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New data on the distribution and ecology of *Camponotus oertzeni* Forel, 1889 (Hymenoptera: Formicidae) in Eastern Europe and the Caucasus

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Abstract. New data on the distribution and ecology of *Camponotus oertzeni* Forel, 1889 (Hymenoptera: Formicidae) are presented. The species is recorded for Russia, Ukraine, Armenia, Abkhazia and South Ossetia for the first time. In the North Caucasus (Russia), the species occupies a wide range of habitats, from humid beech-hornbeam forests in Krasnodar Region and the Republic of Adygea to moderately dry valleys in the Kabardino-Balkarian Republic. Considerable colour variation was observed among worker caste. While typical southern populations representatives of *C. oertzeni* exhibit yellowish-red to reddish colouration of the head, mesosoma, and legs, northern populations from the Caucasus and Ukraine are distinctly darker, with almost black heads and mesosomas, and only slightly lighter brown to yellowish legs. This trend may reflect either genetic differentiation or environmental influence. Morphological differences from the related *C. aethiops* (Latreille, 1798) are discussed.

Key words: *Camponotus oertzeni*, *Tanaemyrmex*, Eastern Europe, colour polymorphism, population differences.

Новые данные о распространении и экологии *Camponotus oertzeni* Forel, 1889 (Hymenoptera: Formicidae) в Восточной Европе и на Кавказе

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Резюме. Приведены новые данные о распространении и экологии *Camponotus oertzeni* Forel, 1889 (Hymenoptera: Formicidae). Вид впервые указан для России, Украины, Армении, Абхазии и Южной Осетии. На Северном Кавказе (Россия) вид населяет широкий спектр местообитаний – от влажных буково-грабовых лесов на территории Краснодарского края и Республики Адыгея до сухих котловин в Кабардино-Балкарской Республике. Среди рабочих особей наблюдались значительные различия в окраске. В то время как типичные представители южных популяций *C. oertzeni* имеют от желтовато-красной до красной окраску головы, мезосомы и конечностей, северные популяции, обнаруженные на Кавказе и на Украине, явно темнее, с почти черной окраской головы и мезосомы и лишь слегка более светлыми, от коричневого до желтоватого цвета, ногами. Эта тенденция может отражать либо генетическую дифференциацию, либо влияние факторов среды. Обсуждаются морфологические различия с родственным видом *C. aethiops* (Latreille, 1798).

Ключевые слова: *Camponotus oertzeni*, *Tanaemyrmex*, Восточная Европа, цветовой полиморфизм, популяционные отличия.

Introduction

The ant fauna (Hymenoptera: Formicidae) is relatively well studied in Europe. However, detailed studies have led to the discovery of previously unknown species in Eastern Europe and the North Caucasus [Yusupov, 2009, 2014;

Radchenko, Yusupov, 2012, 2017; Radchenko et al., 2016; Shevchenko, 2024, etc.].

Camponotus oertzeni Forel, 1889 is a member of the subgenus *Tanaemyrmex* Ashmead, 1905. According to Borowiec and Salata [2022], *C. oertzeni* belongs to the complex of large species with setose gena, pubescence of

