



***Haematoloma dorsatum* (Ahrens, 1812) – a new cercopid species for Polish fauna (Hemiptera: Cicadomorpha: Cercopidae)**

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Abstract: *Haematoloma dorsatum* (Ahrens, 1812) has been recorded for the first time in Poland. This is a Mediterranean species associated with conifers with a dramatic north-eastward expansion in Europe over the last hundred years. The morphology and bionomy of the insect is presented and a potential threat to Scots pine forests is shortly discussed.

Key words: red-black pine bug, pine forest, insect pest, Poland

INTRODUCTION

Cercopidae is the largest family under Cercopoidea, a xylem-sap feeding insects, commonly named froghoppers or spittlebugs, belonging to Cicadomorpha – the suborder of Hemiptera (Carvalho & Webb 2005). The nymphal stages of this family produce mucopolysaccharides and proteins in Malpighian tubules (Rakitov 2002, Farina et al. 2022), which mixed with their urine, are used to make foam protective exudate, that prevents predators and parasites, as well as protect the insects from adverse weather conditions (Cryan & Svenson 2010, Tonelli et al. 2018). These insects feed on a great variety of plants, causing important losses on certain cultures all over the world, such as pasture crops, sugarcane, eucalyptus, rice and maize in Africa, America, China and Southeast Asia.

The actual classification of the family Cercopidae includes 1556 described species, distributed in 175 genera, 109 of which are placed in the Old World Cercopinae (Crispolon et al. 2023). Central European fauna counts four species (Holzinger et al. 2004) belonging to the genus *Cercopis* Fabricius, 1775: *C. vulnerata* Illiger in Rossi, 1807, *C. intermedia* Kischbaum, 1868, *C. arcuata* Fieber, 1844, *C. sanguinolenta* (Scopoli, 1763); and one species belonging to the genus *Haematoloma* Haupt, 1919: *H. dorsatum* (Ahrens, 1812).

Haematoloma dorsatum, known as red-black pine bug, was described by August Ahrens (1812, Fasc. I Tab. 21) from southern France (Montpellier) under the name *Cercopis dorsata* Germar. Haupt (1919) transferred this species to the genus *Haematoloma* Haupt, 1919, which later also incorporated the second species *Haematoloma balirana* Poisson, 1925.

Until the beginning of the 20th century, this species was restricted to the Mediterranean basin: Portugal, Spain, southern parts of France and Switzerland, Italy, Algeria, Greece and Turkey

(Nast 1933), but since the 1930s we can observe its significant north-eastward range expansion in Europe. After the first records in Belgium – 1913 (Van Stalle 1989), Germany – 1936 (Wagner 1939), and the Netherlands – 1942 (Reclaire 1944), the number of new localities increased dramatically in these countries over the next decades. In the late 1980's the species has been noticed on the German East Frisian island of Borkum (Haeseler & Niedringhaus 1988), in 1996 in Austria (Holzinger et al. 1996), and recently, in 2023 recorded from the Czech Republic – northwestern Bohemia (Malenovský, pers. comm.)

Although Moraal (1996) mention this species from Poland giving erroneous reference to the paper of della Giustina (1983), we are convinced we provide the first records of this species for the country.

MATERIAL AND METHODS

Information on the species distribution in Poland comes from the iNaturalist website and was verified by direct contact with the authors of the observations. The observations from the State Forests were provided by Sławomir Woźniak. Specimens (4 exx.) from the following locations: Miedzichód (29 May 2024), Trzciel (03 May 2024) and Międzyrzec (20 May 2024) were collected and are stored at the General Directorate of the State Forests - Forest Protection Centre in Szczecinek, ul. Mickiewicza 2, 78-400 Szczecinek. All photographs come from the authors and are published with their permission. The maps were generated in the program MapaUTM v.6, available from: <https://www.heteroptera.us.edu.pl/mapautm.html> (Gierlasiński 2024).

