

CURRENT DISTRIBUTION OF *BULGARICA CANA* (HELD, 1836) (GASTROPODA: CLAUSILIIDAE) IN EUROPE

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ABSTRACT: The range of *Bulgarica cana* (Held), up-dated on the basis of recent publications and conchological material collected since 1990, covers the whole of the Carpathians and the eastern parts of the Sudetes; the lowland range extends through eastern Poland, Ukraine, Belarus, Lithuania, Latvia and part of Estonia to Russia in the east. The species' range, with insular sites on the fringes, is fragmented as a result of the habitat fragmentation.

KEY WORDS: terrestrial snails, door snails, distribution, Europe

INTRODUCTION

Bulgarica cana (Held, 1836) is a central and east European species (KERNEY et al. 1983). As most clausiliids, it has a sinistral, fusiform shell, with the closing apparatus consisting of a movable clausilium and folds restricting its movement (LIKHAREV 1962, NORDSIECK 2007). The shell of *B. cana* is thick-walled, red-brown in colour, slightly transparent and ribbed; the ribs are slightly sinuous, often grey or whitish (Fig. 1). The aperture is elongated, diamond- or egg-shaped with a broad white lip. The dorsal keel, and the superior and inferior lamellae are clearly visible through the aperture. The inferior lamella is often light-red in colour and never bifurcated. The shell height is 14–19 mm, the width 3.3–3.9 mm; the number of whorls is 11–14 (URBAŃSKI 1957, LIKHAREV 1962, KERNEY et al. 1983, WIKTOR 2004, WELTER-SCHULTES 2012).

B. cana inhabits moist deciduous and mixed forests in the mountains and foothills, and is less frequent in lowland forests (LIKHAREV 1962, KERNEY et al. 1983, HORSÁK et al. 2013), with strong preference for well-preserved and undisturbed tree stands. It is a strictly dendrophilous species, living on trunks and in bark crevices of live or dead, standing or fallen

trees, and less frequently found in litter (LIKHAREV 1962, KERNEY et al. 1983, SULIKOWSKA-DROZD 2005, HORSÁK et al. 2013).

As a result of fragmentation of its preferred habitats, the species' range is fragmented, with some



Fig. 1. Shells of *Bulgarica cana* from MICHAL HORSÁK's collection, leg. 2000 Moravia, Czech Republic. Bar equals 1 cm. Photo: MAGDALENA MARZEC

insular sites on its fringes. This is not reflected in the recent literature (WELTER-SCHULTES 2012) in which the continuous range of *B. cana* includes (from west to east) the western parts of Germany, Poland, the Czech Republic, Slovakia, most of Hungary, the Kaliningrad District, Lithuania, Latvia, the western part of Estonia, Belarus, Ukraine and extends through Russia to the boundary of Europe. Its disjunct fragments include large parts of the northern

foothills of the Alps in Germany and Austria and of the Carpathians in Romania. As there are some unexplained gaps in the range described above (e.g. isolation of the Carpathian Romanian population) and *B. cana* is regarded as rare or even threatened (SPURIS 1998, GÄRDENFORS 2000, BERAN et al. 2005, JUNGBLUTH & VON KNORRE 2009), its distribution requires revision.

METHODS

Conchological materials from the following museum collections were examined: Daugavpils University and Natural History Museum of Latvia; Finnish Museum of Natural History; Hungarian Natural History Museum; Museum and Institute of Zoology, Poland; Museum of Natural History, University of Wrocław, Poland; Natural History Museum, Vienna, Austria; Natural History Museum, Oslo, Norway; Phyletisches Museum, Jena, Germany; Swedish Museum of Natural History;

Slovak National Museum. I also used my own private collection as well as those made available by ROBERT CAMERON, MICHAL HORSÁK, DIETRICH VON KNORRE, GRITA SKUJIENÉ and ANNA SULIKOWSKA-DROZD. Altogether 306 samples (1,874 shells) were analysed (Appendix 1). The recent literature on the occurrence of *B. cana* and forest snail communities was also reviewed. Data collected prior to 1990 were regarded as historic, those collected since 1990 as current.

RESULTS AND DISCUSSION

SPECIES RANGE PRIOR TO 1990

A precisely reconstructed distribution of *B. cana* in the middle of the 20th century (Figs 2–3) was adopted as the starting point to determine the species' current range. The distribution range in eastern and south-eastern Europe (Fig. 2, LIKHAREV 1962, current country names are given) covered the whole of Carpathians to the northern Balkans in Bulgaria; Poland; the Baltic countries except western Estonia. In Russia, there was a number of sites in the Moscow district and in the western part of St. Petersburg district. There were single sites near Pskov, Smolensk, Roslav, Bryansk and Kazan, and in

the districts of Orlov, Tula and Belgorod. In Belarus, there were single sites near Vitebsk and the Pinsk marshes; in Ukraine the species was recorded from the Carpathians and from the environs of Kiev. In central and western Europe (Fig. 3, KERNEY et al. 1983) the range of *B. cana* included the northern foothills of the Alps from Lake Constance in northern Switzerland to south-eastern Bavaria (Germany); in Germany also single sites in the mountains in the southern and central parts of the country and on the Baltic coast; western and northern Austria; in the Czech Republic and Slovakia the Carpathians and the Sudetes, otherwise rather rare; Poland and one locality in Finland (Koli).



