graphoderus bilineatus* (Degeer, 1774) in Belgium: a detailed account of the known records (Coleoptera: Dytiscidae)**

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Abstract

Dytiscus latissimus Linnaeus, 1758 and *Graphoderus bilineatus* (Degeer, 1774) are listed as appendix II and IV species of the EU Habitat Directive and the Natura 2000 network. The last confirmed records of *D. latissimus* and *G. bilineatus* are from respectively 1921 and 1948 and both species are now considered to be extinct in Belgium. Despite the attention that these two declining species get in Europe, there has never been an account of the known Belgian records and these species have no official status in Belgium. For this article, all the known Belgian records from collections, literature and fiches are compiled and mapped.

Keywords: *Dytiscus latissimus*, *Graphoderus bilineatus*, Dytiscidae, Belgium, Habitat directive, Natura 2000, protected species.

Samenvatting

Dytiscus latissimus Linnaeus, 1758 en *Graphoderus bilineatus* (Degeer, 1774) zijn opgenomen als bijlage II en IV soorten van de EU-Habitatrichtlijn en het Natura 2000 netwerk. De laatste bevestigde vondsten van *D. latissimus* en *G. bilineatus* dateren uit respectievelijk 1921 en 1948 en beide soorten worden nu als uitgestorven beschouwd in België. Ondanks de aandacht die deze twee soorten krijgen binnen Europa, werd er nooit een overzicht gemaakt van de bekende Belgische waarnemingen van deze twee soorten en hebben ze ook geen officiële status in België. Voor dit artikel werden alle bekende Belgische vondsten van collecties, literatuur en fiches samengebracht en in kaart gebracht.

Résumé

Dytiscus latissimus Linnaeus, 1758 et *Graphoderus bilineatus* (Degeer, 1774) sont deux espèces figurant à l'annexe IV de la Directive Habitat et à l'annexe II de la Convention de Berne. Les dernières observations confirmées de *D. latissimus* et *G. bilineatus* datent respectivement de 1921 et 1948 et actuellement ces deux espèces sont considérées comme éteintes en Belgique. Malgré l'attention portée à ces deux espèces en déclin en Europe, en Belgique elles ne relèvent d'aucun statut officiel. Dans cet article sont rassemblées et cartographiées les données des collections et de la littérature.

Introduction

Dytiscus latissimus Linnaeus, 1758 and *Graphoderus bilineatus* (Degeer, 1774) are listed as appendix II and IV species of the EU Habitat Directive and the Natura 2000 network. Protection by the EU Habitat Directive means that countries of the EU have to assess the status and, if not regionally extinct, monitor these species. Furthermore, active protection is required for species from the appendix II and IV (FOSTER, 1996a). *D. latissimus* and *G. bilineatus* are included in the IUCN Red List as vulnerable (FOSTER, 1996b, 1996c). Both western Palearctic species have relatively large distribution ranges, occurring in most central European countries from France and Italy in the south, Sweden and Finland in the north, ranging eastwards to Western Siberia (NILSSON, 2010). Since the beginning of

the twentieth century, both species have decreased significantly, especially in the western part of their range (HOLMEN, 1993). Nowadays, these species are considered extinct in France (QUENEY, 2004), Luxemburg (GEREND, 2003), Switzerland, Austria, Italy (CUPPEN & KOESE, 2005; CUPPEN *et al.*, 2006a) and in the Czech republic only *G. bilineatus* is still present at two locations (BOUKAL *et al.*, 2007). Recent records of both species are known from The Netherlands (CUPPEN *et al.*, 2007; KOESE *et al.*, 2008), Germany (HENDRICH & BALKE, 2000), Poland (PRZEWOZNY & LUBECKI, 2011), all Scandinavian countries (NILSSON & HOLMEN, 1995), the Baltic states (VAHRUŠEVSA & KALNIŅŠ, 2013; KALNIŅŠ, 2006), Hungary, Ukraine, Belarus and Russia (HENDRICH & BALKE, 2000). In Belgium, the last confirmed records of *D. latissimus* and *G. bilineatus* date back to respectively 1921 and 1948 and both species are now considered to be extinct in Belgium (BOSMANS, 1992; DOPAGNE, 1995; SCHEERS, 2012; SCHEERS & LAMBEETS, 2014).

Although countries of the European Union are obliged to assess the status, there is no official status for *D. latissimus* and *G. bilineatus* in Belgium. Both Red Lists on Belgian Water beetles (BOSMANS, 1994; SCHEERS, 2012) are unofficial and only include the Flanders region. Furthermore, there has never been an account of the known Belgian records of these two species.