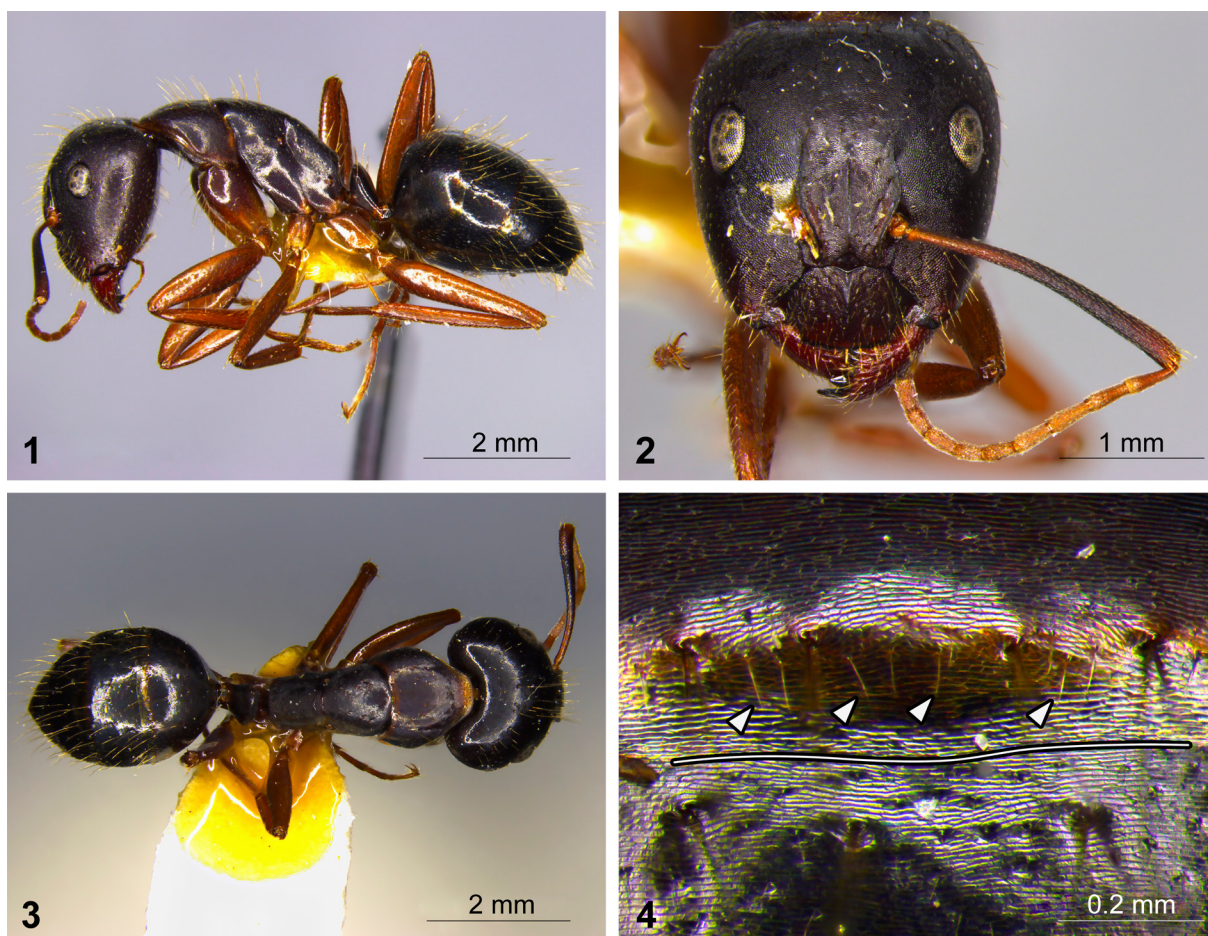
antennal scapi and posterior tibiae lacking suberect hairs. This complex also includes *Camponotus aethiops* (Latreille, 1798), *C. jaliensis* Dalla Torre, 1893 and *C. sannini* Tohmé et Tohmé, 2000. *Camponotus oertzeni* is most similar to *C. aethiops*, which is widespread in Europe and Central Asia. Previously, *C. oertzeni* was known from Slovenia, Croatia, Serbia, Montenegro, Northern Macedonia, Bulgaria, mainland Greece, the Aegean Islands, Crete, the Cyclades, the Dodecanese, the Ionian Islands, Türkiye, Azerbaijan and Iran [Forel, 1889; Emery, 1908, 1915; Finzi, 1928, 1939; Menozzi, 1936; Agosti, Collingwood, 1987; Radchenko, 1997; Borowiec, 2014; Borowiec, Salata, 2012, 2017a, b, 2018a, b, 2022; Bračko et al., 2016; Karaman, Kiran, 2022; Lapeva-Gjonova, Antonova, 2022].