Figs 2–3. Distribution of *Bulgarica cana* in the middle of the 20th century: 2 – based on LIKHAREV (1962), 3 – based on KERNEY et al. (1983)

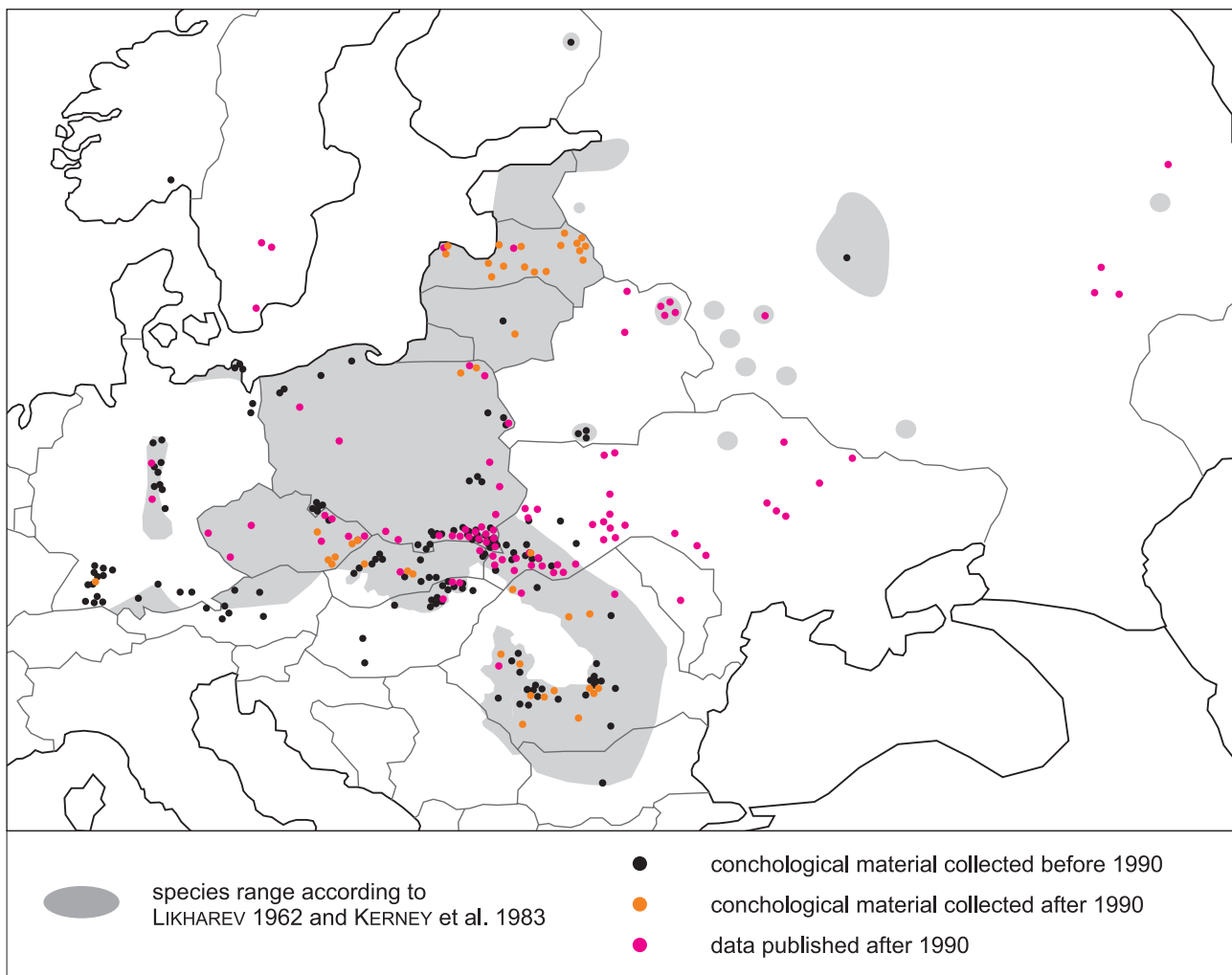


Fig. 4. Distribution of *Bulgarica cana* with locality data added, range according to LIKHAREV (1962) and KERNEY et al. (1983) is shown in the background

Most of the data from conchological collections (collected prior to 1990) overlap the range presented above (Fig. 4). The biggest discrepancy is the presence (on the map in Fig. 4) of numerous sites in the mountains of the Black Forest, Baden-Württemberg, Germany (collections from the first half of the 20th century). There are also other single sites at the edge of the range.

SPECIES RANGE AFTER 1990

Comparison of the new data (collections and publications since 1990) with those listed above presents a strikingly different picture. Most of the ranges also overlap; however, there are many discrepancies. While the new sites can be easily interpreted as an increase in the knowledge about the previously less studied areas, the absence of sites presents more difficulties. The lack of data may be caused by a simple lack of research. Also the absence of the species in the studies is difficult to interpret; it does not necessarily mean that the species was not present.