RESULTS

Systematics

Order: Hemiptera Linnaeus, 1758
 Suborder: Cicadomorpha Evans, 1946
 Superfamily: Cercopoidea Leach, 1815
 Family: Cercopidae Leach, 1815
 Subfamily: Cercopinae Leach, 1815
 Tribe: Cercopini Leach, 1815
 Genus: *Haematoloma* Haupt, 1919
 Species: *Haematoloma dorsatum* Ahrens, 1812

Morphology and ecology

Adults with body length 6.7–8.5 mm (males) and 6.9–8.6 mm (females). Base color black, thorax and legs completely black. Outer margin of forewings red. Forewings with a broad, red posterior band, a red spot in the clavus and a red spot in the corium, connected to the red outer margin. Coloration of forewings can be very variable, some specimens are nearly completely black, without any red coloration. Frons not clearly arched, not exceeding the front of the vertex (<https://www.truehopperswp.com/species/haematoloma-dorsata>).

Adults in Central Europe appear from the end of April until the end of July, sometimes until the end of August. They feed mainly on Scots pine (*Pinus sylvestris*), however, in southern and western parts of Europe they are also recorded from other conifers such as *Pinus nigra* (Arnold), *P. pinaster* (Aiton), *P. halepensis* Mill., *P. jeffreyi* Balf., *P. brutia* Ten., *P. ponderosa* Dougl. ex Laws and also *Abies* Mill., *Cedrus* Trew, *Cupressus* L., *Juniperus* L., *Picea* A. Dietr. and *Pseudotsuga Carrière* species (Cobos 1995, Covassi et al. 1989, Notario et al. 1981).

Their typical habitats are open forests in damp to dry sites, usually on limestone or sandy soils with well-developed grassy forest floor. The number of adults found on grasses can be



Fig. 1–9. *Haematoloma dorsatum* in Poland, habitus. 1–2 – Pamięcin Nature Reserve, 07.05.2023, photos by Paweł Fortuna; 3 – Zielonogórski Las Odrzański, 11.05.2024, photos by Ryszard Orzechowski; 4 – Warszewo, 05.05.2024 photos by Iwona Adamska; 6–7 – Gryfino, photos by Bogdan Palka: 6 – 04.05.2024, 7 – 29.04.2024; 8–9 – Chociszewo, 06.06.2023, photos by Lucyna Bugiera.

pretty high after they emergence in May, from where they migrate to the tree canopy and start feeding on pine needles and mate.

Eggs are white and spindle-shaped with a length-to-width ratio of about 1.3 to 0.4 mm. They are deposited single, sometimes in small clusters in the basal part of the grass stem (Roversi & Baccetti 1994).

Nymphs with body length 6.8-7.5 mm; body slender, head distinctly narrower than pronotum; general coloration light whitish with dark red eyes (Stockmann et al. 2013; with nymph drawing on page 199). They hatch in autumn and overwinter until next spring. Nymphs live in the litter layer and they feed in group of two to five individuals on the basal stem parts or roots of various grasses (Poaceae Barnhart), mainly *Deschampsia flexuosa* (L.) Trin. (acidic soils) and probably *Brachypodium pinnatum* (L.) P. Beauv. (on more basic substrates) (Roversi & Baccetti 1994). There are four nymphal instars, which develop within a protective mass of white spittle. Nymphs of the 5th stage emerge from the end of April till the beginning of May.

***Haematoloma dorsatum* as a forest pest**

The insect has been identified as a significant threat to pine stands in Spain, Italy and the Netherlands (Alonso et al. 1992, Cobos 1995, Covassi et al. 1989, Moraal 1996). Imagines that feed on pine needles have been observed to cause partial defoliation and weakening of pine trees, thereby increasing their susceptibility to colonization by secondary pathogens or pests.

Only adults are harmful to the pine trees, which, with their piercing-sucking mouthparts, penetrate the stomatal openings (Roversi et al., 1989). These insects prefer feeding on older pine needles, however, in some cases when the population of the cercopid is highly abundant, young needles of the current year can also be attacked. Due to the lesions caused by sucking, the needles reveal rows of yellowish to brownish rings around. The next step is drying and a subsequent reddening or browning of the pine needles, which drop down in June or July before full development. Interestingly, only the green needles of the current year are usually untouched and can be observed on infested trees. In the Netherlands, infestations were observed in young as well as in mature Scots pine stands.

