

A field report on *Carabus* species (Coleoptera: Carabidae) in the Netherlands during October 2021

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Abstract. The author reports several *Carabus* species, found during a field trip in October 2021 in The Netherlands. Following information about the species concerned, the habitats these species were found are discussed.

Samenvatting. De auteur bespreekt verschillende *Carabus* soorten die tijdens een excursie in oktober 2021 in Nederland werden gevonden. Naast het meedelen van soortspecifieke informatie worden ook de habitats besproken.

Résumé. L'auteur rapporte la présence de plusieurs espèces de *Carabus*, qui ont été trouvées lors d'une excursion sur le terrain en octobre 2021 aux Pays-Bas. En plus des informations relatives aux espèces concernées, les habitats dans lesquels elles ont été trouvées sont discutés.

Key words: *Carabus cancellatus* — *Carabus granulatus* — *Carabus problematicus* — *Carabus violaceus*.

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Introduction

Carabus beetles belong to the insect Order Coleoptera Family Carabidae, the ground beetles. In The Netherlands, the genus *Carabus* is currently represented by 14 species. Two other *Carabus* species, *Carabus intricatus* Linnaeus, 1761 and *C. glabratus* Paykull, 1790 are considered to be extinct in the Netherlands (Turin 2000; Muilwijk *et al.* 2015).

Fluctuations in population numbers are not uncommon in some of the Dutch *Carabus* species, e.g. *Carabus cancellatus* Illiger, 1798 and *C. nitens* Linnaeus, 1758 (de Haan & Turin 2017). In other cases, species thought to have disappeared from the Netherlands can resurface. For instance, the last known verified observation of a population of *C. convexus* Fabricius, 1775 in The Netherlands dates back to 1981 (Turin 1983). Until then, *Carabus convexus* occurred very locally in Limburg, but official observations after 1981 are lacking (Turin 1983). However, after an absence of more than 100 years in the region around Nijmegen, *C. convexus* was rediscovered there in 2007 (de Haan & Turin 2017).

C. (Megodontus) violaceus ssp. *purpurascens* Fabricius, 1787 was thought to be the only representative of the *Megodontus* subgenus in the Netherlands (de Haan & Turin 2017). In 2013, a Dutch population of another subspecies of *Megodontus* was found: *Carabus (Megodontus) violaceus* ssp. *violaceus* Linnaeus, 1758 was discovered in the Province of Drenthe (de Haan & Turin 2017). Triggered by this observation, the author undertook a field trip to two locations in the Provinces of Drenthe and Overijssel, in search of *Carabus* species (Fig. 1).

Material and methods

When ambient environmental temperatures drop below a specific threshold, *Carabus* beetles go into hibernation. Most species seek refuge under the bark of rotten tree trunks, hide inside dead wood or under moss-covered stumps, and these are the places that should be investigated to find *Carabus* beetles during the winter. In

this investigation, together with the habitat, several species were photographed *in situ*.

A small number of individuals was collected, some of which will be deposited in the Entomological Collection of the Royal Belgian Institute of Natural Sciences (RBINS) in Brussels, Belgium.



Fig. 1. The two sampling sites in The Netherlands where *Carabus* spp. were collected. The location in Overijssel is indicated with a red dot, the location in Drenthe is marked in blue. © I. Peeters.

Sampling site in Overijssel

The first sampling site, near Steenwijk, consists of about 850 hectares of forest, heathland, fens and arable fields. The primary aim was to find *C. (Tachypus) cancellatus*, a *Carabus* of average size (18–25 mm). This species is copper to bronze in colour, occasionally with a greenish lustre.



Fig. 2. A forest edge, adjacent to arable lands near Steenwijk, the Netherlands, 31.x.2021. © I. Peeters.

The antennae and legs are black, but the scapes are dark orange. Some individuals have orange-brown femora. The body-form is rather convex, with a pronounced pattern of continuous primary longitudinal keels and secondary catenulated keels on the elytra. The pronotum is relatively broad.



Fig. 3. A hibernating rufofemoral *Carabus cancellatus*, near Steenwijk, The Netherlands, 31.x.2021. © I. Peeters.

Carabus cancellatus is considered to be a eurytopic and mesophilic species. It inhabits dry, open habitats such as timber-felling sites, forest clearings, heathlands, forest edges and farming lands with flower-rich edges, preferably in a mosaic structure (Thiele 1977, Vandekerkhove 2008).

Therefore, the decision was made to search for hibernating individuals in the transition zone between arable land and woodland (Fig. 2). Within two hours, 4 separately hibernating specimens of *C. cancellatus* were found inside dead tree trunks (Fig. 3). Two individuals had orange-brown femora (Figs. 8a, 8b).