Both historically and currently, the core of the range of *B. cana* is primarily the Carpathians which hold most numerous records over the past 25 years. The species inhabits the entire mountain range from Romania (DOMOKOS & VÁNCSA 2005, SÓLYMOS & PÁLL-GERGELY 2007, GHEOCA et al. 2008), through Ukraine (PELBÁRT 2000, KHLUS & SVERLOVA 2004, BAIDASHNIKOV 2005, GURAL-SVERLOVA & GURAL 2009), Poland (SZYBIAK 2000, SULIKOWSKA-DROZD 2005, CAMERON et al. 2010, ALEXANDROWICZ 2011, ZAJĄC 2014), Slovakia (ŠTEFFEK 2000, JUŘIČKOVÁ et al. 2005b) and Hungary (BÁBA & TÓTH 2000, DELI 2002, SÓLYMOS et al. 2009) to the Czech Republic (HORSÁK 2003, 2005, HORSÁK et al. 2006). In the Czech Republic, the species is more common in Moravia. Besides numerous Carpathian populations, there are also sites in the Sudetes (JUŘIČKOVÁ et al. 2005a, LACINA 2010) and the Bohemian-Moravian Highlands (HLAVÁČ 2002). In Bohemia it is rare (HORSÁK et al. 2013). Only the Protected Landscape Area of Křivoklátsko (located west of Prague) has numerous sites of *B. cana* (LOŽEK 2011). There are

also a few isolated populations in the west of the country (DVOŘÁK 2005, HORÁČKOVÁ & DVOŘÁK 2008).

It is difficult to ascertain the range of *B. cana* in Poland (Fig. 5). Until recently it was assumed that the species inhabited the entire country (LIKHAREV 1962, KERNEY et al. 1983, WELTER-SCHULTES 2012). However, RIEDEL (1988) remarked that there were no records of *B. cana* from Mazovia (except one sub-fossil site in Kampinos Forest) and in Podlasie (except Białowieża Forest). The species was also missing in potentially suitable habitats in central Poland, as well as throughout the lowlands west of the Vistula, for example in the environs of Łódź (SULIKOWSKA-DROZD 2010), in Kaszuby (CAMERON & POKRYSZKO 2006) or in many parts of Wielkopolska (SZYBIAK 2002, KORALEWSKA-BATURA et al. 2006). The only sites in this part of the country are single records from the Drawa National Park in the South Pomeranian Lakeland (SZYBIAK et al. 2005) and in Wielkopolska (SZYBIAK 2008, JANKOWIAK pers. com.). In recent years there were no records of *B. cana* either from potentially attractive forest stands in the mountains and uplands (CAMERON et al. 2010), i.e. in the Kraków-Częstochowa Upland in the vicinity of Ojców, in the Świętokrzyskie Mts, or in the Polish part of the Sudetes, although it is still present in the eastern Sudetes in the Czech Republic (JUŘIČKOVÁ et al. 2005a, LACINA 2010). The situation in the eastern part of Poland looks different. The species' range extends from Romincka Forest and its adjacent areas in the north (CAMERON et al. 2010, MARZEC 2010), through Augustów Forest (CAMERON et al. 2010), Białowieża Forest (CAMERON & POKRYSZKO 2004), Polesie and Roztocze (CAMERON et al. 2010) up to numerous sites in the Carpathian Region. Since there is no information on the malacofauna of large forest complexes in the Mazurian Lakeland, such as Pisz Forest, Borecka Forest and Napiwodzko-Ramucka Forest, fragments of which may offer suitable habitats, the region cannot be excluded from the range of *B. cana*.

The knowledge of the occurrence of *B. cana* in the Baltic countries is incomplete. There is no information on terrestrial snails in the Kaliningrad District. However, the presence of *B. cana* at numerous sites in the Polish part of Romincka Forest suggests that the species is also present on the Russian side. *B. cana* is known to occur in Lithuania (SKUJENÉ 2002), but there are no detailed data on its distribution. In Latvia the species occurs in many parts of the country, but everywhere it is rare and not abundant (PILĀTE & GREKE 2002, PILĀTE 2003). There is no information on its occurrence in Estonia.

B. cana is moderately abundant in Belarus (ZEMOGLYADCHUK 2009). It probably does not occur in the central part of the country (Fig. 5), where

it has never been found before (LIKHAREV 1962). Currently, most of its sites are located in northern and north-eastern Belarus, in the region of Vitebsk (MERZHVINSKII 2011, KOTSUR 2015). The occurrence of *B. cana* in the south, in the Pripjat valley near the border with Ukraine, is also likely, because of the earlier records (LIKHAREV 1962); it is still found on the Ukrainian side (BAIDASHNIKOV 2005, BALASHOV 2012). The species may also occur in the west of the country. The presence of *B. cana* in the Polish part of Białowieża Forest may suggest that it is also present on the Belarusian side.

The south-eastern boundary of the range of *B. cana* runs through Ukraine (BALASHOV 2016) and is conventionally thought to follow the southern borders of the Vinnitsa, Kirovograd, Poltava and Sumy districts (Fig. 5). The species is present in many sites throughout western and northern Ukraine from the Carpathians to the boundary with Russia (PELBÁRT 2000, KHLUS & SVERLOVA 2004, BAIDASHNIKOV 2005, BALASHOV 2010, 2012, 2016, GURAL-SVERLOVA & GURAL 2009, 2010, 2011, BALASHOV et al. 2013). In many regions, however, it is rare, and its presence at the fringes of its range depends on a large amount of dead timber at the sites (BALASHOV 2016). In Lviv, Ukraine, the only record of *B. cana* so far known is from a forest-like city park (GURAL-SVERLOVA 2014).