Through the examination of the collections of the Zoological Museum of Moscow State University (ZMMU, Moscow, Russia) and the Zoological Institute of the Russian Academy of Sciences (ZISP, Saint Petersburg, Russia), as well as our own collected material, we record *C. oertzeni* for Russia (Krasnodar Region, the Republic of Adygea, Stavropol Region, the Kabardino-Balkarian Republic, the Republic of Dagestan), Ukraine (Kiev and Vinnitsa regions),

Armenia (Gegharkunik Region), Abkhazia and South Ossetia for the first time. Ecological preferences in the North Caucasus and variability in worker caste colouration are discussed.

Material and methods

Most of the specimens studied were found in the collections of ZMMU and ZISP. The majority of specimens were labeled as *C. aethiops* (*C. maculatus aethiops*) or had only a geographic label. Material was also collected by the first and second authors in the period from 2005 to 2024, on the territory of Russia (Republic of Adygea, Republic of Dagestan and Kabardino-Balkarian Republic, Krasnodar and Stavropol regions), Armenia and Abkhazia. The material from South Ossetia was collected by Yu.E. Komarov. Hand collection and nest excavation were the main methods used. Ants were also collected using standard pitfall traps. The material was preserved in 70% ethanol. The photos were taken using a Leica M205C microscope at the Research Park of St Petersburg State University ("Resource Centre

