Dolomedes plantarius (Araneae, Pisauridae) in Belarus: records, distribution and implications for conservation

Vladisalav Ivanov, Oleg Prishepchik & Ekaterina Setrakova

Abstract. Dolomedes plantarius (Clerck, 1757) is becoming another iconic species within European conservation programmes. It is commonly accepted that the densest populations of this species are situated in Western Europe and many records confirm this. At the same time Eastern European populations are often not taken into account when assessing future dynamics of species distribution due to climate change. Here we provide data about D. plantarius in Belarus, which includes both an extensive literature survey and our own records in different parts of the country. The evidence provided suggest that Belarus is currently a large refugium for the fen raft spider, which was found during the last 30 years practically everywhere where specialists were interested in its study. We suggest that involvement of international research teams in studies of D. plantarius in Belarus will ensure the most efficient population management in Europe.

Keywords: protected areas, Red List, spiders, vulnerable species


Dolomedes plantarius (Clerck, 1757) is the only protected spider in Belarus. It has conservation status III in the Red Book of Belarus (2006) and is considered as vulnerable (VU) according to the IUCN (World Conservation Monitoring Centre 1996). Despite its important status D. plantarius was not studied in Belarus in any detail and our current work is an attempt to put together all known records about this species as well as to present our own data. The distribution and status of D. plantarius in Europe was nicely discussed by Duffey (2012) and one of the points we also would like to emphasize is that this species is quite likely to have considerably more dense populations in various parts of Europe than was believed before. Recent discoveries in various countries confirm this idea (Duffey 2012). The information provided here about earlier records of D. plantarius in Belarus might seem to be excessive but most of the publications on which we based our research are in Belarusian or Russian and many of these works are conference presentations, hence unavailable for most of the arachnologists in the world. Also data about habitats and types of water bodies where this spider species was found might be of additional interest to ecologists and conservation biologists. We hope that provided data will be useful when planning conservation activities as well as will help to create more reliable models of D. plantarius population dynamics in Europe.

History of records of D. plantarius in Belarus

The first mention of D. plantarius in Belarus dates back to 1986 (Shlakhtyonok 1986). In his study the author claimed to have found this species in a dry (!) meadow with the help of a Barber trap. The meadow was located in the territory of the Biarezinski Biosphere Reserve, in the middle and north of the country. The identification was confirmed by the Russian arachnologist V. I. Ovcharenko. It is believed to be the first record of D. plantarius in Belarus, however, the close relative D. fimbriatus is known from previous work by Litvinova et al. (1980) where all the data about spiders of Belarus ever collected up to that time were systematized. It is quite possible that D. plantarius was caught earlier but identified as D. fimbriatus which used to be the typical situation in the first half of the 20th century (Helsdingen 1994). Unfortunately, the specimens collected by Shlakhtyonok (1986) is not available so we could not examine it. In the Red Book of Belarus (2006) there is also a mention of a site in the territory of national park “Prypiacki” where D. plantarius was collected sometime between 1986 and 2006 (the date when the Red Book was issued). The observation was most probably made by J. Zhukovets and there is no specimen available to check it.

It is very strange that such an interesting and large species was missed by specialists in Belarus so, in fact, there is a gap in the records that lasted for almost 20 years. We doubt that this was connected with rarity of the D. plantarius because our own investigations showed rather dense populations at different sites in this country.

The third record was in 2002-2003, but the data was published only in 2007 which meant it was not included into Red Book of Belarus published in 2006 (Moroz & Shavnova 2007). Dolomedes plantarius was collected with help of a hydrobiological net in two of eight sites. Both of the sites were lakes (Lubien and Karosina) in the territory of the National Park “Prypiacki”. The first lake, Lubień (52°03’49.2”N 28°12’35.2”E), where D. plantarius was present was flooded during the spring time. The shores were overgrown with Typha, Phragmites and Carex. The second lake, Karosina (52°04’09.9”N 28°11’58.7”E), was also flooded during snow
melting in spring and its shore was also overgrown with Typha, Phragmites and Carex, however at the very water line Stratiotes was present as well. Moroz & Shavanova (2007) did not provide the exact number of specimens collected and just show the percentage of D. plantarius among other spiders sampled in all sites and within the two where it was present (2.8, 4.76 and 3.9 % respectively). In total, 14 species of 6 families were collected at all 8 sites. No specimens of D. plantarius are available now.

