

A long-expected finding: the first record of the isopod *Eluma caelatum* (Miers, 1877) from Belgium (Crustacea: Isopoda: Armadillidiidae)

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Abstract

Since the discovery of *Eluma caelatum* (Miers, 1877) in the Netherlands close to the Belgium boarder in the mid 1990's, various attempts have been made to find this isopod species in Belgium. However, these attempts have been unsuccessful until a joint excursion of Belgian and Dutch isopod researchers searched for this enigmatic species once more in autumn 2016. They discovered the first Belgian specimens of *E. caelatum* at the nature reserve “Zwin” near Knokke in West-Vlaanderen. One month later, another population was found near Sint-Laureins in Oost-Vlaanderen, also close to the Dutch border. Possibly *E. caelatum* colonised Belgium from the Netherlands since there are no connections with southern populations in France. In Belgium and The Netherlands the species is bound to coastal areas with a synantropic character, like levees of dikes and ditches while it is more of a forest species in southern Europe. Therefore, it is unclear if the species is an accidental import from the south or if the species is native at the edge of its distribution range.

Keywords: *Eluma caelatum*, Isopoda, woodlouse, distribution, Belgium

Samenvatting

Sinds de ontdekking van *Eluma caelatum* (Miers, 1877) in Nederland, dichtbij de Belgische grens, midden jaren 1990 werd er getracht de soort te vinden in België. Echter zonder succes totdat een gezamenlijke excursie van Belgische en Nederlandse onderzoekers nog eens op zoek ging naar deze pissebed in de herfst van 2016. Ze vonden de eerste Belgische exemplaren in het “Zwin” bij Knokke in West-Vlaanderen. Een maand later werd een tweede populatie ontdekt in Oost-Vlaanderen bij Sint-Laureins dicht bij de Nederlandse grens. Mogelijk heeft de soort België gekoloniseerd vanuit Nederland omdat er geen connecties zijn met zuidelijke populaties. In België en Nederland is de soort gebonden aan kustgebieden met een synantroop karakter zoals dijken en slootoevers. In zuidelijk Europe is de soort echter vooral in bossen te vinden. Daarom is het onduidelijk of de soort een toevallige introductie is of een inheemse soort op de rand van zijn verspreidingsgebied.

Résumé

Depuis la découverte d'*Eluma caelatum* (Miers, 1877) aux Pays-Bas, près de la frontière belge, au milieu des années 90, diverses tentatives ont été faites pour trouver cette espèce d'isopode en Belgique. Ces tentatives sont restées infructueuses jusqu'à sa découverte en automne 2016. En effet, c'est lors d'une excursion, co-organisée par des chercheurs belges et hollandais, dans la réserve naturelle du Zwin près de Knokke (West-Vlaanderen) que plusieurs spécimens ont été découverts pour la première fois de Belgique. Un mois plus tard, une autre population a été trouvée près de Sint-Laureins (Oost-Vlaanderen), localité également proche de la frontière hollandaise. *E. caelatum* aurait-il colonisé la Belgique depuis les Pays-Bas étant donné qu'il n'y a aucun lien avec les populations du sud de la France? De plus, en Belgique comme aux Pays-Bas, l'espèce est liée aux zones côtières à caractère synanthropique, comme les digues et les fossés, alors qu'il s'agit plutôt d'une espèce forestière dans le sud de l'Europe. Par conséquent, cette espèce a-t-elle été introduite accidentellement dans nos régions ou est-elle à la limite de son aire de répartition septentrionale?

Introduction

Coastal habitats expose plants and animals to sometimes extreme environmental conditions, resulting in a specialised subset of species. Many of these species have adapted to coastal abiotic conditions and do not occur inland, resulting in a unique coastal fauna with species that are rare in the rest of the country. This is certainly the case for countries with a short coastline, like Belgium. The few nature reserves in the coastal zone are very valuable as habitats for species from different taxonomic groups, and are therefore of high natural historical value. In Belgium, there are some woodlouse species that can tolerate salt spray and are restricted to coastal areas, such as *Armadillidium album* Dollfus, 1887 (KERSMAEKERS, 1988) and *Miktoniscus patiencei* Vandel, 1946 (LOCK & DURWAEEL, 2000). A third species, *Ligia oceanica* (Linnaeus, 1767), is more common in Belgium along shores with hard substrate, such as longitudinal embankments and is dependent on salt. In the Netherlands, a fourth species was discovered that is mostly restricted to coastal areas: *Eluma caelatum* (Miers, 1877) (TEMPELMAN & BERG, 1997; BERG *et al.*, 2008, under its synonym *E. purpurascens*). This species is known from a few former islands of the province of Zeeland (BERG *et al.*, 2008), from over 26 locations and reaches here its northern distribution border in continental Europe. The species has been expected to occur in Belgium (LOCK & DURWAEEL, 2000) because of its close occurrence near the Belgian border in the Netherlands (BERG *et al.*, 2008), but previous attempts to find the species failed (TEMPELMAN & BERG, 1997; KOEN LOCK pers. comm.). On the 22nd of October 2016, a joint excursion of Spinicornis (Belgian Land Isopod Group) and the Dutch EIS-Isopoda survey group was organised to look for the presence of *E. caelatum* in Belgium once more. Surprisingly, the species could be easily found during a quick stop at the nature reserve “het Zwin”, near Knokke. The experience on the habitat of this species from the sightings in the Netherlands by the last author resulted in the relatively easy catch of this new species for the Belgian isopod fauna. Only about one month later, a large population was discovered on a stream levee in the province of Oost-Vlaanderen, close to the Dutch border. This raises the question if *E. caelatum* has been overlooked for all these years due to lack of insight knowledge on the specific habitat of *E. caelatum* or if the species just recently colonised Belgium from the Netherlands.