The question arises whether *Haematoloma dorsatum* might be a potential vector of the bacterium *Xylella fastidiosa* responsible for the bacterial leaf scorch (BLS) disease of trees. Originating in the Americas, this plant pathogen has recently been detected for the first time in several European and Near Eastern countries: Italy (2013), France (2015), Switzerland (2015), Spain (2016), Germany (2016), Portugal (2019), and more recently, Israel (2019) (Almeida 2016, Frem et al. 2020). The bacterium has a very wide host range, encompassing 650 plant species in 82 different plant families, representing a significant threat to fruit crops such as grapevine, citrus, coffee, olive, peach or almond (Rapicavoli et al. 2018). Comparatively very little is known about *X. fastidiosa* on forest trees, although its strains were isolated from American elm (*Ulmus americana* L.), American sycamore (*Platanus occidentalis* L.) and northern red oak (*Quercus rubra* L.) (Harris et al. 2014). The spittlebugs of the family Aphrophoridae, close relatives to *Haematoloma dorsatum*, are considered the main vectors of this exotic plant pathogenic bacterium in Europe, with the confirmed role of *Philaenus spumarius* (Cornara et al. 2017). According to McGaha et al. (2007), it seems that conifers are non-hosts and might be resistant to *X. fastidiosa* because they lack the xylem vessels that the pathogen typically colonizes.

There is no known parasite, predator or environmental factor that would significantly affect the populations of *Haematoloma dorsatum*.