The eastern limit of the range is difficult to ascertain. The current information on the occurrence of *B. cana* in Russia is insufficient. Only sites in the district of Tula were confirmed recently (MAMATKULOV 2005). The historic records along the western borders of Russia with Ukraine, Belarus, Latvia and Estonia, as well as the sites near Moscow and St. Petersburg (probably best known because of the proximity of academic centres) (LIKHAREV 1962) allow a delineation of an approximate boundary. The easternmost sites of the species are found in the Volga valley and its tributaries: in the vicinity of Kazan (LIKHAREV 1962) and in the Vyatka basin (SHIKHOVA 2007), or more to the southwest in the environs of Penza (BULAVKINA & STOYKO 2007, 2008, STOYKO et al. 2008). The localities of *B. cana* on the far eastern edge of Europe should be regarded as insular, outside the continuous range.

B. cana has also a number of widely scattered insular records rather remote from the continuous range. In the west, there are sites in Germany, formerly numerous in the German highlands and now decreasing in number. Nowadays the species is still present in the forests of Thuringia (REUM 2006) and in the south in the mountains of the Black Forest. The re-finding of *B. cana* in the forests of Lower Saxony, where it was not found for years (LILL 2004), suggests that the species may have survived in many other former sites. Currently there are no data on the species' occurrence in the lowland parts of Germany.

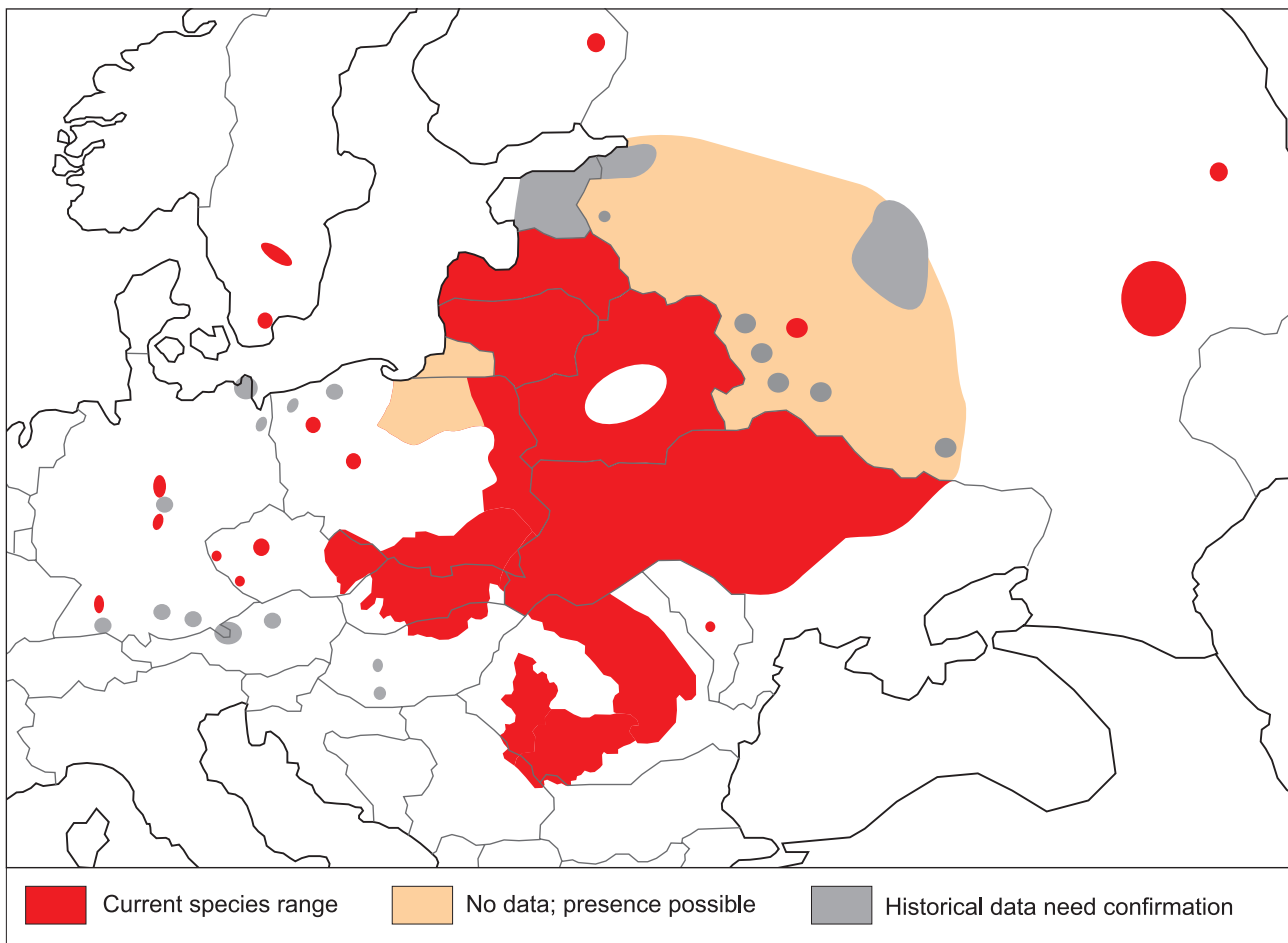


Fig. 5. Up-dated distribution of *Bulgarica cana*

Likewise, there is no new information on the presence of *B. cana* in Austria and Switzerland.