Here, the forest edge consists mainly of spruce trees, beech, birch and some chestnut and oak trees. The undergrowth vegetation is dominated by ferns and some bramble bushes. In addition, an isolated patch of a rather moist woodland, situated about 1 km away from the first location, was also searched (Fig. 4). This location was surrounded by farmlands and drainage ditches, of which two were broad and deep. Within an hour, three more specimens of *C. cancellatus* were found, including two rufofemoral individuals. A single *C. (Carabus) granulatus* Linnaeus, 1758 (Fig. 8c) was also found. *C. granulatus* is a typical species of wetland margins, peaty brooks, permanently damp shaded deciduous forests and wooded banks near brooks.



Fig. 4. A forest edge, next to an overgrown drainage ditch and arable land near Steenwijk, the Netherlands, 31.x.2021. © I. Peeters.

Carabus violaceus violaceus* vs. *Carabus violaceus purpurascens

The second target species was *Carabus (Megodontus) violaceus* ssp. *violaceus* (Fig. 8e). As mentioned earlier, *Carabus (M.) violaceus* ssp. *purpurascens* (Fig. 8g) was considered to be the only Dutch member of the *Megodontus* complex before the discovery of *C. violaceus* s. str. In the past, the systematic classification of *purpurascens* has proved to be very difficult. It is ranked as a distinct species in several publications (Jeannel 1941; David & Marchal 1968; Darnaud *et al.* 1979; Blumenthal 1981; Forel & Leplat 1995). Other authors retain the subspecific rank (Brezina 1994; Turin 2000; Deuve 2004; Matern *et al.* 2011; Maguerre 2016; Prunier 2017; Deuve 2019). Today, following a morphometric investigation by Assman & Schnauder (1998) and the results of genetic research by Osawa *et al.* (2004) and Matern *et al.* (2011) the subspecific status of *purpurascens* is justified.

In regions where both *C. v. purpurascens* and the nominate form *C. violaceus* s. str. coexist, hybridization is possible, both on a primary and a secondary contact level. The latter is described as the process in which two allopatric populations of a species are geographically reunited and gene exchange takes place. With the *purpurascens* subspecies, such contacts can result in a degradation of the elytral striae. They can become partially reduced, or even disappear completely, showing intermediate characters between subspecies (var. *asperulus*, var. *asperipennis* and var. *palliardi*). For instance, near Elsenborn (Belgium), a population of *purpurascens* occurs in which more than 90% of the individuals show stages of degraded elytral patterns. Some individuals have a striking resemblance to *C. violaceus* s. str. (pers. obs. 2010, 2015, 2017) (Fig. 8f).



Fig. 5. *Carabus violaceus violaceus* in situ, Drenthe, the Netherlands, 31.x.2021 © I. Peeters.

The southwestern part of Lower-Saxony (Germany) hosts populations of both *Carabus violaceus* s. str. and *C. violaceus* ssp. *purpurascens* (Assmann & Schnauder 1998, Matern *et al.* 2011, Kerbtier 2010–2021); the Dutch population is located very close to the border in the southeast of Drenthe (de Haan & Turin 2017), so the decision was made to search in that particular part of The Netherlands. After some unsuccessful attempts, the first *C. violaceus* ssp. *violaceus* was found in a part of a planted forest, extending over 450 hectares (Fig. 5). The patch consisted exclusively of beech trees (Fig. 6). More specimens were found in a different area with several coniferous tree species (Fig. 7). Within 1,5 hours, 11 specimens of *C. violaceus* s. str. were found. In addition, 8 *C. problematicus* Herbst, 1786 (Fig. 8d) were also encountered. During the search, despite the expectations, not a single *C. violaceus* ssp. *purpurascens* was seen.



Fig. 6. A patch with beech trees as a habitat for *Carabus violaceus violaceus*, Drenthe, the Netherlands, 31.x.2021. © I. Peeters.



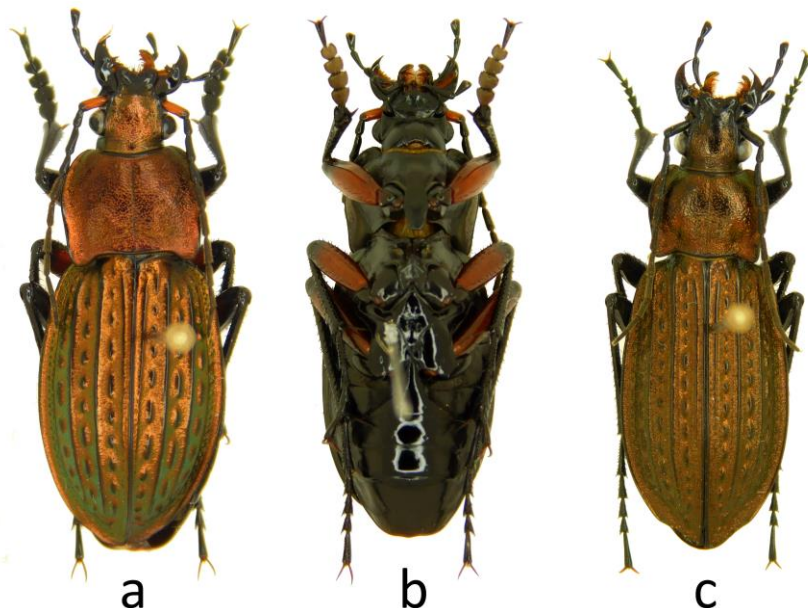
Fig. 7. A patch with coniferous trees, inhabited by *Carabus violaceus violaceus* and *Carabus problematicus*, Drenthe, the Netherlands, 31.x.2021. © I. Peeters.