The next unequivocal record comes from V. Lukin (Lukin 2006a). Dolomedes plantarius was found on the bank of an irrigation channel, two kilometres to the north of the village of Bahuščinka in 09.07.2004, 53°46′27.7″N 23°55′59.8″E. There were two females with egg sacs. One of them was taken to the laboratory and died within 5 days; no spiders emerged from the egg sac. In 2005, V. Lukin visited the same channel, but after the channel had been cleaned there were no Dolomedes at all (Lukin 2006b). We examined the specimen collected by Lukin and confirm its identity as D. plantarius; we also provide a photo of its epigyne (Fig. 1 a).

In the Brest region, in the south-western part of Belarus, Demjanczik (2006) reported the presence of D. plantarius within the reserve “Prybužskaje Paleśsie”, but no further information was provided. We decided to not include this record on our map as it is very doubtful. No known arachnologist from Belarus or abroad has worked at this site or has at least published anything on the matter. The record exists as part of a list with no exact site, picture or other evidence.

The next site where D. plantarius was definitely present was in the near vicinity of the Pyški forest, in the Hrodna region on the bank of the river Nioman, 2006, coordinates 53°40′40.5″N 23°46′52.9″E (Ryzhaya & Kopysova 2007). We could not examine the specimen, however it might still be preserved in the personal collection of Ryzhaya at the Hrodna State University.

The only record from National Park “Braslaŭskija lakes” dates back to 2007. Dolomedes plantarius was mentioned in a preliminary report of the project devoted to development of the National Park (Maksimienka 2011). The site mentioned is the shore of lake Ryčy in the vicinity of the village of Ščučyn, Demjanczik (2006) reported the presence of D. plantarius within the reserve “Prybužskaje Paleśsie”, but no further information was provided. We decided to not include this record on our map as it is very doubtful. No known arachnologist from Belarus or abroad has worked at this site or has at least published anything on the matter. The record exists as part of a list with no exact site, picture or other evidence.

The next site where D. plantarius was definitely present was in the near vicinity of the Pyški forest, in the Hrodna region on the bank of the river Nioman, 2006, coordinates 53°40′40.5″N 23°46′52.9″E (Ryzhaya & Kopysova 2007). We could not examine the specimen, however it might still be preserved in the personal collection of Ryzhaya at the Hrodna State University.

The only record from National Park “Braslaŭskija lakes” dates back to 2007. Dolomedes plantarius was mentioned in a preliminary report of the project devoted to development of the National Park (Maksimienka 2011). The site mentioned is the shore of lake Ryčy in the vicinity of the village of Ščučyn, Demjanczik (2006) reported the presence of D. plantarius within the reserve “Prybužskaje Paleśsie”, but no further information was provided. We decided to not include this record on our map as it is very doubtful. No known arachnologist from Belarus or abroad has worked at this site or has at least published anything on the matter. The record exists as part of a list with no exact site, picture or other evidence.

The next site where D. plantarius was definitely present was in the near vicinity of the Pyški forest, in the Hrodna region on the bank of the river Nioman, 2006, coordinates 53°40′40.5″N 23°46′52.9″E (Ryzhaya & Kopysova 2007). We could not examine the specimen, however it might still be preserved in the personal collection of Ryzhaya at the Hrodna State University.

The only record from National Park “Braslaŭskija lakes” dates back to 2007. Dolomedes plantarius was mentioned in a preliminary report of the project devoted to development of the National Park (Maksimienka 2011). The site mentioned is the shore of lake Ryčy in the vicinity of the village of Ščučyn, Demjanczik (2006) reported the presence of D. plantarius within the reserve “Prybužskaje Paleśsie”, but no further information was provided. We decided to not include this record on our map as it is very doubtful. No known arachnologist from Belarus or abroad has worked at this site or has at least published anything on the matter. The record exists as part of a list with no exact site, picture or other evidence.

The next site where D. plantarius was definitely present was in the near vicinity of the Pyški forest, in the Hrodna region on the bank of the river Nioman, 2006, coordinates 53°40′40.5″N 23°46′52.9″E (Ryzhaya & Kopysova 2007). We could not examine the specimen, however it might still be preserved in the personal collection of Ryzhaya at the Hrodna State University.

The only record from National Park “Braslaŭskija lakes” dates back to 2007. Dolomedes plantarius was mentioned in a preliminary report of the project devoted to development of the National Park (Maksimienka 2011). The site mentioned is the shore of lake Ryčy in the vicinity of the village of Ščučyn, Demjanczik (2006) reported the presence of D. plantarius within the reserve “Prybužskaje Paleśsie”, but no further information was provided. We decided to not include this record on our map as it is very doubtful. No known arachnologist from Belarus or abroad has worked at this site or has at least published anything on the matter. The record exists as part of a list with no exact site, picture or other evidence.
site or conditions there. It is quite probable that the specimen was on the bank of river Čarnica, but we cannot be sure (epigyne, Fig. 1 f). We cannot provide exact coordinates, so the specimen is marked with “?” in the table.

