# Contribution to the knowledge of *Carabus* species (Coleoptera: Carabidae) in South Denmark

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**Abstract.** The author reports the presence of several *Carabus* species found in South Denmark in July 2021. Apart from specific species information, the habitats are also briefly discussed.

**Samenvatting**. De auteur bespreekt verschillende *Carabus* soorten die gevonden werden in Zuid-Denemarken, in juli 2021. Naast het meedelen van soortspecifieke informatie worden ook de habitats kort besproken.

**Résumé.** L'auteur rapporte la présence de plusieurs espèces de *Carabus* qui ont été trouvées début juillet 2021 au sud du Danemark. En plus des informations spécifiques aux espèces, les habitats sont également discutés.

**Key words: *Carabus* — *arvensis* — *hortensis* — *violaceus* — *nitens* — *problematicus* — *clatratus* — Denmark.**

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## Introduction

According to the Naturbasen website, 14 *Carabus* species have been recorded in Denmark. The presence of *C. auratus* Linnaeus, 1761 has only been confirmed since 1996. The species occurs in a few locations in Southern Denmark (Jørum & Jørum 1996). On the Danish Red List, 8 *Carabus* species are evaluated as LC (least concern), 3 species have the EN label (endangered), 2 species are NT (near threatened) and 1 species is evaluated as VU (vulnerable).

Pitfall traps were set between 10–18 of July 2021, in Blåvand, Billum and Errested, all located in South Denmark. Blåvand (Fig. 1, red dot) and Billum (Fig. 1, blue dot) are situated in the west. Errested is a hamlet near the Danish west coast, north of Haderslev, (Fig. 1, green dot).

## Material and methods

In addition to being polyphagous predators, *Carabus* beetles will also feed on carrion. Most species forage at night so they are difficult to find in the daytime. They are also susceptible to environmental factors such as temperature, humidity level and food supply, especially during the warm summer months. All factors combined make daytime observations during the summer very difficult. Instead, *Carabus* beetles were collected by pitfall trapping, in biodegradable cups filled with wine vinegar. These were placed in the soil, with the rim not exceeding the ground level. It was not necessary to add a roof since the weather forecast did not predict rainfall. After three days, all traps were removed and emptied.

## Sampling sites in Blåvand and Skallingen

Blåvand is the westernmost point of metropolitan Denmark. A significant portion is marshland, moor, dunes, dry heathlands, and beaches. There is a large military training site on the Kallesmærsk Hede (Blåvand/Oksbøl). During the summer months, most of the exercises are suspended to avoid disturbance to tourist activities. Blåvand also includes the Skallingen Peninsula, at the north end of the Wadden Sea. Here, the landscape consists of beaches, dunes and salt marshes. On the eastern side of Skallingen, half the area is used for cattle grazing, and there is also a Golf Club.

On the 11th of July 2021, two plots were sampled. Three pitfalls were placed in the proximity of the Mosevra church at the Kallesmærsk Hede (Fig. 2) and three were placed in a pasture containing a shallow brook, near the east coast of Skallingen. All traps were emptied on the 15thof July.

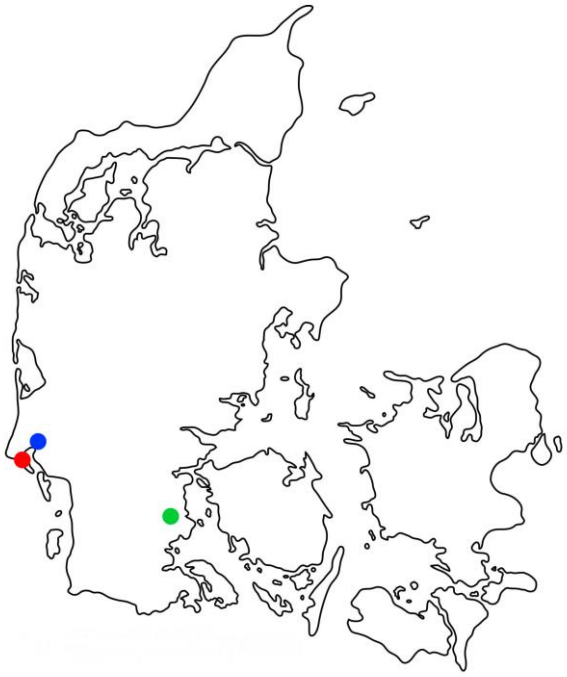

Fig. 1. The sampling sites in Denmark. The locations in Blåvand and Skallingen are indicated with a red dot, Billum is marked in blue and Errested in green. © I. Peeters.