Isolated populations of *B. cana* exist in northern Europe, in Sweden and Finland (Fig. 5). In Sweden, there are several sites. The northernmost record, near lake Vättern, is recent (FRITZ & VON PROSCHWITZ 2000). In Finland only a single site, in the Koli National Park, is known (RASSI et al. 2010).

The single site in Moldova (BAIDASHNIKOV 2005, BALASHOV et al. 2013), in the Codru Reserve, located in the centre of the country, can be treated as an insular site outside the range but also as a connection between the Romanian (Carpathian) and western Ukrainian sites which makes it possible to define the south-eastern range limit (Fig. 5). Because of the small forest cover of Moldova, as well as the lack of data (contemporary or historical) on the occurrence of *B. cana* in eastern Romania outside the Carpathians, I decided to treat the Moldovan site as insular.

B. cana does not occur in Bulgaria (DEDOV 1998, IRIKOV & ERŐSS 2008). Earlier records may have been based on misidentification. In Bulgaria *Bulgarica* is represented by a total of 10 species, some of them with several subspecies (IRIKOV & ERŐSS 2008).

Though many of these taxa do not deserve species status (WELTER-SCHULTES 2012), it shows the great diversity and richness of the genus in Bulgaria.

Comparison of the maps (Figs 4–5) gives a false impression of an eastward range expansion. Most of the new malaco-faunistic research was carried out in central and eastern Europe, hence so many new records from this region. This does not mean, however, that the sites of *B. cana* are new. On the opposite, western, edge of the range the ‘loss’ of sites may have many reasons. First, the species may have never occurred in some areas, but its range was misinterpreted on the maps; for example, according to KERNEY et al. (1983) *B. cana* is present in the Czech Republic in the Carpathians and in the Sudetes, otherwise rather rare; this statement is not reflected on the map, where its range covers all of the Czech Republic. It is also not excluded that some of the records of *B. cana* in western Europe resulted from misidentification. The species is sometimes confused with *Balea biplicata* (Montagu, 1803), a common and euryoecious western European species. An actual shrinkage of the range is also very likely; however, it is difficult to determine if there are areas where the species has become extinct, and where they are. *B. cana* occurs



mainly in well-preserved and undisturbed forests. Fragmentation and degradation of such forest stands leads to limitation or even disappearance of its natural habitats and its local extinction. In many countries *B. cana* is regarded as threatened and placed on Red Lists, with categories: CR (critically endangered) – Austria and Switzerland (REISCHÜTZ & REISCHÜTZ 2007, RÜETSCHI et al. 2012); EN (endangered) – Czech Republic, Germany and Finland (BERAN et al. 2005, JUNGLUTH & VON KNORRE 2009, RASSI et al. 2010); VU (vulnerable) – Sweden and Slovakia (GÄRDENFORS 2000, ŠTEFFEK & VAVROVÁ 2006); LC (least concern) – Ukraine (BALASHOV 2016); and DD (data deficient) – Norway and Estonia (KÅLÅS et al.

2006, RED DATA BOOK OF ESTONIA 2008). In Latvia it has category 'rare' (SPURIS 1998). Nowadays forest management, especially the removal of dead timber, is responsible for the increasingly endangered status of *B. cana* (LILL 2004, BALASHOV 2016).

It is possible that in many countries, especially in western Europe, at present there is less field research compared to the past. The lack of new data may be caused by the lack of research or experts. It is very likely that *B. cana* is still present in those well-preserved forests in Germany, Switzerland and Austria for which faunistic information was published long ago.

CONCLUSION

Based on the above data, the range of *B. cana* is as follows (Fig. 5): the whole of the Carpathians and eastern parts of the Sudetes; with the lowland part of the range extending through eastern Poland, Ukraine, Belarus, Lithuania, Latvia, part of Estonia, to Russia in the east. Many insular sites are scattered on the fringes of the range: in the west in Poland, western Bohemia, central and southern Germany; in the north in Sweden and Finland and in the east in the Volga Basin in Russia.

The distribution of *B. cana* presented here is rather generalised and simplified. The species is closely associated with natural forests. Since they are not

continuous over large areas, the species' range is disjunct and in places even insular.

ACKNOWLEDGEMENTS

I am very grateful to all those who gave me access to the conchological collections, especially to ANITA ESCHNER from the Naturhistorisches Museum, Vienna. My thanks go also to all who lent me their private collections: ANNA SULIKOWSKA-DROZD, GRITA SKUJIENÉ, ROBERT A. D. CAMERON, MICHAL HORSÁK and DIETRICH VON KNORRE.

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Received: December 5th, 2016

Revised: March 3rd, July 22nd, 2017

Accepted: July 22nd, 2017

Published on-line: September 1st, 2017





Appendix 1. Conchological material examined, with notes on physiographic regions of Europe.

Names of localities given as on original labels.