The sites where *D. plantarius* was most abundant (though we did not collect many specimens due to conservation reasons) were the rivers Vilija (north-west), Rasta and Biesiedź (south-east) and Zvaniec fen (south). Within all of these sites both *D. plantarius* and *D. fimbriatus* occurred simultaneously. Near Planta-2 lake, which is situated in the National Park “Biełaviežskaja forest”, only *D. plantarius* was found.

Interesting observation concerned the appearance of the epigyne in two cases of females from Zvaniec fen. The middle bright plate was covered with a pink-brown secretion which Harms et al. (2009) believe to be the remnants of some glan- dular activity while the female was laying eggs. Another possibility is that it was plain dirt. After removing the secretion there is no doubt about the characteristic features of the *D. plantarius* epigyne (Figs 1 p–q). However, such cases are mentioned rarely so unexperienced arachnologists might mistake examples with secretion as a *D. fimbriatus* epigyne without the bright white plate.

**Distribution of *D. plantarius* in Belarus**

According to the geography of our findings it seems that some groups of probable populations can be determined. Yet, it is impossible to set real boundaries between them now, as many records represent only the presence of a single specimen at a site, and distances between them are large. However, there might be one cluster of populations associated with the river Nioman and quite likely adjacent rivers and other water bodies. At least, *D. plantarius* was found practically along the whole length of the Nioman in Belarus. Another cluster seems to exist in the basin of the Dniepr river, including Soż, Biesiadź, and Biarezina of the large rivers that flow into it. Finally, there are populations within basin of the river Prypiat.

The last two clusters are probably connected to each other. Population(s) on the river Vilija are quite likely to be isolated from other populations due to geographical barriers, as well as the northern ones if they really exist (Fig. 3). The majority of *D. plantarius* records in Belarus are associated with rivers or channels. At the same time the Zvaniec fen population of *D. plantarius* seems to be substantial and such biotopes may also be more favourable for this species. In Great Britain, all populations are associated with fens (Duffey 2012), similarly
in the Czech Republic, the few known populations live in the littoral zone of ponds and cut-off meanders (Buchar & Růžička 2002). It is known that practically no specialists in Belarus have ever tried to find *D. plantarius* intentionally and it was often collected occasionally while scientists were conducting other more general research. In fact, there was no specific work ever devoted to spiders of fens or bogs in Belarus. Despite the fact that our, and previous, investigations have not yielded many specimens it is obvious that *D. plantarius* is widespread in Belarus. In short, it is present everywhere except for the north-east of the country. In 2013 we travelled through several districts of the Viciebsk region including the Western Dźwina and Dzisna rivers and did not find any specimens. However, our investigation was very short and we cannot be sure that *D. plantarius* is absent there. In addition, such large rivers as the Western Buh, Drysa, Uła, Ubarć, Druć, Pina, Łan, Ščara and many others have never been examined along with numerous fens and lakes in the territory of Belarus. Another important observation is that both species of *Dolomedes* may occur simultaneously within the same biotope. Such results were reported before (Holec 2000), but in this case the author was very careful in stating that the species coexist. We observed no differences in patterns of distribution of the two species and it seems that it is common for both of them to share the same biotope. At least within three of the most densely populated biotopes (the rivers Vilija, Biesiedź and Zvaniec fen) *D. plantarius* and *D. fimbriatus* were found together. The next step is to look at the dynamics of both species in order to evaluate competition rates and their actual preferences in terms of abiotic factors.

It is our strong belief that Belarus has many potential sites where *D. plantarius* might be present and that its populations are big and healthy. Previous lack of records is explained simply by lack of interest from the side of specialists and amateurs as well as a lack of specialists themselves. It is obvious that the importance of Belarus for conservation purposes is underestimated by specialists from Western Europe, while the country has plenty of water bodies suitable for the species. There are more than 20 000 rivers, 10 000 lakes and numerous swampy areas (more that 14 % of the territory of the country!). The territory of Belarus is practically equal to the territory of Great Britain but the human population is 6 times lower which ensures the safety of natural biotopes simply by the inability to destroy it. Also, 8 % of the territory is already protected and as soon as *D. plantarius* is included in The Red Book of Belarus every record is a legal reason to confer conservational status to a particular territory and increase the total amount of protected areas. Models that predict distribution and dynamics of *D. plantarius* in Europe (Leroy et al., 2013) underestimated the presence of the species in Belarus and probably the calculations were slightly wrong, however, the general trend is correct. If the populations will shift in time to the east and north of Europe due to climate change, newcomers will find the sites already occupi-