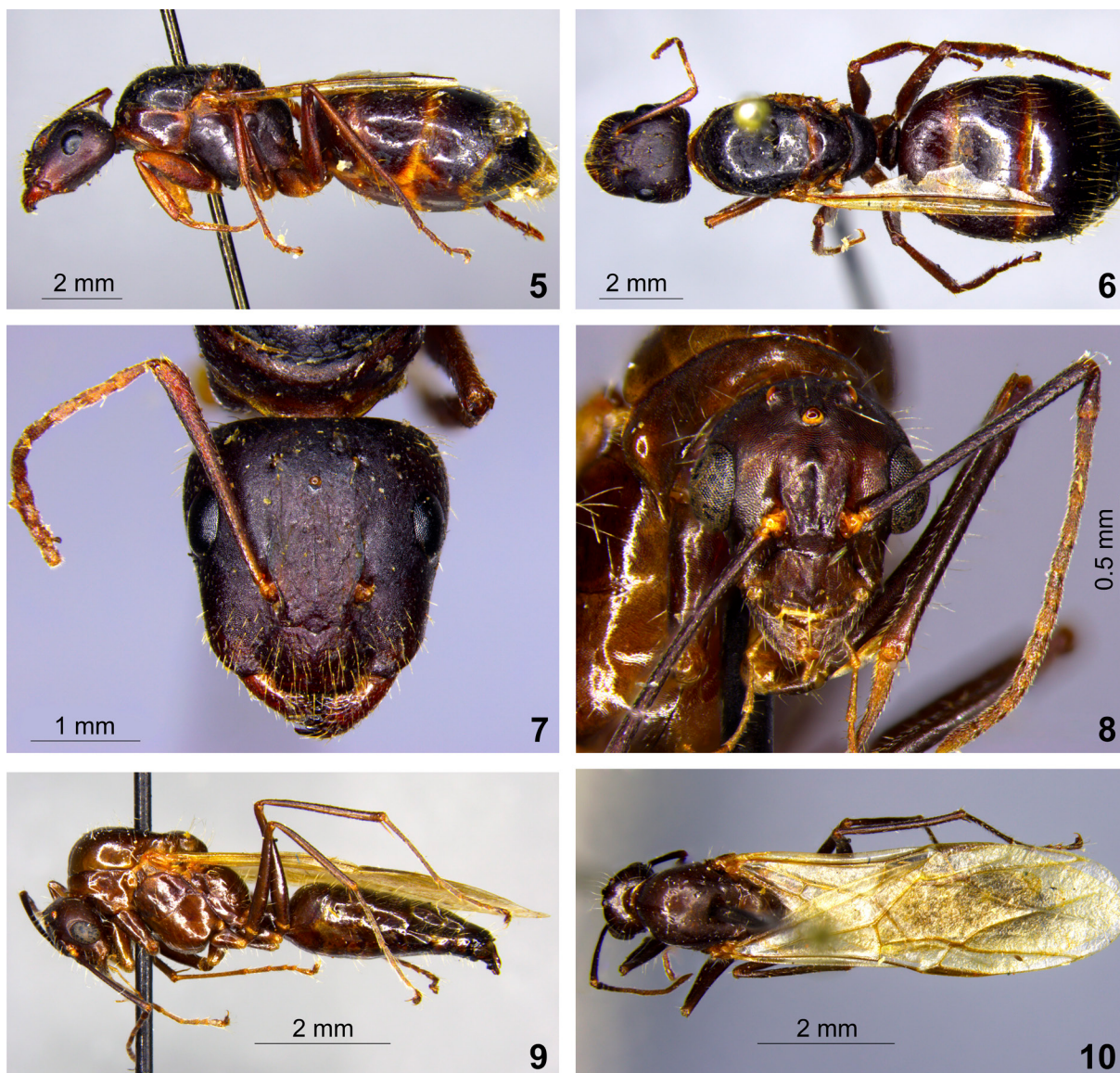


Figs 1–4. *Camponotus oertzeni* worker, habitus, details.

1, 3 – worker: 1 – lateral view, 3 – dorsal view; 2 – head, frontal view; 4 – the transverse row of short setae on the posterior margin of the first gastral tergite (white line indicates the end of the first tergite, the arrows point to the ends of the setae).

Рис. 1–4. *Camponotus oertzeni*, рабочий, габитус, детали строения.

1, 3 – рабочий: 1 – латерально, 3 – дорсально; 2 – голова, фронтально; 4 – поперечный ряд прилежащих волосков на заднем крае первого тергита брюшка (белая линия обозначает заднюю границу первого тергита, стрелки указывают на вершины прилежащих волосков).



Figs 5–10. *Camponotus oertzeni*, habitus, details.

5–7 – gyne: 5 – lateral view, 6 – dorsal view, 7 – head, frontal view; 8–10 – male: 8 – head, frontal view, 9 – habitus, lateral view, 10 – habitus, dorsal view.

Рис. 5–10. *Camponotus oertzeni*, габитус, детали строения.

5–7 – самка: 5 – габитус, вид сбоку, 6 – габитус, вид сверху, 7 – голова, вид спереди; 8–10 – самец: 8 – голова, вид спереди, 9 – габитус, вид сбоку, 10 – габитус, вид сверху.

for Microscopy and Microanalysis”). Specimens are temporarily kept in the author’s collections (PCSH – D.M. Shevchenko’s collection, PCZY – Z.M. Yusupov’s collection) and will be deposited in ZISP, ZMMU and the Tembotov Institute of Ecology of Mountain Territories of the Russian Academy of Sciences (Nalchik, Russia). The following abbreviations are given in the “Material” section for ant castes: “w” for worker, “g” for gyne and “m” for male.

Camponotus oertzeni Forel, 1889
(Figs 1–10)

Material. Russia. Krasnodar Region: Sochi District: 1 w (ZMMU), “326. Abrau, N-W Caucas. 26.07.[19]21 Arnoldi”; 3 w (ZMMU), “Sochi, 20.04.1916, №660 N Koltzov”; 1 w (ZMMU), “642. Bez. Sotschi 08.1926 W. Alpatow”; 2 w (ZMMU), “Сочи (Кавказ), 14.07.1927, И. Гудим”