Belgian localities

West-Vlaanderen: Knokke-Heist, levee grassland on the inside of a dike, 31UES2489, 22.X.2016, 2♀♀, leg. & det. Pallieter De Smedt — Knokke-Heist, levee grassland, 31UES2489, 04.XI.2016, 1ex., leg. & det. Pepijn Boeraeve.

Oost-Vlaanderen: Sint-Laureins, stream levee, 31UES4282, 26.XI.2016, 25ex., leg. & det. Pepijn Boeraeve.

Identification

Eluma caelatum reaches about 8-10mm (max. 15mm) when stretched and can be easily distinguished from other *Armadillidiidae*-species because the eye is composed of only one large hyaline ocellus,

instead of a group of smaller black ocelli as in most *Armadillidium*-species. It has a distinctive purplish-brown colour with two broad bands of a series of elongated lighter dots across the dorsal side of the body (Figs 1- 2). The body is densely covered with fine short hairs which gives the species a downy appearance. The telson is triangular (Fig. 2). The species can fold itself into an almost complete sphere with the antenna folded on the head (TEMPELMAN & BERG, 1997; BERG *et al.*, 2008; GREGORY, 2009).



Fig. 1. Lateral view of the first record of *Eluma caelatum* for Belgium (Photo: Gert Arijs).



Fig. 2: Head and telson of *Eluma caelatum* (Photo: Gert Arijs).

Distribution and habitat

Eluma caelatum has been reported in Europe from the British Isles; Western France, the Netherlands (BERG *et al.*, 2008), Portugal, Spain, NW-Africa, Canary Islands, Madeira and the Azores (SCHMALFUSS, 2003). It has also been introduced in some other places in the world. As it reaches its northern distribution border in continental Europe in the south of the Netherlands, in combination with its occurrence in the south of Europe and northern Africa assumes that the central range lays in south Europe.

The Belgian specimens in West-Vlaanderen were found a few centimetres from a concrete pole in the middle of rough grassland vegetation on the inside of a dike, consisting of an *Arrhenatherion* trunk community, dominated by *Arrhenatherum elatius* (L.) P. Beauv. ex J. Presl & C. Presl. and *Elytrigia repens* (L.) Desv. ex Nevski (Fig. 3). In Oost-Vlaanderen, the specimens were found underneath dead wood and between leaf litter on a stream levee. Both locations correspond to the habitat of *E. caelatum* described from the Netherlands (BERG *et al.*, 2008). The Belgian localities were both more or less synantropic and less than 1,300m from the Dutch border (Fig. 4).

In the Netherlands, the species is almost exclusively found within 100m from salt water, with a maximum of 6,300m (BERG & KROON, 1999). Most of the observations were done on sea dikes, both on the out- or inside or along the border ditches at the base of the dike. The observation in Oost-Vlaanderen was located about 9,500m from salt water and thus the locality furthest away from salt water in the Low Countries. Although *E. caelatum* does not have to rely on salt water, it appears to be tolerant to salt spray. It is not known why the species does not move land inwards, but maybe it cannot compete with other isopod species that cannot tolerate salt spray.

The species has been found in Ireland for over a century, but was only relatively recently discovered in the UK (1975) (HARDING & SUTTON, 1985) and in northern England only in 1995 (GREGORY, 2009). HARDING & SUTTON (1985) reported 94% of the collection sites in the UK as being coastal. Two inland sites in Ireland are close to railway lines. The species is categorised as “Naturalised” in the UK because of its occurrence in synantropic and disturbed coastal sites (LEE, 2015). They assume the species to be introduced via horticultural trades.