Collections: DU & NHML – Daugavpils University and Natural History Museum of Latvia; FMNH – Finnish Museum of Natural History; HNHM – Hungarian Natural History Museum; MIZ – Museum and Institute of Zoology, Poland; MP – Museum of Natural History, University of Wrocław, Poland; NHMW – Natural History Museum, Vienna, Austria; NNHM – Natural History Museum, Oslo, Norway; PhM – Phyletisches Museum, Jena, Germany; SMNH – Swedish Museum of Natural History; SNM – Slovak National Museum. ASD – ANNA SULIKOWSKA-DROZD; DvK – DIETRICH VON KNORRE; GS – GRITA SKUJIENÉ; MH – MICHAL HORSÁK; MM – MAGDALENA MARZEC; RADC – ROBERT CAMERON

Country No (contemporary)	Collection label	Year	Collection owner	Country No (contemporary)	Collection label	Year	Collection owner
Fennoscandia				35	PL Puszczza Białowieska, nad Orłówką	1916	NHMW
1	N Skurstad, Asker	1885	NNHM	36	PL Puszczza Białowieska, rezerwat	1923	MIZ
2	FIN PK Pielisjärvi, Koli	1965	FMNH	37	BY pow. Pińsk, Zawiszczce	1913	MIZ
3	FIN PK Pielisjärvi, Koli	1957	FMNH	38	BY Polesie, pow. Pińsk	1913	MIZ
4	FIN Koli	1898	FMNH	39	UA obw. Pińsk, Kucheczka Wola	1934	NHMW
East European Plain				40	UA Lwów, Azartowska Skała	1921	MIZ
5	RUS Moskiewskaja oblast', Biełkowo		HNHM	41	UA Podole, Kręciłów k. Zbrucz	1930	NHMW
6	LV Katleši	2000	DU & NHML	42	UA pow. Zaleszczyki, Dobrowłany	1921	MIZ
7	LV Liepna	2000	DU & NHML	North European Plain			
8	LV Žiguri	2000	DU & NHML	43	PL Brandenburg, Forst Steinbusch; Kreis Arnswalde (Choszczno)	1938	NHMW
9	LV Gruzdova	2006	DU & NHML	44	PL Brandenburg, Marzelle, Kreis Arnswalde (Choszczno)	1938	NHMW
10	LV Nurmene	2004	DU & NHML	45	PL Pomorze, Ostrzyce k. Kartuz	1931	NHMW
11	LV Liepupe	2004	DU & NHML	46	PL Pomorze, Drawehn (Drzewiany)	1941	NHMW
12	LV Mežotne	1995	DU & NHML	47	D Rügen; Stubbenkammer	1900–1950	NHMW
13	LV Moricsala	2008	DU & NHML	48	D Rügen, Stubbenkammer		NHMW
14	LV Rīga	2010	DU & NHML	49	D Mecklenburg-Vorpommern: Rügen, Stubbenkammer	1895	PhM
15	LV Šlītere NP	1999	DU & NHML	50	D Mecklenburg-Vorpommern: Stubbenkammer, Königsstuhl	1979	DvK
16	LV Ogre	2009	DU & NHML	51	D Uckermark		HNHM
17	LV Ābeļi	2003	DU & NHML				
18	LV Aizkraukle	1995	DU & NHML				
19	LV Balvi	2008	DU & NHML				
20	LV Gauja NP	2000	DU & NHML				
21	LV Gauja NP	2010	DU & NHML				
22	LV Viesīte	2005	DU & NHML				
23	LV Virgulica	2006	DU & NHML				
24	LT Lithuania	2001–2004	GS				
25	PL Puszczza Romincka	2007	RADC				
26	PL Puszczza Romincka	2010	MM				
27	PL Suwalski Park Krajobrazowy	2013	MM				
28	PL Kowale Oleckie, rez. Cisowy Jar	2007	RADC				
29	PL Białystok	1927	MIZ				
30	PL Białystok, park	1924	MIZ				
31	PL Białowieża	1951	MP				
32	PL Puszczza Białowieska	ca 1920	NHMW				
33	PL Puszczza Białowieska	1923	MIZ				
34	PL Puszczza Białowieska	1921	MIZ				

Country No (contemporary)	Collection label	Year	Collection owner	Country No (contemporary)	Collection label	Year	Collection owner
52	D Uckermark: Melzawer Wald b. Angermünde	1900–1950	NHMW	77	PL Skrzynka k. Łądka	1958	MP
53	D Hildesheim		HNHM	78	PL Bardo Śląskie	1956	MP
54	D Söllingen, Weende	1946	NHMW	79	PL Czermna k. Kudowy	1957	MP
Central European Uplands				80	PL Zieleniec	1957	MP
55	D Rübeland	1978	HNHM	81	PL Radków	1959	MP
56	D Harz, Thale	1899	PhM	82	PL Duszniki	1957	MP
57	D Thüringen: Stempeda, Alter Stoll	1899	PhM	83	PL Bielice	1958	MP
58	D Rhön: Rockenstuhl b. Motzlar	1932	NHMW	84	PL Muszkowice	1957–1962	MP
59	D Rhön: Dermbach: Karl-Friedrich-Stein	1932	NHMW	85	PL Śląsk	ca 1890	SMNH
60	D Thüringen: Dermbach	1982	DvK	86	PL Solna Hora	1959	SNM
61	D Thüringen: Fischbach/Rhön	1983	DvK	87	PL Zemborzyce k. Lublina	1937	NHMW
62	D Thüringen: Fischbach/Rhön, Hebetal	1983	DvK	88	PL Roztocze	2007	RADC
63	D Thüringen: Wernigerode	1985	DvK	89	PL pow. Puławy, Nałęczów	1910	MIZ
64	D Thuringer Wald	1932	NHMW	90	PL pow. Zamość	1912	MIZ
65	D Arnegg b. Blauberer; Ulm	1900–1950	NHMW	91	CZ Moravia, Javoříčko	2001	MH
66	D Baden-Württemberg: Burgfelden, Buchermischwald	2005	DvK	Alpine Region			
67	D Gutenstein im Badischen Donautal	1900–1950	NHMW	92	D Fridingen an der Donau	1900–1950	NHMW
68	D Württemberg, Mühlhausen		NHMW	93	D Kapel am Bodensee		NHMW
69	D Württemberg, Neuffen	1900–1950	NHMW	94	D Württemberg, Bodensee, Kappela Gehrenberg	1900–1950	NHMW
70	D Württemberg, Urach	1900–1950	NHMW	95	D Württemberg, Bodensee, Ravensburg	1900–1950	NHMW
71	D Württemberg, Wiesensteig	1900–1950	NHMW	96	D Württemberg, Ravensburg	1956	NHMW
72	D Schwaben		HNHM	97	D Maria Zell an Hohenzollern	1900–1950	NHMW
73	D Schwabische Alb	1900–1950	NHMW	98	D Mühlthal b. Starnberg	1948	NHMW
74	D Gutenberg Kr. Nuringen, Schwabische Alb	1974	NHMW	99	D Grünwald, München	1963	HNHM
75	A Oberösterreich, Aurolzmünster	ca 1960	NHMW	100	D Munchen		NHMW
76	PL Czarna Góra k. Stronia Śl.	1960	MP	101	D Bayern, Gauting		NHMW
				102	D Bayern; Würmtal bei Mühlthal	1924	NHMW
				103	D Südbayern: Hirschau am Lech	before 1900	NHMW
				104	A Frauenberg bei Admont	1945	NHMW
				105	A Salzburg, Anthering	ca 1960	NHMW
				106	A Salzburg, Falkenstein Wand.	ca 1960	NHMW
				107	A Salzburg, Unken Steinpassau	1953	NHMW