[Sochi (Caucasus), I. Gudim]; 2 w (ZMMU), “5256 Sotschi 07.[19]31, V. Lutschnik”; 3 w (ZMMU), “5258 Sotschi 08.[19]31, V. Lutschnik”; 1 w (ZMMU), Matsesta, 6.05.1931 (Y.I. Kostylev); Tuapse District: 2 w (PCZY), Gorskoe vill. env., edge of a broad-leaved forest, forb-couch grass community, near a stream, 44°21’36.0”N / 38°43’12.0”E, 108 m, 14.06.2008 (Z.M. Khanov). Republic of Adygea, Maikop District: 4 w (ZMMU), “6097 Шунтук, Майкоп, Сев. Кавказ, Арнольди” [Shuntuk, Maykop, North Caucasus, Arnoldi]; 12 w (PCZY), Kamennomostskiy settlement env., oak forest with rhododendron, nest in soil, workers collected in the leaf litter and in the thicket of ferns, 44°17’00.0”N / 40°09’00.0”E, 652 m, 29.07.2011 (Z.M. Yusupov); 5 w (PCSH), Nickel settlement env., Granitnoe Gorge, on a rocky slope in the floodplain of the Belaya River, 44°09’48.23”N / 40°08’28.64”E, 520 m, 19.06.2024 (D.M. Shevchenko); 1 w (PCSH), Ust’-Sakhray settlement env., Sakhray waterfall, beech and hornbeam forest, on rocky granite outcrops, 44°09’04.67”N / 40°17’43.31”E, 600 m, 24.06.2024 (D.M. Shevchenko); 2 g, 3 w (PCSH), Dakhovskaya Cossack vill. env., oak forest on the stony slope of Dakhovskaya kuesta, 44°14’31.96”N / 40°10’23.02”E, 740 m, 22.06.2023 (D.M. Shevchenko). Stavropol Region: 25 w (PCZY), Pyatigorsk, Mashuk Mt., mixed-grass meadow on the edge

of broad-leaved forest, nest in soil, 44°02'58.0"N / 43°04'45.8"E, 658 m, 1.06.2013 (Z.M. Yusupov). Kabardino-Balkarian Republic, Cherekskiy District: 4 w (PCZY), Verkhnyaya Balkariya vill. env., semiarid valley, SE slope, upland xerophytic vegetation, nest in soil, 43°08'29.7"N / 43°27'34.7"E, 1232 m, 13.08.2005 (Z.M. Yusupov); 5 w (PCZY), the same place, nest in soil, 18.08.2005 (Z.M. Yusupov); 9 w (PCZY), the same place, nest in soil, 17.06.2007 (Z.M. Yusupov). Republic of Dagestan, Buynaksk District: 3 w (PCZY), 1.5 km SE of Dubki vill., oak forest, nest in soil, under the stone, 43°00'18.0"N / 46°51'10.8"E, 610 m, 3.05.2019 (Z.M. Yusupov).

Armenia. Gegharkunik Region: 4 w (PCZY), Sevan Lake env., rock outcrops, xerophytic vegetation, on stones, 40°35'43.8"N / 44°57'55.6"E, 1920 m, 27.05.2021 (Z.M. Yusupov); Lori Region: 15 w (PCZY), 2 km N Pambak vill., oak forest with large stones, nest in soil, 40°50'29.8"N / 44°33'48.6"E, 1319 m, 29.05.2021 (Z.M. Yusupov).

Abkhazia. Gagra District: 1 w (ZMMU), "Ermolovskoe pr. Gagry 08.08.1933, G. Kostylev" (= Tsandripsh village); 3 w (ZISP), "Тарпы, зап. Кавказ, Арнольди 18.06.1933" [Gagra, Western Caucasus, Arnoldi]; 1 w (ZMMU), "Абхазия, Гагра, 20.09.1963, В. Ковалёв" [Abkhazia, Gagra, V. Kovalyov]; Gulripsh District: 4 m, 1 w (ZISP), "Ажары у Чхатлы на Кодоре, Сухум. Калишевс. 14.07.05" [Azhara vill. near Chkhatala River on Kodor, Sukhum. Kalishevskiy. 14.07.1905]; 3 w (ZISP), same data, but 17.07.1905; 2 g, 1 w (ZISP), same data, but 18.07.1905; 1 g, 2 w (ZISP), same data, but 21.07.1905; 6 g, 1 w (ZISP), "р. Чхатла, у впад. в Кодор, Сухум. о. Калишевс 01.08.05" (Chkhatala River at the confluence with the Kodor River, Sukhum env. Kalishevskiy 1.08.1905); 2 g, 5 w (ZISP), "Лага на Кодоре, Сухум. окр. Калишевс 19.08.05" [Lata vill. on Kodor River, Sukhum env. Kalishevskiy 19.08.1905]; Sukhum District: 3 w (PCZY), Sukhum, agrocenosis, nest in soil, on the area with sparse herbaceous vegetation, 42°58'25.0"N / 41°04'02.7"E, 10 m, 12.07.2006 (Z.M. Yusupov); 6 w (PCZY), in the same place, in the grass, 12.07.2006 (Z.M. Yusupov).