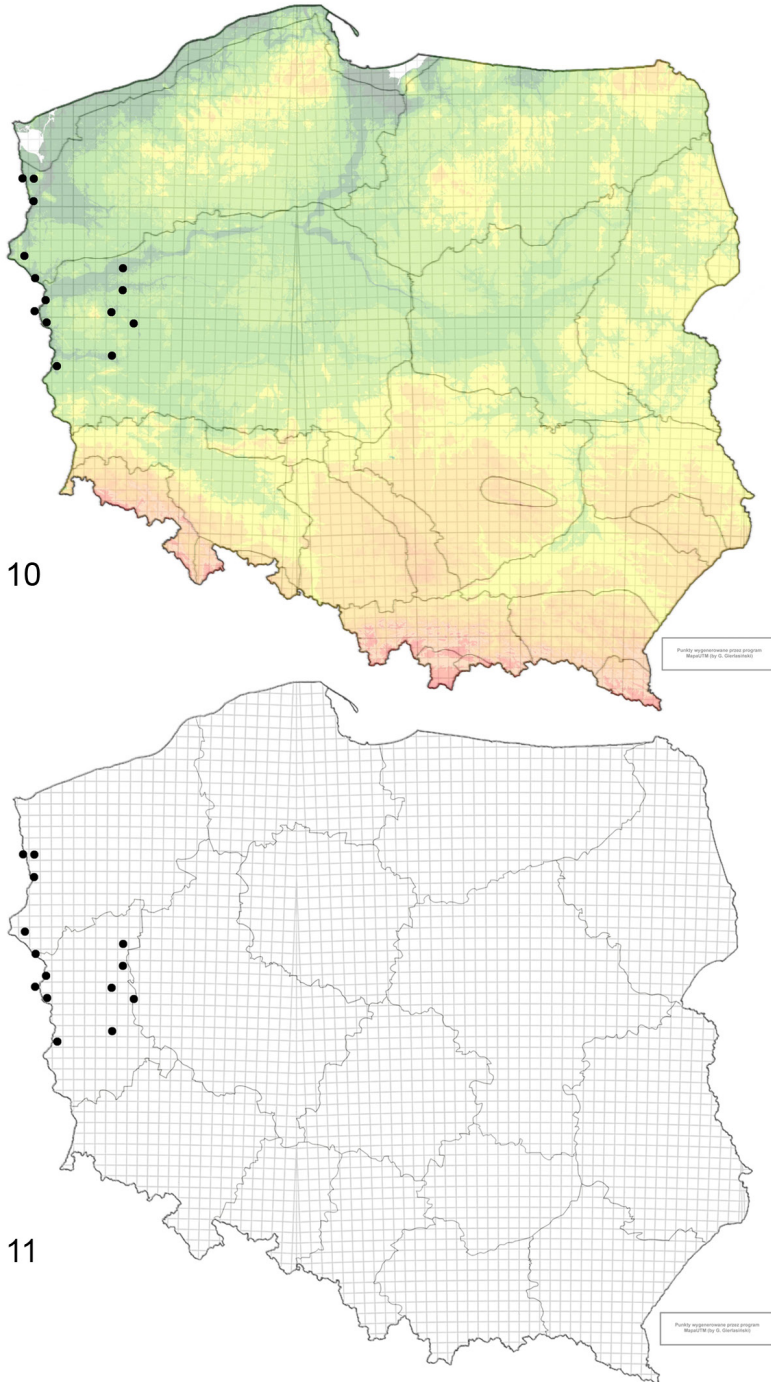


Fig. 10–11. Distribution of *Haematoloma dorsatum* in Poland (map generated with Mapa UTM ver. 6: Gierlasiński 2024). 10 – distribution of UTM squares based on the zoogeographical division of Poland (KFP); 11 – distribution UTM squares based on administrative division of the voivodeships of Poland.

Localities of *Haematoloma dorsatum* in Poland

The zoogeographical division of Poland (KFP) is presented according to Katalog Fauny Polski (Burakowski et al. 1973), physico-geographical regionalisation of Poland (RFG) follows Kondracki (2013).

Zachodniopomorskie voivodeship, KFP Pojezierze Pomorskie

- 1a) Gryfino; UTM: VV60; 4 May 2015 [53.2514836, 14.5188205]; macroregion RFG: Pobrzeże Szczecińskie, mesoregion RFG: Równina Wełtyńska; 1 ex. observed by Bogdan Pałka, <https://entomo.pl/forum/viewtopic.php?t=47284&sid=f6a35a8634cbfbbeb2c1b4f23f315000>;
- 1b) same place; 19 May 2021, 1 ex. observed by Bogdan Pałka;
- 1c) same place; 29 April 2024; several specimens observed by Bogdan Pałka at the grassy edge of the forests and field woodlands, one specimen in the pine forest with grassy undergrowth.
- 2) Mieszkowice, Cedyński Landscape Park; UTM: VU55; 29 April 2024 [52.8265909783, 14.297301583]; macroregion RFG: Pojezierze Południowopomorskie, mesoregion RFG: Równina Gorzowska, 1 ex. observed by Michał Kotowicz on the car, <https://www.inaturalist.org/observations/244885508>;
- 3a) Dobra Szczecińska, UTM: VV52; 7 May 2022; macroregion RFG: Pobrzeże Szczecińskie, mesoregion RFG: Równina Wkrzańska; 1 ex. observed by Iwona Adamska in the unmown meadow, <https://insektarium.net/gatunki-obce-hemiptera/haematoloma-dorsata-przekraska-sosnowka>.
- 3b) same place; 28 May 2021; 1 ex. observed by Iwona Adamska.
- 4) Warszewo, UTM: VV62; 5 May 2024 [53.4925, 14.5425]; macroregion RFG: Pobrzeże Szczecińskie, mesoregion RFG: Wzniesienia Szczecińskie; 1 ex. observed by Iwona Adamska in the unmown meadow.
- 5) Boleszkowice; UTM VU63; 23 May 2024 [52.707777, 14.513611]; macroregion Pradolina Toruńsko-Eberswaldzka, mesoregion Kotlina Freienwaldzka; forest district Dębno, forestry Boleszkowice, forest address: 10-06-1-09-460-h-00; 3 exx. observed by Sebastian Greszta on *Pinus silvestris* (91 year old tree).

