

THE FIRST RECORD OF *VERTIGO GEYERI* LINDHOLM, 1925 (GASTROPODA: PULMONATA: VERTIGINIDAE) IN NORTH-WESTERN POLAND

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ABSTRACT: A new isolated locality of *Vertigo geyeri* Lindholm, a rare and endangered species, was discovered in the nature reserve Bukowskie Bagno, West Pomerania. Among other species, it is accompanied by *Vertigo angustior* Jeffreys. The habitat is a rich, open topogenous moss fen with some sedges, on a gyttja substratum. The locality is relatively young, of not more than 150 years, and may have been colonised from some nearby populations. The record fills the gap between the north-easternmost German localities and the eastern group of records in Poland.

KEY WORDS: endangered species, terrestrial snails, Habitats Directive

INTRODUCTION

Among the species of the genus *Vertigo*, recorded from Poland, three are listed in Annex II to the EU Habitats Directive (EEC 1992) and in the IUCN Red List of Threatened Species (IUCN 2014): *V. moulinsiana* (Dupuy, 1849), *V. geyeri* Lindholm, 1925 and *V. angustior* Jeffreys, 1830 (see also CAMERON et al. 2003). The EU conservation regulations oblige the member countries to ensure their protection. The current numbers of records of *V. angustior* and *V. moulinsiana* are 110 and 93, respectively (KSIĄŻKIEWICZ et al. 2015 and unpublished data), very few of those without precise coordinates. It seems redundant to publish separately every newly discovered locality of any of them. Unlike them, *V. geyeri* – having been relatively recently re-discovered in Poland (HORSÁK & HÁJEK 2005), and being the least frequent in Europe except Scandinavia (CAMERON et al. 2003) – has only around 30 records in the country. Here we provide data on its newly discovered locality outside the previously known distribution areas in Poland.

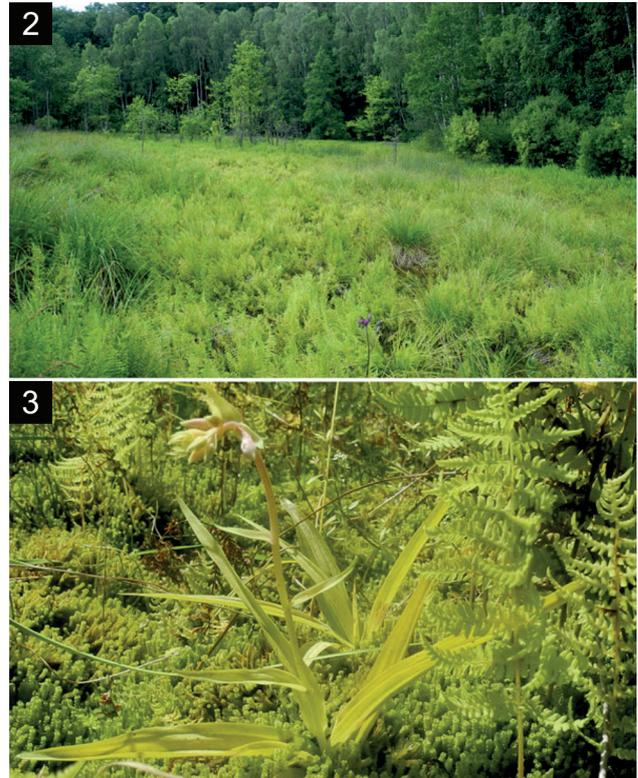
Vertigo geyeri is distributed in Europe (CAMERON et al. 2003, FALKNER 2003, KILLEEN et al. 2011) in

open, permanently wet, extremely to moderately calcium-rich habitats such as spring, alkaline and rich fens (WILLING 2003, 2013, HORSÁK & HÁJEK 2005, KILLEEN et al. 2011, ZAJĄC et al. 2012), with stable ground water levels not dropping below 10 cm (KUCZYŃSKA & MOORKENS 2010). Usually, tufa-forming springs are the best indicators of optimum conditions for the species (KILLEEN et al. 2011, SCHENKOVÁ et al. 2012). *V. geyeri* is regarded as a glacial relict in Poland; it has been recorded from around 30 sites in lowland and upland regions, mainly in the east and in the south-east of the country (HORSÁK & HÁJEK 2005, SCHENKOVÁ et al. 2012, ZAJĄC et al. 2012, KSIĄŻKIEWICZ et al. 2015). According to the IUCN Red List of Threatened Species, *V. geyeri* is a species of least concern (Lc), with a stable population trend (KILLEEN et al. 2011). It is also included in the Red List of Threatened Animals of Poland as near threatened (NT; WIKTOR & RIEDEL 2002). Interestingly, its inclusion in this category took place prior to its re-discovery in Poland.