<table>
<thead>
<tr>
<th>Date</th>
<th>Water body</th>
<th>Coordinates</th>
<th><em>D. plantarius</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>09.07.2012</td>
<td>Nioman river</td>
<td>53°26′30.2″N 24°44′23.9″E</td>
<td>-1/1</td>
</tr>
<tr>
<td>09.08.2012</td>
<td>Jaselda river</td>
<td>52°07′02.68″N 26°26′44.83″E</td>
<td>-1/1</td>
</tr>
<tr>
<td>25.06.2013</td>
<td>Planta-2 lake</td>
<td>52°34′29.8″N 23°46′40.0″E</td>
<td>3/-</td>
</tr>
<tr>
<td>15.07.2013</td>
<td>Nioman river</td>
<td>53°29′57.0″N 26°39′03.8″E</td>
<td>-1/1</td>
</tr>
<tr>
<td>09.2013</td>
<td>?, Minsk region</td>
<td>?</td>
<td>-1/1</td>
</tr>
<tr>
<td>12.09.2013</td>
<td>Vilija river</td>
<td>54°46′30.7″N 26°12′36.1″E</td>
<td>-1/1</td>
</tr>
<tr>
<td>05.06. - 18.08.2014</td>
<td>Zvaniec fen</td>
<td>52°04′43.6″N 24°49′51.4″E and 52°05′42.0″N 24°52′55.2″E</td>
<td>3/6</td>
</tr>
<tr>
<td>14.06.2014</td>
<td>BSU, pond</td>
<td>53°50′10.7″N 27°28′01.4″E</td>
<td>-1/?</td>
</tr>
<tr>
<td>06.2015</td>
<td>Rasta river</td>
<td>53°45′93.41″N 30°42′43.61″E</td>
<td>1 specimen per transect 100 × 5 m along both river banks</td>
</tr>
<tr>
<td>06.2015</td>
<td>Biesiedź river</td>
<td>53°21′45.24″N 32°26′50.87″E</td>
<td></td>
</tr>
<tr>
<td>06.2015</td>
<td>Biesiedź river</td>
<td>53°11′91.83″N 31°54′09.50″E</td>
<td></td>
</tr>
<tr>
<td>06.2015</td>
<td>Biesiedź river</td>
<td>53°17′05.78″N 32°11′35.81″E</td>
<td></td>
</tr>
<tr>
<td>06.2015</td>
<td>Biesiedź river</td>
<td>53°19′50.78″N 32°00′67.70″E</td>
<td></td>
</tr>
</tbody>
</table>

![Fig. 2: Dolomedes cf. plantarius from vicinity of biological faculty of BSU. a. habitus; b. epigyne](image-url)
ed and we can expect admixture between them. However the consequences are hard to predict.

To sum up, if there is a strong intention to save *D. plantarius* in Europe it is essential that not only Belarusian specialists will be involved in investigation of this species within Belarus itself, but all interested legal bodies and scientists across the Europe.

Acknowledgements

We sincerely thank Jury Hihiniak and Vital Lukin for providing specimens, Oleg Borodon for logistics help, Eric Duffey for providing literature, Marko Mutanen for advice and criticism of an early version of the manuscript and Mohamed bin Zayed Species Conservation Fund for financial support (Project number 13256173).

References


Chizhevskaya TP 2009 Rare and protected species of invertebrate animals of National Park “Prypiatiska”. In: Conference materials “Issues of conservation of biodiversity and management of biological resources”, Minsk, SSIA “Scientific and practical centre of NAS of Belarus for biological resources” 1: 262-264 [in Russian]


Moroz MD & Layenko TM 2013 Aquatic invertebrate animals of rivers Šušč and Łaknja. – Proceedings of Viciebsk State University 7 (5): 76-82 [in Russian]


Savarin AA & Ostrovsky AM 2011 Distribution of spiders *Argiope bruennichi* (Scopoli, 1772) and *Dolomedes plantarius* (Clerck, 1758) in south-west of Belarus. – Transactions of P. M. Mashenov Vitebsk [Viciebsk] State University 1 (61): 55-58 [in Russian]