Lubuskie voivodeship, KFP Nizina Wielkopolsko-Kujawska

- 1) Pamięcin Nature Reserve, Ujście Warty Landscape Park; UTM: VU71; 7 May 2023 [52.464806, 14.664712]; macroregion RFG Pojezierze Lubuskie, mesoregion RFG Pojezierze Łagowskie; 1 ex. observed by Paweł Fortuna in the grass overgrowing the *Quercus-Pinus sylvestris* forest floor, <https://www.inaturalist.org/observations/166134553>.
- 2) Komorów near Gubin; UTM: VT85; 5 June 2023 [51.962796, 14.781338]; macroregion RFG Wzniesienia Zielonogórskie, mesoregion RFG Dolina Dolnej Nysy Łużyckiej; 1 ex. observed by Aleksandra and Michał Śmigiel inside the car; some more individuals observed in the surrounding area, <https://www.inaturalist.org/observations/169255447>.
- 3a) Chociszewo near Trzciel; UTM: WT59; 6 June 2023 [52.315718, 15.750745]; macroregion RFG Pojezierze Lubuskie, mesoregion RFG Bruzda Zbąszyńska; 1 ex. observed by Lucyna Bugiera in the old orchard, <https://www.inaturalist.org/observations/165881811>;
- 3b) same place, 15 June 2023; 1 ex. observed by Lucyna Bugiera in the old orchard.
- 4) Zielonogórski Las Odrzański; UTM: WT36; 11 May 2024 [52.0333325, 15.5354957]; macroregion RFG Pradolina Warciańsko-Odrzańska, mesoregion RFG Kotlina Kargowska; 1 ex. observed by Ryszard Orzechowski at the edge of the riparian forest, <https://www.inaturalist.org/observations/218181328>.

- 5) Zielonogórski Las Odrzański; UTM: WT36; 18 May 2024 [52.0121444, 15.5650669999]; macroregion RFG Pradolina Warciańsko-Odrzańska, mesoregion RFG Kotlina Kargowska 1 ex. observed by Ryszard Orzechowski at the edge of the oak-hornbeam forest, <https://www.inaturalist.org/observations/218731658>.
- 6) Łęgi koło Słubic Nature Reserve; UTM: VU60; 18 May 2024 [52.3670895997, 14.5559682997]; macroregion RFG Pojezierze Lubuskie, mesoregion RFG Lubuski Przełom Odry; 1 ex. observed by Marek Adamski inside the riparian forest, <https://www.inaturalist.org/observations/216543344>.
- 7) Skwierzyzna; UTM: WU44; 29 May 2024 [52.70888, 15.733611]; macroregion Pradolina Toruńsko-Eberswaldzka, mesoregion Kotlina Gorzowska; forest district Międzychód, forestry Kraniec, forest address: 10-18-1-02-17-a-00; 2 exx. in copula observed by Sławomir Woźniak on *Pinus silvestris* (48 year old tree).
- 8) Trzciel; UTM: WT59; 03 May 2024 [52.345, 15.814722]; macroregion Pojezierze Lubuskie, mesoregion Bruzda Zbąszyńska; forest district Trzciel, forestry Jasieniec, forest address: 10-29-1-10-585-f-00; 1 ex. observed by Krzysztof Nowakowski on *Pinus silvestris* (6 year old tree).
- 9) Słubice; UTM: VT79; 8 May 2024 [52.322777, 14.592777]; macroregion Pojezierze Lubuskie, mesoregion Równina Torzymska; forest district Rzepin, forestry Bukowiec, forest address: 10-26-1-04-731-c-00; 1 ex. observed by Sławomir Woźniak on *Deschampsia cespitosa* (L.) P.Beauv. tussock.
- 10) Międzyrzecz; UTM: WU42; 20 May 2024 [52.558333, 15.590277]; macroregion Pojezierze Wielkopolskie, mesoregion Pojezierze Poznańskie; forest district Międzyrzecz, forestry Rokitno, forest address: 10-19-1-02-147-a-99; 1 ex. observed by Jacek Leśny on the car.
- 11) Międzyrzecz; UTM: WU30; 24 May 2024 [52.435277, 15.497222]; macroregion Pojezierze Lubuskie, mesoregion Bruzda Zbąszyńska; forest district Międzyrzecz, forestry Kursko, forest address: 10-19-1-09-179-b-00; 1 ex. observed by Sławomir Woźniak on *Pinus silvestris* (125 year old tree).