NEW LOCALITY

The nature reserve Bukowskie Bagno ($53^{\circ}07'06''$ – $53^{\circ}07'20''$ N, $16^{\circ}19'40''$ – $16^{\circ}20'12''$ E) (Fig. 1) is located near Wołowe Lasy/Niekursko, in the eastern part of Drawa Forest, West Pomeranian Voivodeship; the sampling site coordinates are $53^{\circ}07'06''$ N, $16^{\circ}19'44''$ E. The area was first inventoried in 2006, and the nature reserve was established in 2009 (all information about the locality after JERMACZEK et al. 2006, and GROOTJANS and WOŁEJKO personal communication). The reserve protects one of the best preserved fen complexes of Drawa Forest (WOŁEJKO et al. 2015).

The reserve is a group of fens adjoined by forests, in the through of Lake Bukowo Małe. The fens replaced lakes which had disappeared at the end of the 19th c. The locality (Figs 2–3) is a large, open, topogenous, moss and sedge fen, classified as *Caricetum diandrae paludelletosum*. The dominant plants are *Marchantia polymorpha*, *Paludella squarrosa*, *Helodium blandowii*, *Tomentypnum nitens*, *Carex diandra*, *Schoenoplectus tabernaemontani* and *Epipactis palustris*. The substratum is gyttja. The site is surrounded by large tussocks of *Carex paniculata*, with *Sphagnum fallax* and *Thelypteris palustris*. The habitat in its present form is relatively young; maps from the second half of the 19th c. show it as a small lake. Very small water level fluctuations in Bukowskie Bagno, otherwise rarely observed in Drawa Forest (KUJAWA-PAWLACZYK & PAWLACZYK 2014), may favour the existence of *V. geyeri*.



Figs 2–3. Rich fen where the samples were collected: 2 – general view, 3 – close-up with *Paludella squarrosa*, *Epipactis palustris*, and *Thelypteris palustris*. Photos: R. RUTA, 11.07.2014