Dytiscus latissimus was rediscovered in the Netherlands in 2006 (VAN DIJK, 2006), after which both species got more attention. Recently, extensive research has been performed on the occurrence and habitat of both *D. latissimus* and *G. bilineatus* in the Netherlands (CUPPEN & KOESE, 2005; CUPPEN *et al.*, 2006a; CUPPEN *et al.*, 2006b; CUPPEN *et al.*, 2007; KOESE & CUPPEN, 2006; KOESE *et al.*, 2008; REEMER *et al.*, 2008).

As often the case with species characterized by a large distribution area, *D. latissimus* has been found in a relatively wide range of standing, freshwater habitats. According to NILSSON & HOLMEN (1995), the main habitat of the species is in dense marginal vegetation, mainly of *Carex* or *Equisetum*, in large clear-water or slightly dystrophic lakes. In the south of its range (including The Netherlands and Belgium), the species seems to prefer oligotrophic lakes (HOLMEN, 1993), while in the north, it occurs mainly in the most nutrient-rich lakes. The habitat of *G. bilineatus* is very similar with that of *D. latissimus* (NILSSON & HOLMEN, 1995), but *G. bilineatus* is less often encountered in dystrophic lakes and seems to be more confined to mesotrophic and eutrophic (not hypertrophic!) lakes, oxbows and waterways. The species seems to be strongly correlated with plant species that are typical for *Magnopotamion* or *Hydrocharition*-type vegetation.

Detailed account of the known records

All known Belgian records of *Dytiscus latissimus* and *Graphoderus bilineatus* are given in Table 1 and 2. It seems that *D. latissimus* and *G. bilineatus*, with respectively 12 and 19 localities (from which few locations with more than one record), have always been rare in Belgium. Both species were mainly restricted to the eastern part of Flanders (Campine region) and a small region near the city of Mons. *G. bilineatus* was also present at two locations near the city of Ghent (Fig. 1 and Fig. 2). The



Dytiscus latissimus Linnaeus, 1758 male and female (photos by N. Mal)



Graphoderus bilineatus (Degeer, 1774) male (Turnhout, 20.V.1943) and female (Geel, 13.IX.1930) (photos by Jonathan Brecko, RBINS).

Belgian records show a clear preference of both species for regions with sandy and peaty soils. The most recent record of *D. latissimus* dates back to 1921 and *G. bilineatus* was last recorded in 1948.

Table 1. Account of the Belgian records of *Dytiscus latissimus* Linnaeus, 1758.

| Locality | Province | Date | Specimens | Type | Reference |
|------------------|-----------|----------------|-----------|------------|---------------------------|
| Peer | Limburg | no date < 1857 | 1 | Literature | Preudhomme De Borre, 1890 |
| Munsterbilzen | Limburg | no date < 1865 | - | Literature | Anonymous, 1887 |
| Hasselt | Limburg | no date < 1890 | - | Literature | Preudhomme De Borre, 1890 |
| Kalmthout | Antwerpen | no date < 1919 | - | Fiche | Fichier Gembloux |
| Kuringen | Limburg | no date < 1919 | - | Fiche | Fichier Gembloux |
| Peer | Limburg | no date < 1919 | - | Fiche | Fichier Gembloux |
| Hasselt | Limburg | no date < 1919 | - | Fiche | Fichier Gembloux |
| Tongeren | Limburg | no date < 1919 | - | Fiche | Fichier Gembloux |
| Maaseik | Limburg | no date < 1919 | - | Fiche | Fichier Gembloux |
| Turnhout | Antwerpen | III.1861 | 1 | Specimen | Collection RBINS |
| Kalmthout | Antwerpen | 21.III.1869 | 1 | Literature | Preudhomme De Borre, 1885 |
| Houdeng-Goegnies | Hainaut | 10.X.1883 | - | Fiche | Fichier Gembloux |
| Maaseik | Limburg | VIII.1885 | 2 | Literature | Preudhomme De Borre, 1886 |
| Kalmthout | Antwerpen | 1886 | 2 | Literature | Preudhomme De Borre, 1886 |
| Framerries | Hainaut | 1886 | - | Literature | Preudhomme De Borre, 1886 |
| Zonhoven | Limburg | VII.1888 | 1 | Specimen | Collection RBINS |
| Framerries | Hainaut | 1898 | - | Fiche | Fichier Gembloux |
| Wuustwezel | Antwerpen | 17.VII.1903 | 1 | Specimen | Collection RBINS |
| Kalmthout | Antwerpen | 21.VIII.1921 | 1 | Specimen | Collection G. Bonamie |