Location excluded from Poland

- 1) Zatoń Dolna, Cedyński Landscape Park; UTM: VU57; May 2023 [53.0099484287, 14.2956200798]; macroregion RFG: Pobrzeże Szczecińskie, mesoregion RFG: Dolina Dolnej Odry observed by Stefanie Mückner. <https://www.inaturalist.org/observations/162272280>
This individual from <https://www.inaturalist.org/observations/162272280> does not necessarily have to come from Poland, because the observation is listed as “Hidden“, and iNaturalist states as follow: “Publicly available coordinates available as a random point within 0.2 degrees lat/long of the true coordinates.” The photo caption says “Brandenburg, DE” and it is doubtful that the location on the map is on the Polish side.

DISCUSSION

Undoubtedly, the origin of this species in Poland is the migration from the Western Europe. During the second half of the 20th century the species has spread across the western part of Germany (Nickel 2003). The colonization of the eastern part of the country started from the localities of Salzwedel and Klötze (Sachsen-Anhalt) in 2002 (Nickel, pers. comm.) and it took the last twenty years when the species reached the German-Poland border – the records from iNaturalist in 2023 and 2024 are Schwedt/Oder, Torgelow and Frankfurt/Oder.

It would be beneficial to consider the factors that may have contributed to the rapid spread of the species across Europe. It is beyond doubt that climate-related variables such as temperature,

precipitation and weather extremes can affect the distribution and abundance of insects. This is because they can impact the availability of food resources, natural enemies, competitors and climate. However, it is often the complex interaction between these factors that creates insect population dynamics (Wainhouse & Inward 2016).

Temperature is the most significant abiotic factor influencing insect development rate and the seasonal timing of life-cycle events. However, it also exerts an influence on their host trees and natural enemies. A positive linear relationship exists between growth rate and temperature across the majority of the temperature range to which particular species are adapted. Higher temperatures facilitate range extension of species with a predominantly southern distribution. Furthermore, prolonged periods of hot, dry weather may result in tree water stress, which is beneficial for insects through changes in the nutritional quality of the host tree or a reduction in the effectiveness of its defenses (Day et al. 2004, Inward et al. 2012).

It is challenging to make precise predictions about the future impact of forest pests. However, some generalizations can be made based on the ecological characteristics of different insect groups. It seems probable that the damage caused by *Haematoloma dorsatum*, like that caused by aphids and other sap-sucking insects, will increase as the climate warms (Straw 1995). It can be expected that higher temperatures will increase the reproductive rate of these insects, and that drought stress of host trees may increase their susceptibility to attack. As predicting future risks of damage by insect pests is an important point of forest management, it is crucial to monitor the distribution of the newly recorded cercopid in Poland together with its potential harmfulness for Scots pine tree plantations.

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STRESZCZENIE

[*Haematoloma dorsatum* (Ahrens, 1812) – występowanie przekraski sosnówki (Hemiptera: Cicadomorpha: Cercopidae) w Polsce]

Praca przedstawia pierwsze dane o rozmieszczeniu owada – przekraski sosnówki *Haematoloma dorsatum* (Ahrens, 1812) w Polsce. Jest to gatunek pluskwiaka z rodziny krasankowatych (Cercopidae) o pierwotnym zasięgu mediterrańskim, o bardzo szybkiej ekspansji w Europie Zachodniej od lat trzydziestych XX-go wieku, obecnie z licznymi stanowiskami na obszarze Europy Środkowej – centralne i wschodnie Niemcy. Dorosłe osobniki pojawiają się od końca kwietnia do końca lipca, czasami do końca sierpnia. Główną rośliną żywicielską jest sosna zwyczajna (*Pinus sylvestris*), budująca drzewostany na miejscach zarówno suchych jak i wilgotnych, na glebach wapiennych i piaszczystych, z dobrze rozwiniętym trawiastym runem, które jest miejscem rozwoju larw. Dorosłe osobniki nakłuwają przy pomocy narządów gębowych kłująco-ssących igły sosen powodując przy masowych inwazjach ich osłabienie i obumieranie. W Polsce odnotowano jak dotąd pojedyncze stanowiska tego pluskwiaka w zachodniej części kraju, na obszarze województw zachodniopomorskiego i lubuskiego. Prawdopodobne jest rozprzestrzenienie się owada na dalsze obszary Polski, stąd celowe jest prowadzenie badań monitoringowych w drzewostanach iglastych oraz szkółkach drzew leśnych i ozdobnych.

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