Country No (contemporary)	Collection label	Year	Collection owner	Country No (contemporary)	Collection label	Year	Collection owner
108	A Salzburg, Weitworth	ca 1960	NHMW	134	PL Beskid Zachodni, rez. Śrubita k. Wlk. Raczy	1970	MP
Carpathian Region							
Western Carpathians							
109	PL Beskid Niski, Ostryszne	1999	ASD	135	PL Beskidek, g. Jaworzyna	1997	ASD
110	PL Beskid Niski, g. Baranie	1999	ASD	136	PL g. Gawraniec, Pewel Mała	1929	MIZ
111	PL Beskid Niski, Cergowa	1966	MP	137	PL Sanok	ca 2000	RADC
112	PL Beskid Niski, Prełuki	1997	ASD	138	PL Przemyśl	ca 2000	RADC
113	PL Beskid Niski, Szklary / Daliowa	1998	ASD	139	PL Tatry, ścieżka pod Regłami	1916	MIZ
114	PL Beskid Niski, Wola Niżna	1999	ASD	140	PL Tatry, dolina Białego	1917	MIZ
115	PL Beskid Niski, Karlików	1998	ASD	141	PL Pieniny k. Krościenka	1925	MIZ
116	PL Beskid Niski, g. Magura Wątkowska	1999	ASD	142	PL Pieniny, Pieniński Potok	1961	MP
117	PL Beskid Niski, Konieczna / Radocyna	1999	ASD	143	CZ Moravia, Brezova	2001	MH
118	PL Beskid Niski, Mymoń	1998	ASD	144	CZ Moravia, Bile Karpaty	1998	MH
119	PL Beskid Niski, g. Jaworzynka	1983	ASD	145	CZ Moravia, Horni Lomna	2000	MH
120	PL Beskid Niski, Polany Surowiczne	1997	ASD	146	CZ Moravia, Korytna	2000	MH
121	PL Beskid Niski, Puławy Dolne	1998	ASD	147	CZ Moravia, Malenovice	2002	MH
122	PL Beskid Niski, Puławy Dolne	2006	ASD	148	SLO Vtáčnik, Gepniarova Dolina	1973	SNM
123	PL Beskid Niski, Wisłok Wlk.	1999	ASD	149	SLO Mała Fatra	1966	SNM
124	PL Gorlice		RADC	150	SLO Mała Fatra, Holice	1966	SNM
125	PL Krosno	1966	MP	151	SLO Mała Fatra, Revan	1966	SNM
126	PL g. Luboń Wlk.	1923	MIZ	152	SLO Mańínska Tiesňava	1966	SNM
127	PL Babia Góra	1928	MIZ	153	SLO Sulovske Skaly, Obrovska Brana	1970	SNM
128	PL pow. Limanowa, g. Obidowiec	1920	MIZ	154	SLO Strážovské vrchy, Zliechov	2001	MH
129	PL pow. Limanowa, g. Turbaczyk	1923	MIZ	155	SLO Muransky Kras, Tesna Skala	1970	SNM
130	PL pow. Nowy Sącz, g. Wielki Rogacz,	1922	MIZ	156	SLO Poľana, Zelobudzské Skalky	1997	MH
131	PL pow. Nowy Sącz, Łomnica	1922	MIZ	157	SLO Poľana	1997	MH
132	PL Beskid Zachodni, pow. Nowy Sącz, Piwniczna	1922	MIZ	158	SLO Poľana, Drabovka	1953	SNM
133	PL Beskid Zachodni, Piwniczna	1922	MIZ	159	SLO Slovensky Raj, Kláštorisko	1966	SNM
				160	SLO Slovensky Raj, Piecky	1970	SNM
				161	SLO Zádielska Dolina	1955	SNM
				162	H Aggtelek: Ménes-völgy	1987	HNHM
				163	H Börzsöny: Nagy-Hideg-hegy	1969	HNHM
				164	H Bükk	before 1970	HNHM
				165	H Bükk: Ablakos-kő	1952	HNHM