On the Kallesmærsk Hede, two specimens of *Carabus nitens* Linnaeus, 1758 (13–8 mm) were found (Fig. 4a). They are most probably teneral adults, since older *C. nitens* are inactive during the autumn. Activity peaks in May and early June. In Denmark, the species inhabits very dry heathlands and dunes, but it also occurs in humid to very wet places (Lindroth 1985). *C. nitens* is a locally

Fig. 2. The Kallesmærsk Hede, a habitat of *C. nitens*, vii.2021. © I. Peeters.

distributed species, of which numbers have decreased strongly (Lindroth 1985). Most locations are situated near the coast in South Denmark and North Jutland.

On the Skallingen Penisula, three pitfall traps were placed alongside drainage brook, which cuts through a pasture with a dense vegetation of grasses (Fig. 3). One trap was placed in a humid patch in the brook bed. Except for a few moist patches, the brook was dry and the banks were overgrown with reedbeds, making it invisible from a distance. Here, two specimens of *C. clatratus* Linnaeus, 1761 were found. The other traps alongside the brook yielded 2 more species: *C. problematicus* ssp. *harcyniae* Stürm, 1815 (4 individuals) and *C. arvensis* ssp. *arvensis* Herbst, 1784 (2 individuals).

*Carabus clatratus* (22–30 mm) (Fig. 4b) is found scattered across the country, but most observations are made along the entire west coast and the North Jutland Region. *C. clatratus* is a hygrophilous beetle and inhabits marshy meadows with a rich vegetation, close to the sea (Lindroth 1985). It reproduces in spring, and activity peaks in May and June. Only very few observations are made during the summer.

In Denmark, *C. arvensis* (15–20 mm) (Fig. 4c) is a rare and local beetle (Lindroth 1985). In accordance with its xerophilous nature, *C. arvensis* inhabits sandy, open and dry country. This species especially favours *Calluna* heathlands with scattered pine trees and clearings (Lindroth 1985). *C. arvensis* is active throughout the summer, but its activity peaks in May and June.

*Carabus problematicus (*18–28 mm) (Fig. 4d) is a common species and widely distributed in Jutland, but less so in the southern part of Denmark. It inhabits both light, deciduous forests and more or less dry, sandy soil on open country (Hansen 1968; Jørum 1985). In Denmark, the species appears to be an autumn breeder with larval hibernation (Jørum 1985).

## Sampling site in Billum

Billum is a small village, situated north of Tarpand east of Oksbøl. Between the 11th and 15th July, 5 traps were placed in an isolated deciduous and light woodland with a vegetation of beech, oak and spruce. Here, two *Carabus* species were found, *C. problematicus* (8 individuals) and *C. nemoralis* Müller, 1764 (6 individuals).

*Carabus nemoralis* (22–26 mm) is defined as a very eurytopic and mesophilic forest species but it also occurs in shaded parks and gardens (Thiele 1977). Orchards, hedgerows, pasturelands and fields with a sufficient presence of trees and shrubbery are also favoured. It is a very common species of *Carabus*, and widespread all over the country. It is most active during April and May. Teneral adults emerge in August-September. It is a nocturnal hunter, able to follow mucus trails of slugs and earthworms (Digweed 1994).

Fig. 3. A luscious pasture near the sea, a habitat of *C. clatratus*, *C. arvensis* and *C. problematicus* in Skallingen, Denmark, vii. 2021. © I. Peeters.

## Sampling site in Errested

Errested is situated north of Hadersled and west of Ørby. Between the 16th and 18th of July, 10 traps were placed in a deciduous forest, located east of the hamlet. Five traps were placed along opposite sides of the track of a dirt road cutting through the forest, and the others were set down at the left-hand side. This parcel had a less dense vegetation and it also seemed drier. Here, two *Carabus* species were found: *C. violaceus* ssp. *ottonis* Csiki, 1909 (Fig. 4e) and *C. hortensis* Linnaeus, 1758 (Fig. 4f).

*Carabus violaceus* (22–29 mm) is a nocturnal, eurytopic forest species with a preference for light deciduous or coniferous forests on rather dry, humus-rich soil (Lindroth 1985). It is less common in shady habitats of the open country (Lindroth 1985). It reproduces mainly in August (Lindroth 1985). There are many described subspecies, which more often than not result in taxonomic confusion. In 1985, Staven & Blumenthal described the natio *intermarinus*, a geographical variety. According to the authors, this form occurs in Haderslev and Apenrade in Denmark and the German regions around Kiel and Flensburg, and elsewhere (Staven & Blumenthal 1985). A natio has no taxonomic status, and *intermarinus* has been placed as a form of ssp. *ottonis* Csiki, 1909 by Deuve (2021). This view is adopted here.

*Carabus hortensis* (22–28 mm) (Fig. 4f) is a rather common and widely distributed species, less so in the western and northern parts of Jutland. In most of its distribution area, C. *hortensis* is a eurytopic forest dweller, inhabiting deciduous and mixed forests, even though it also occurs in other habitats (Hatteland & Hauge 2007). According to Lindroth (1985), *C. hortensis* is a typical forest dweller and favours a rather dry but humus-rich soil.