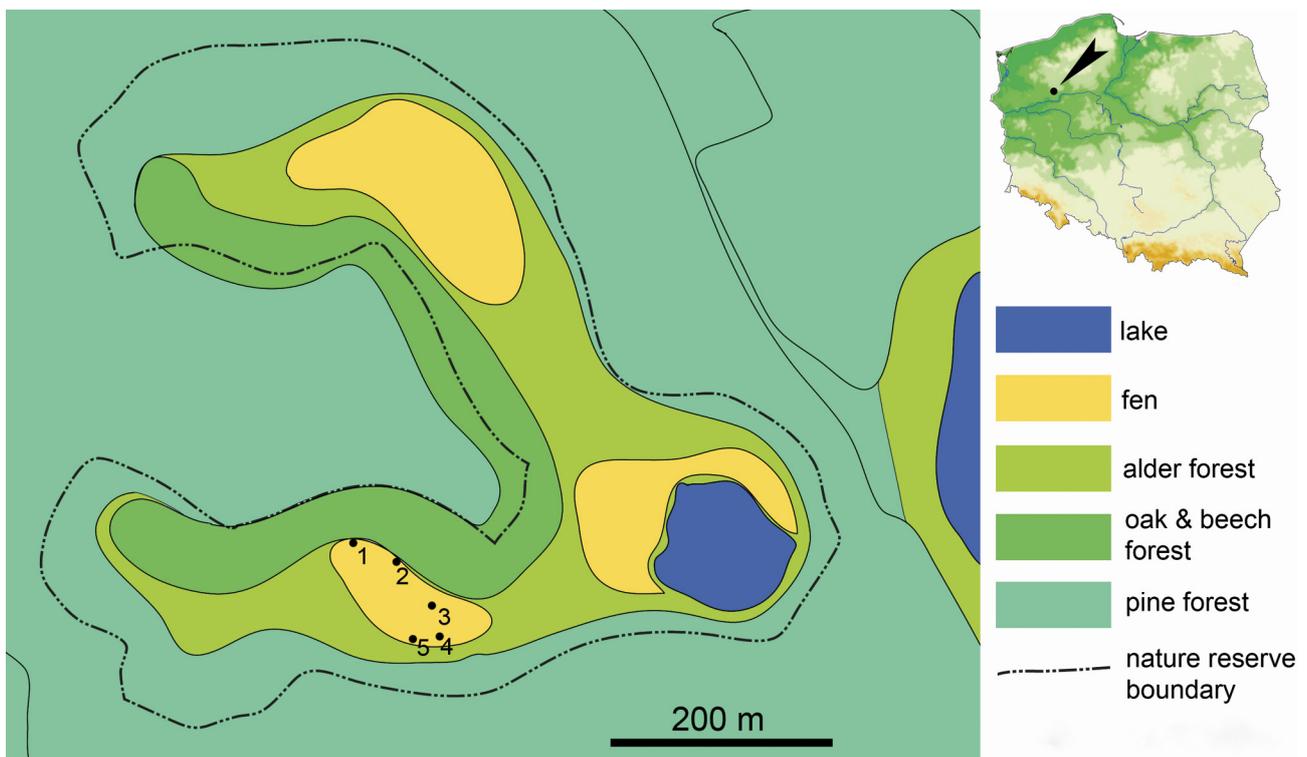


Fig. 1. Vegetation map of the nature reserve Bukowskie Bagno with sampling sites indicated as solid circles

Table 1. Snail species recorded in the new locality of *Vertigo geyeri*

Species name	No. specimens
<i>Carychium minimum</i> O. F. Müller, 1774	48
<i>Succinea oblonga</i> Draparnaud, 1801	2
<i>Succinea putris</i> (Linnaeus, 1758)	17
<i>Cochlicopa lubrica</i> (O. F. Müller, 1774)	11
<i>Vertigo antivertigo</i> (Draparnaud, 1801)	54
<i>Vertigo substriata</i> (Jeffreys, 1833)	12
<i>Vertigo geyeri</i> Lindholm, 1925	6
<i>Vertigo angustior</i> Jeffreys, 1830	44
<i>Punctum pygmaeum</i> (Draparnaud, 1801)	49
<i>Nesovitrea hammonis</i> (Strøm, 1765)	19
<i>Euconulus alderi</i> (Gray, 1840)	22
<i>Clausilia bidentata</i> (Strøm, 1765)	3