Table 2. Account of the Belgian records of *Graphoderus bilineatus* (Degeer, 1774)

| Locality | Province | Date | Specimens | Type | Reference |
|---------------|-----------------|-----------------|-----------|------------|----------------------------|
| Austuweel | Antwerpen | no date < 1885 | - | Literature | Preudhomme De Borre, 1885 |
| La Cambre | Brabant wallon | no date < 1887 | - | Literature | Preudhomme De Borre, 1887 |
| Herstal | Liège | no date < 1888 | - | Literature | Preudhomme De Borre, 1888 |
| Mons | Hainaut | no date < 1889 | - | Literature | Preudhomme De Borre, 1889 |
| Maaseik | Limburg | no date < 1890 | - | Literature | Preudhomme De Borre, 1890 |
| Ridderborn | Limburg | no date < 1890 | - | Literature | Preudhomme De Borre, 1890 |
| Lanaken | Limburg | no date < 1890 | - | Literature | Preudhomme De Borre, 1890 |
| Munsterbilzen | Limburg | no date < 1890 | - | Literature | Preudhomme De Borre, 1890 |
| Ridderborn | Limburg | V.1874 | 1 | Specimen | Collection RBINS |
| Austruweel | Antwerpen | 1890 | 1 | Specimen | Collection RBINS |
| Wuustwezel | Antwerpen | 15-12.VIII.1901 | 5 | Specimen | Collection RBINS |
| Hasselt | Limburg | 1901 | 1 | Specimen | Collection RBINS |
| Wuustwezel | Antwerpen | VIII.1901 | 3 | Specimen | Collection RBINS |
| Wuustwezel | Antwerpen | 24.VII.1902 | 2 | Specimen | Collection RBINS |
| Wuustwezel | Antwerpen | 13.VII.1903 | 4 | Specimen | Collection RBINS |
| Wuustwezel | Antwerpen | 17.VIII.1903 | 2 | Specimen | Collection RBINS |
| Overmere | Oost-Vlaanderen | 27.IV.1909 | 1 | Specimen | Collection RBINS |
| Genk | Limburg | 18.VIII.1916 | 1 | Specimen | Collection RBINS |
| Merksplas | Antwerpen | 17.IX.1917 | 1 | Specimen | Collection RBINS |
| Drongen | Oost-Vlaanderen | 1918 | - | Literature | Bosmans & Van Stalle, 1983 |
| Overmere | Oost-Vlaanderen | 17.VI.1919 | 3 | Specimen | Collection RBINS |
| Overmere | Oost-Vlaanderen | 21.VI.1919 | 1 | Specimen | Collection RBINS |
| Overmere | Oost-Vlaanderen | 21.VII.1919 | 1 | Specimen | Collection RBINS |
| Geel | Antwerpen | 13.IX.1930 | 4 | Specimen | Collection RBINS |
| Herentals | Antwerpen | 10.V.1932 | 1 | Specimen | Collection RBINS |
| Hasselt | Limburg | 14.V.1932 | 1 | Specimen | Collection RBINS |
| Hasselt | Limburg | 14.V.1932 | 1 | Specimen | Collection RBINS |
| Herentals | Antwerpen | 13.IV.1937 | 1 | Specimen | Collection RBINS |
| Turnhout | Antwerpen | 20.V.1943 | 1 | Specimen | Collection RBINS |
| Rijmenam | Antwerpen | 12.VIII.1945 | 2 | Specimen | Collection RBINS |
| Wijgmaal | Vlaams-Brabant | VI.1946 | 1 | Specimen | Collection RBINS |
| Herentals | Antwerpen | 19.IV.1948 | 1 | Specimen | Collection RBINS |