## Conclusion

During the sampling period between the 11th and 18th of July, the weather conditions were not optimal. At that time, South-Denmark had very warm and dry weather, and consequently, expectations of encounters with *Carabus* beetles were low. However, *C. arvensis* was an unexpected discovery in the Skallingen habitat, and according to the naturbasen.dk website, it is a new record for that locality. The closest observation of *C. arvensis* predates 2012 and was made near Esbjerg, about 35 km away. This report extends knowledge of the distribution of *Carabus* species in Denmark.

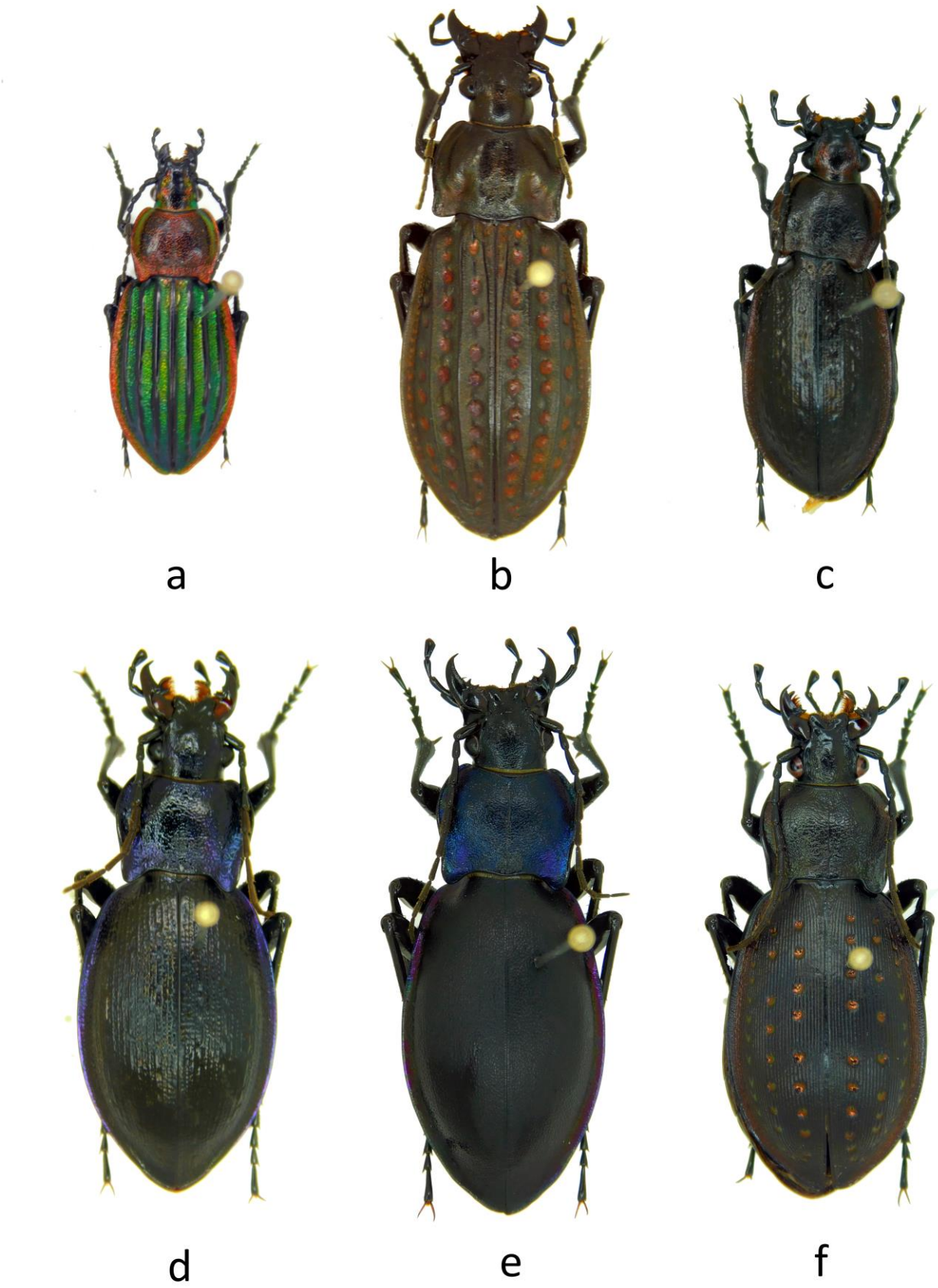


Fig. 4. *Carabus* species in South Denmark; a, *Carabus nitens* Linnaeus, 1758; b, *C. clatratus* Linnaeus, 1761, © I. Peeters.

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