South Ossetia. Tskhinval District: 4 w (PCZY), 1 km NW Pris vill., oak forest, 42°13'53.9"N / 43°58'57.3"E, 850 m, 10.05.2013 (Yu.E. Komarov); 1 w (PCZY), in the same place, pine forest, 13.07.2013 (Yu.E. Komarov); 35 w (PCZY), in the same place, oak forest, 13.07.2013 (Yu.E. Komarov); 10 w (PCZY), oak forest, on the trail, 42°13'34.9"N / 44°00'42.0"E, 870 m, 25.05.2013 (Yu.E. Komarov); 19 w (PCZY), in the same place, 16.06.2013 (Yu.E. Komarov); 1 w (PCZY), 500 m NW of Tskhinval, 42°13'58.0"N / 43°57'15.6"E, 810 m, oak forest, 15.06.2013 (Yu.E. Komarov); 9 w (PCZY), in the same place, pine forest, 13.07.2013 (Yu.E. Komarov); 1 w (PCZY), in the same place, oak forest, 13.07.2013 (Yu.E. Komarov); 1 w (PCZY), in the same place, pine forest, 30.08.2013 (Yu.E. Komarov); 12 w (PCZY), in the same place, oak forest, 30.08.2013 (Yu.E. Komarov); 1 w (PCZY), Tskhinval, wasteland behind the former railway station, 42°14'36.2"N / 43°58'02.2"E, 800 m, 22.06.2014 (Yu.E. Komarov); 1 w (PCZY), Atsriskhev vill. env., South Ossetian State Reserve, in the grass, 42°17'32.7"N / 44°13'23.1"E, 1220 m, 20.06.2014 (Yu.E. Komarov); 52 w (PCZY), 1 km SE Atsriskhev vill., South Ossetian State Reserve, hornbeam forest, under the stone, 42°17'45.4"N / 44°13'44.8"E, 1280 m, 21.06.2014 (Yu.E. Komarov); 78 w (PCZY), in the same place, under the stone, 21.06.2014 (Yu.E. Komarov); 27 w (PCZY), Zonkar vill. env., Malo-Liakhi gorge, S slope, hornbeam forest, 42°17'27.2"N / 44°09'31.0"E, 1372 m, 21.06.2014 (Yu.E. Komarov); 2 w (PCZY), Atsriskhev vill. env., Malo-Liakhi gorge, S slope, hornbeam forest, pitfall traps, 42°18'10.6"N / 44°14'32.6"E, 1260 m, 2.10.2014 (Yu.E. Komarov); 1 w (PCZY), 2.5 km S Belot vill., SE slope, mixed-grass meadow among hornbeam forest, pitfall traps, 42°17'35.9"N / 44°07'45.1"E, 1250 m, 27.08.2015 (Yu.E. Komarov); 27 w (PCZY), 2 km E Atsriskhev vill., Malo-Liakhi gorge, South Ossetian State Reserve, S slope, glade among hornbeam forest, 42°18'19.9"N / 44°15'00.3"E, 1393 m, 18.05.2016 (Yu.E. Komarov); Znaur District: 1 w (PCZY), Verkhniy Bekmar vill. env., clearing among deciduous forest, on plants, 42°14'59.5"N / 43°49'40.0"E, 950 m, 30.08.2013 (Yu.E. Komarov).

Ukraine. Vinnitsa Region: 2 w (ZISP), "Цыбулевский лес Подольской губ. 03.04.1911 И. Якубовский №6/77" [Tsibulevskiy forest, Podolsk Province, I. Yakubovskiy]; Kiev Region: 1 w (ZMMU), "Канев. Киев. Обл. 17.06.1952г. Кришталя №124" [Kanev, Kiev Region, Kryshstal].