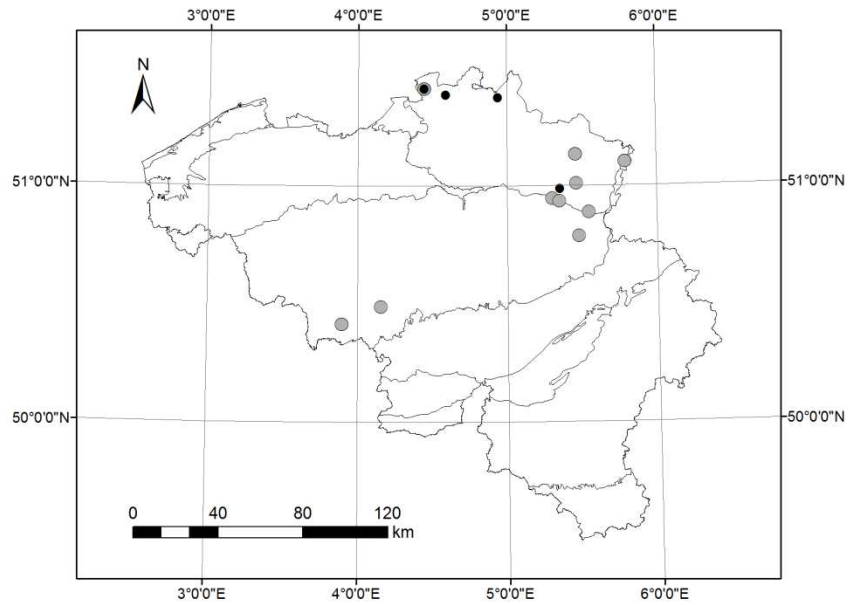


Fig. 1. Map of the Belgian records of *Dytiscus latissimus* Linnaeus, 1758. Black dots indicate confirmed collection records and grey dots records from literature and fiches.

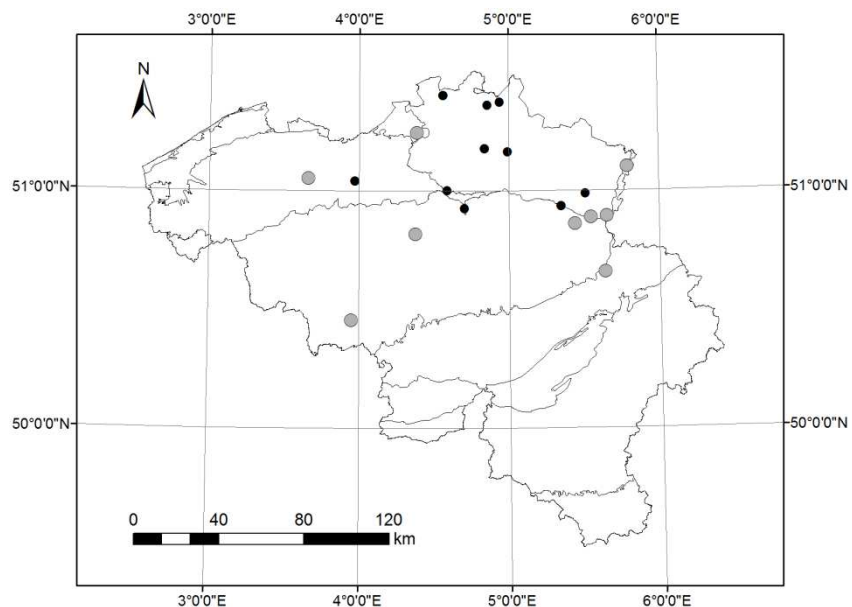


Fig. 2. Map of the Belgian records of *Graphoderus bilineatus* (Degeer, 1774). Black dots indicate confirmed collection records and grey dots literature records.

Discussion

Both species are now considered to be extinct in Belgium (BOSMANS, 1992; DOPAGNE, 1995; SCHEERS, 2012) and because of the distance of the closest populations (for *D. latissimus* the closest population is in Uffelte, The Netherlands and for *G. bilineatus* this is in Oisterwijk, The Netherlands where a very small population still persist) and the overall rarity of the species in the neighboring countries, recolonization seems highly improbable. It is, however, not impossible that populations of one of the two species still exist in Belgium. A rediscovery of *D. latissimus*, as the case in the Netherlands (VAN DIJK, 2006), seems highly improbable, but *G. bilineatus* might still have a relict population in the Campine region. Further research is necessary to get more certainty about the present status of the two species in Belgium. Suitable habitat is still present at some locations in the campine region, especially in the central part of the province of Limburg. The use of traps (Molchreuse or bottle traps) are the best way to find *D. latissimus* and *G. bilineatus*, but these traps were only used

sporadically in the last decennia and some of the most suitable lakes were not sampled with traps or even not sampled at all. At the last known locality of *D. latissimus*, the ‘Stappersven’ in the nature reserve ‘Kalmthoutse Heide’ in the Northwest of the province of Antwerp in 1921, water beetles were sampled in 2011 (SCHEERS, 2011). During that survey, baited bottle traps were used, but no specimens of *D. latissimus* could be found.

Until the end of 2014, the most recent record known of *D. latissimus* was from 1903 (Wuustwezel). It was only during the control of a private collection that the specimen from the ‘Stappersven’ caught in 1921 was found. It is highly probable that there are still unknown records in private collections that give more insight in the history and previous distribution of both species in Belgium.

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