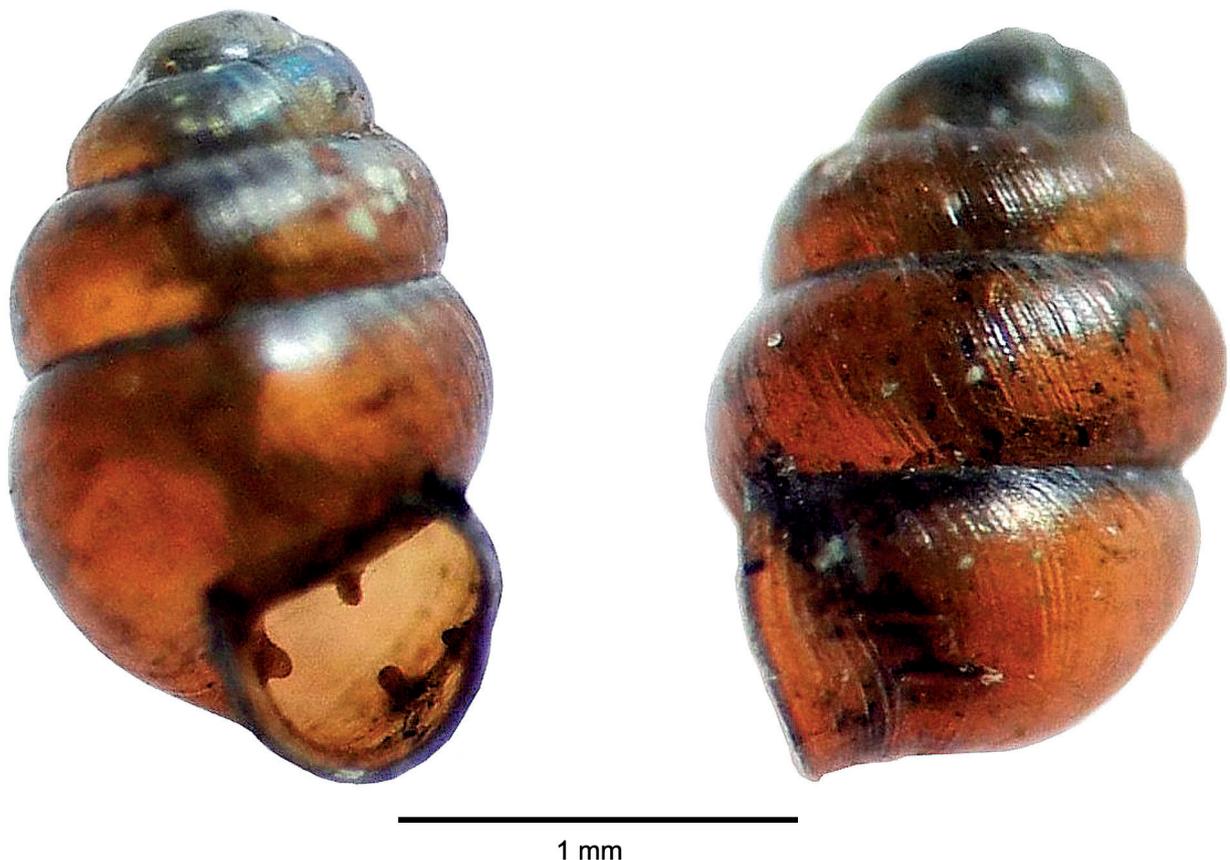
DISCUSSION

Besides contributing to the knowledge of distribution and habitat requirements of this rare species, the new record is interesting from the point of view of its geographical location and its probable age.

V. geyeri (Fig. 4) is variously assigned to biogeographical categories by different authors (boreal WILLING 2003; boreo-alpine HORSÁK & HÁJEK 2005; Eurasian [probably partially based on incorrect species identification – editor’s remark] MENG 2008,

Samples were collected by the second author on 04.09.2014 from quadrats of 25 × 25 cm in five points of different vegetation and moisture level, largely following the recommendations of ZAJĄC *et al.* (2012). All the sampling points were located in the southern part of the nature reserve (Figs 1–3). The litter was passed through entomological sieve and the fine fraction was examined under stereomicroscope. The results to some extent reflect the composition of the snail community (Table 1). It is noteworthy that another Annex II species, namely *V. angustior*, co-occurs with *V. geyeri*. The presence of *Clausilia bidentata* (Strøm, 1765) reflects the effect of the adjacent forest.

HOFFMANN *et al.* 2010). It occurs in Europe where it inhabits the Boreal, Alpine, Continental and Atlantic zones (FALKNER *et al.* 2001). It has been recorded from Austria, Denmark, Finland, Germany, Ireland, Italy, Norway, Poland, Russia, Sweden and the UK (CAMERON *et al.* 2002, FALKNER 2003, HORSÁK & HÁJEK 2005). In Poland the old records from the environs of Białowieża (GEYER 1919) have been only allegedly confirmed (DYDUCH 1980, for details see

Fig. 4. *Vertigo geyeri* – a specimen from Bukowskie Bagno. Photo: Z. KSIĄŻKIEWICZ-PARULSKA