Notes. *Camponotus oertzeni* is morphologically similar to *C. aethiops*, which has probably led to misidentifications in the past, as the main distinguishing feature between these two species was thought to be the colouration of the workers. Radchenko [1997] stated that *C. oertzeni* differs from *C. aethiops* by the orange-red colouration of the head and mesosoma. More recent studies [Salata, Borowiec, 2018] have reported a wide range of colour variation in both species, indicating that colouration by itself is not a reliable diagnostic character. Instead, the most consistent

morphological difference is the length of the transverse row of short setae on the posterior margin of the first abdominal tergite: in *C. aethiops*, the setae of this row are long, usually reaching or exceeding the posterior margin of the tergite, whereas in *C. oertzeni* it is short, typically reaching only 1/2 to 2/3 of the tergite margin length (Fig. 4). Nonetheless, Salata and Borowiec [2018] noted that *C. aethiops* is generally darker, with a predominantly dark brown to almost black body and usually brown to black legs (although, in rare cases, individuals may have a reddish mesosoma and yellowish legs), while *C. oertzeni* populations commonly exhibit partly pale, yellowish-red to reddish heads, mesosomas, and legs. However, in the North Caucasus and Ukraine, the species shows darker colouration: head, mesosoma and abdomen are almost black, the femora and tibiae are light brown to yellow (Figs 1–3).

Camponotus oertzeni can also be distinguished from *C. aethiops* by its ecological preferences. While the latter species prefers dry open habitats, *C. oertzeni* inhabits wetter habitats like deciduous forests and open, yet moist rocky outcrops in floodplains. In the Republic of Adygea of Russia the species inhabits oak and beech-hornbeam forests, in which it settles in open areas such as clearings, edges and open rocky outcrops (Figs 11, 12). In the second half of June 2024 gynes of *C. oertzeni* were often found nesting in limestone crevices and under rocks in moist beech and hornbeam forests after the nuptial flight. In the Kabardino-Balkarian Republic of Russia the species also inhabits moderately dry valleys above the belt of deciduous forests (where it is suddenly not represented), in the belt of mountain xerophytes at an altitude of about 1200 m (Fig. 13).

Discussion

A wide colour polymorphism is a well-known phenomenon among various ant genera, including *Camponotus* Mayr, 1861 [Seifert, 2019; Csösz et al., 2022]. In the paper on the *Formica cinerea* species-group Seifert [2002] reported that the colour polymorphism in the workers of *Formica cinerea* Mayr, 1853 has more likely genetic basis than the ecological one, as he found three sites with syntopic occurrence of reddish and dark morphs. The difference in mesosoma colouration in northern populations of *C. oertzeni* may also be both genetic differences and environmental impact.

Interestingly, *C. aethiops*, which is more typical for semiarid valleys, in the Kabardino-Balkarian Republic of Russia is absent in these semiarid basins. On the territory of the region, it is represented only in the plain part, in the steppe zone. Probably, *C. aethiops* could not penetrate through the belt of moist broad-leaved forests, while *C. oertzeni* could and therefore occupy a habitat untypical for the species.

Records in southwestern Ukraine and in the North Caucasus significantly extend the northern boundary of the species distribution (Fig. 14). The presence of the species in Kiev Region of Ukraine is doubtful and needs to be verified. Since morphological characteristics allow us to clearly classify the specimens as *C. oertzeni*, an error in the labeling of the material seems possible.



Figs 11–14. Habitats and distribution of *Camponotus oertzeni*.

11 – oak forest on the stony slope of Dakhovskaya kuesta (Russia, Adygea); 12 – Granitnoe Gorge, a rocky slope in the floodplain of the Belaya River (Russia, Adygea); 13 – the semiarid basin in the belt of mountain xerophytes (Russia, Kabardino-Balkaria, vicinity of Verkhnyaya Balkariya village); 14 – distribution map including new data.

Рис. 11–14. Местобитания и распространение *Camponotus oertzeni*.

11 – парковый дубовый лес на каменистом склоне Даховской куэсты (Россия, Адыгея); 12 – Гранитное ущелье, каменистый склон в пойме реки Белой (Россия, Адыгея); 13 – субаридная котловина в поясе горных ксерофитов (Россия, Кабардино-Балкария, окрестности с. Верхняя Балкария); 14 – карта распространения с учетом новых данных.

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