The species is reported as being a forest species in Western France where it inhabits the leaf litter layer with a preference of chestnut tree forest (VANDEL, 1962; SÉCHET, 2004; LIVORY, 2007; SÉCHET & NOËL, 2015). Also in northern Africa and on the Iberian Peninsula the species is found in forests, but also in caves (VANDEL, 1962).

Accompanying species in West-Vlaanderen were *Philoscia muscorum* (Scopoli, 1763), *Oniscus asellus* Linnaeus, 1758, *Porcellio scaber* Latreille, 1804 and *Armadillidium vulgare* (Latreille, 1804). This community composition corresponds with landslide levee slope communities inhabited by *E. caelatum* from the Netherlands (BERG *et al.*, 2008). Along ditches with a clay soil it occurs together, next to the above-mentioned species with *Trachelipus rathkii* (Brandt, 1833), *Trichiniscoides sarsi* Patience, 1908 and *Trichoniscus pusillus* Brandt, 1833 and *Trichoniscus pygmaeus* Sars, 1898. In Oost-Vlaanderen, also *Trichoniscus pusillus* s.l., *Trichiniscoides sarsi* and *Trichiniscoides albidus* (Budde-Lund, 1880) were accompanying species.



Fig. 3. Habitat of *Eluma caelatum* in West-Vlaanderen. Specimens have been found at the base of a concrete pole in the middle of the rough grassland vegetation at the left side of the picture (Photo: Pallieter De Smedt).

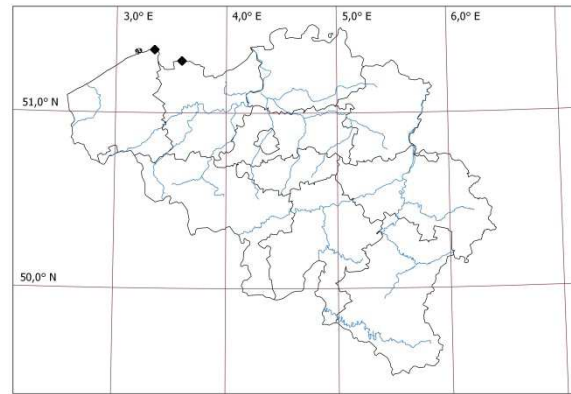


Fig. 4. Distribution of *Eluma caelatum* in Belgium.

Discussion

The status of *E. caelatum* in Belgium is unclear. After all, the species was relatively easy to find with the right expert knowledge on habitat preference. We therefore assume that the species was overlooked for some years. However, similar habitat as the location in Oost-Vlaanderen was visited several times in the past few years without success, assuming that the number of populations is limited. The two localities where the species was found are close to the Dutch border and no connection can be made with southern populations (e.g. the species could not be found in suitable areas along the Belgian coast more to the south (recent search by the authors) and in northern France (DELASALLE & SÉCHET, 2014; inpn.mnhn.fr/)). For that reason, it sounds reasonable to assume that the species reached Belgium from the north. It could be possible that the species is only present in Belgium since a couple of decades. Different authors (VANDEL, 1962; BILTON, 1995; GREGORY, 2009) assume that the species is probably not native to Western Europe, but originates from the Iberian Peninsula or northern Africa. This is supported by the synantropic nature of the habitat in Ireland, the UK and the Netherlands. In addition, some isolated records in Great Britain were at major ports (GREGORY, 2009), and possibly the species was introduced via imported goods from overseas. If this is true, we could also expect *E. caelatum* to occur near e.g. the large port of Antwerp or Zeebrugge in Belgium.

In Western France, the species is hardly found at the coast but mostly in forested areas (VANDEL, 1962; SÉCHET, 2004). If forest is the natural habitat of the species, as it is on the Iberian Peninsula and northern Africa, we could expect the French populations to be native. In northern countries like Ireland, the UK, Belgium and the Netherlands, the distribution of the species could then be limited to synantropic coastal areas, which have slightly higher temperatures compared to inland areas. The suboptimal climate for *E. caelatum* at his northern distribution boundary could cause the species to be restricted to coastal areas and therefore assumed to be native as well. Therefore, we could not be sure if the species was an accidental import or a native species at the edge of its distribution range. Nevertheless, if climate gets warmer, it could be possible that the species will colonise forest habitat in Belgium along the coast or colonise the country from the south. Therefore, it seems worthwhile to carefully investigate forest in the southern part of the country for the presence of *E. caelatum*.

With the discovery of *E. caelatum*, there are in total 35 Belgian terrestrial woodlice species with free-living populations (DE SMEDT *et al.*, 2016).

Acknowledgements

We would like to thank Eric Cosyns for the information on the vegetation characteristics of the collection site in West-Vlaanderen.

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