At present, this forest is the only known locality of *C. violaceus* ssp. *violaceus* in The Netherlands. Even though the species seems to be quite abundant there, the exact location will not be disclosed. One important question about its occurrence in this particular forest in The Netherlands remains unanswered: how did the species get there? There are three possible explanations. First, since the location has been afforested during the first part of the 20th century, it can be hypothesised that *C. violaceus* s. str. was introduced to this location, deliberately or accidentally. Alternatively, it could be an overlooked relict population, since the forest is adjacent to a smaller but much older, natural oak-beech forest in the east. If the latter was inhabited by the species before the afforestation, the possibility of natural dispersal is likely. Forest ground beetle assemblages are able to colonize sites which were not forested in the past (Desender *et al.* 2006).

Thirdly, the chances of *C. violaceus* s. str. having found its way over from Germany through natural dispersion are virtually non-existent. The species is a flightless forest specialist with low dispersal power (Matern *et al.* 2011). Forest dwellers such as *C. violaceus* need connected, adjacent forests to reach and colonize more recent, afforested woodlands (Desender *et al.* 2005), and here the landscape is highly fragmented. The Dutch locality is completely isolated and lacks direct connection to the German border. However, even though neighbouring forests are not connected to the one inhabited by *C. violaceus* s. str., they are well worth a closer investigation in the future. Positive results may support the second theory.

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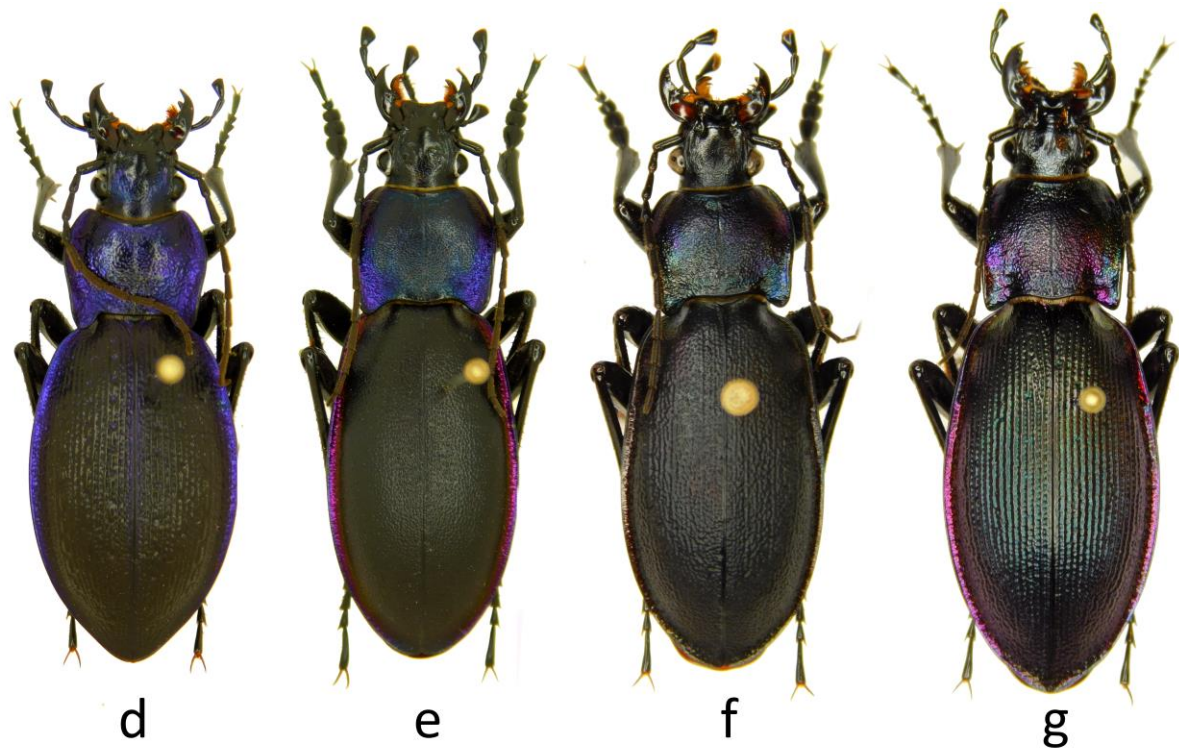


Fig. 8. *Carabus cancellatus* (a-b), *C. granulatus* (c), *C. problematicus* (d), *C. violaceus violaceus* (e), *C. violaceus purpurascens* with resolved striae from Elsenborn, Belgium, x.2010 (f), *C. violaceus* ssp. *purpurascens* type from Bad Honnef, Germany, xi.2017 (g). © I Peeters.

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