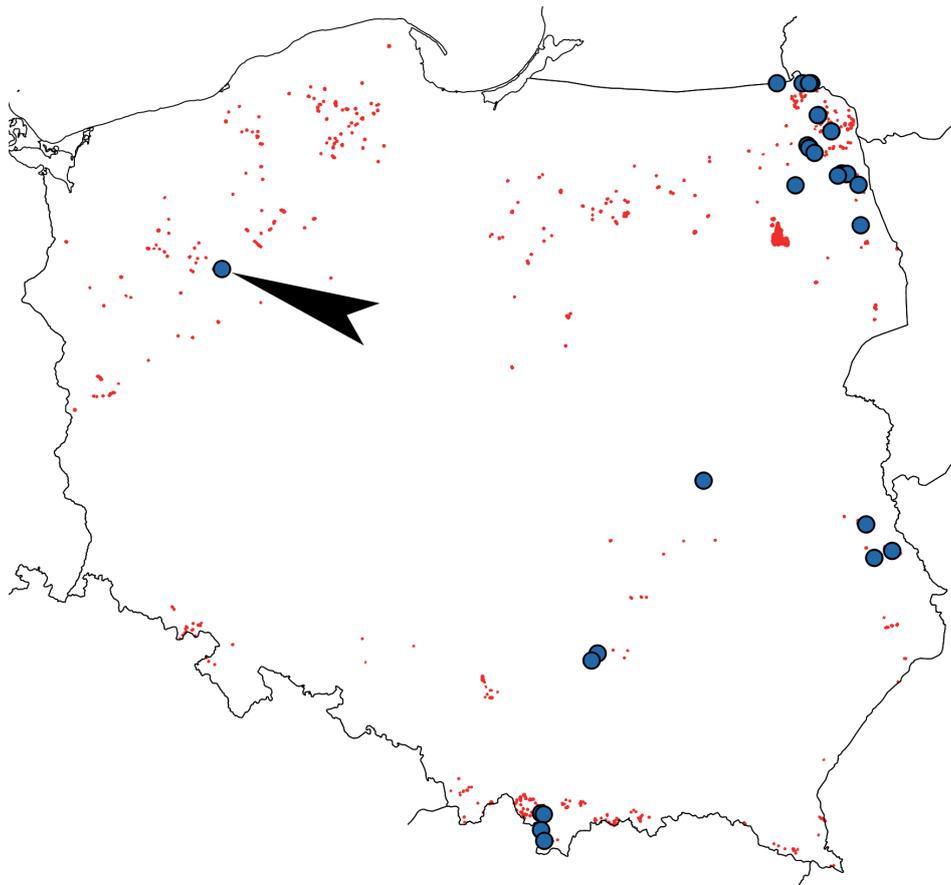


Fig. 5. Distribution of alkaline fens (red dots) and *Vertigo geyeri* (blue circles) in Poland. Data compiled from ZAJĄC et al. 2012, KSIĄŻKIEWICZ et al. 2015, present study and unpublished data (*V. geyeri*) and the Polish alkaline fens database (<http://alkfens.kp.org.pl/o-torfowiskach/ogolnopolska%20baza%20mechowisk/>). New locality indicated with arrow

POKRYSZKO 1990, 1998, DYDUCH-FALNIOWSKA & POKRYSZKO 2001). After the gap of nearly a hundred years (1919–2003) during which Poland, being situated more or less in the middle of the species' distribution range, remained a blank, *V. geyeri* was re-discovered in the Polish Carpathians (HORSÁK & HÁJEK 2005) and later found in a number of sites in eastern Poland (SCHENKOVÁ et al. 2012, ZAJĄC et al. 2012, KSIĄŻKIEWICZ et al. 2015). Most of its presently known (published) localities in Poland are situated in the eastern (north-eastern lakelands, the Biebrza River Valley, Polesie) and south-eastern parts (the Carpathians) of the country, with some few records from central-eastern Poland (the Nida River Valley). Overall, the northern records are all east of the 21st degree, and all the southern ones east of the 19th degree eastern longitude. The distribution range is thus a relatively narrow and uneven belt along the eastern boundary of Poland, with a further westward extension along the Carpathians. Long distances separate the new locality from the eastern part of the range: roughly 450 km to the nearest locality in the north-east and 380 km to the Nida Valley, but only ca. 190 km to the nearest record in the west (Mecklenburg-Vorpommern, FALKNER 2003), thus

indicating that Poland is actually within the (once) continuous range of *V. geyeri*.

The distribution pattern of *V. geyeri* in Poland can be interpreted in two ways. It may mainly reflect the availability of suitable habitats which are rather numerous in north-eastern Poland and in the Carpathians. On the other hand, the number of records in the north is small, compared to the number of suitable habitats (WOŁĘJKO et al. 2012) (Fig. 5). Since the number of potentially suitable habitats in the north-west is also fairly high, the scarcity of records may result from the fact that *V. geyeri* prefers larger fens of the east to the rather small and isolated fens of West Pomerania (see also <http://alkfens.kp.org.pl/o-torfowiskach/ogolnopolska%20baza%20mechowisk/>). This however seems unlikely, since members of the genus *Vertigo*, including the rare and endangered ones, are known to form populations which often occupy only a few square metres (POKRYSZKO 1990, 2003, CAMERON et al. 2003, HORSÁK & HÁJEK 2005). Another possible reason is that, with larger fens, once a fragment is destroyed, there is a good possibility of fast re-colonisation from the nearby fragments – a situation which may occur in the east but not so frequently in the north-



west. Finally, the snail fauna of the alkaline fens of north-western Poland may not be sufficiently studied.

In a situation of many localities close together, even when one of them becomes destroyed, there is a possibility of re-colonisation from the nearby sites. Being isolated, once a locality is destroyed, it may never be re-colonised by the species. Though the habitat in the new locality is not more than 150 years old, it can be speculated that, during the time of its colonisation, some source populations of *V. geyeri* existed nearby. It shows that, when the habitat is suitable and close to sources of colonisers, it does not have to be very old to hold rare and fastidious species. At present it is unknown if there are any nearby popu-

lations of *V. geyeri* and how far they are situated, but it can be expected that a more extensive survey will reveal more localities of the species in north-western Poland. It seems that, at least until more information is available, the site deserves special protection.

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