No	Country (contemporary)	Collection label	Year	Collection owner	No	Country (contemporary)	Collection label	Year	Collection owner
166	H	Bükk: Bánkút	1948	HNHM	204	PL	Brzegi Dolne / Krościenko	1999	ASD
167	H	Bükk: Felső-Sebes-víz	1951	HNHM	205	PL	Myczkowce, g. Grodzisko	1999	ASD
168	H	Bükk: Garadna	1958	HNHM	206	PL	Wysoczany	1999	ASD
169	H	Bükk: Hármaskút	1983	HNHM	207	PL	Brzegi Dolne	1999	ASD
170	H	Bükk: Háromkútvölgy	1967	HNHM	208	PL	Obłazy nad Sanem	1998	ASD
171	H	Bükk: Vörös-kő	1948	HNHM	209	PL	Obłazy nad Sanem	1999	ASD
172	H	Bükk: Kukucsó-hegy	1982	HNHM	210	PL	g. Ostre	1999	ASD
173	H	Bükk: Óserdő	1982	HNHM	211	PL	Przełęcz Bukowska	1999	ASD
174	H	Bükk: Cserépfalu, Szarbalápa	1952	HNHM	212	PL	g. Paportna	1998	ASD
175	H	Bükk: Vadász-völgy	1967	HNHM	213	PL	Polanki k. Terki	1998	ASD
176	H	Jósvafő	1959	HNHM	214	PL	Polana	1999	ASD
177	H	Jósvafő: Almás-völgy	1990	HNHM	215	PL	Pszczeliny	1999	ASD
178	H	Jósvafő: Kecőpatak völgye	1959	HNHM	216	PL	Smolnik nad Osławą	1999	ASD
179	H	Miscolc, Újmassa	1982	HNHM	217	PL	g. Sobień k. Leska	1999	ASD
180	H	Perkupa: Telekes-völgy	1989	HNHM	218	PL	Stebnik	1999	ASD
181	H	Zempléni: Kőkapu	1976	HNHM	219	PL	Suche Rzeki	1999	ASD
182	H	Zempléni: Nagy-Milic	1984	HNHM	220	PL	g. Szeroki Wierch	1998	ASD
Eastern Carpathians									
183	PL	Berežki	1972	MP	221	PL	Teleśnica	1999	ASD
184	PL	Berežki	1998	ASD	222	PL	Oszwarowa	1999	ASD
185	PL	Buk k. Cisnej	1998	ASD	223	PL	Ustrzyki Dolne	1999	ASD
186	PL	Bukowe Berdo	1972	MP	224	PL	Ustrzyki Górne	1972	MP
187	PL	Bystre, g. Jawor	1999	ASD	225	PL	Wetlina	1972	MP
188	PL	Chmielnik nad Sanem	1999	ASD	226	PL	Wetlina	1998	ASD
189	PL	Cisna	1963	MIZ	227	PL	Wetlina, Wierch Mudzanin	1962	MIZ
190	PL	g. Czereszenka	1999	ASD	228	PL	Wielka Rawka	1972	MP
191	PL	dolina potoku Zwór	1999	ASD	229	PL	Wielka Rawka	1999	ASD
192	PL	Dolina Terebowca	1972	MP	230	PL	Wołosate	1998	ASD
193	PL	Dolina Wołosatki	1972	MP	231	PL	Zatwarnica	1999	ASD
194	PL	Dołżyca k. Cisnej	1998	ASD	232	PL	Żubracze	1999	ASD
195	PL	pow. Ustrzyki Dolne, Dwernik	1962	MIZ	233	PL	g. Żuków, Ustianowa	1999	ASD
196	PL	g. Jawor k. Soliny	1999	ASD	234	SLO	Vihorlat, Sninský Kameň	1972	SNM
197	PL	g. Okraglik	1999	ASD	235	SLO	Vihorlat, Udolie Okny	1972	SNM
198	PL	Kiczera	1963	MIZ	236	UA	Bubniszcze	1913	MIZ
199	PL	g. Kremenaros	1999	ASD	237	UA	Gorgany, Łomnica	1937	MIZ
200	PL	Krzywe	1998	ASD	238	UA	Kolochava	1990	HNHM
201	PL	g. Kurników Beskid	1999	ASD	239	UA	pow. Kołomyja, Kniaźdwór	1926	MIZ
202	PL	g. Łopiennik	1999	ASD	240	UA	Jaremcze	1930	NHMW
203	PL	Mchawa k. Baligrodu	1999	ASD	241	UA	pow. Nadwórna, Jaremcze	1926	MIZ
					242	UA	pow. Nadwórna, Jaremcze, dolina Czarnohorczyka	1926	MIZ



Country No (contemporary)	Collection label	Year	Collection owner	Country No (contemporary)	Collection label	Year	Collection owner
242	UA pow. Nadwórna, Jaremcze, dolina Żonki	1926	MIZ	276	ROM Pasul Turnul Roşu	1998	HNHM
243	UA pow. Nadwórna, Jaremcze, g. Czarnohorczyk	1926	MIZ	277	ROM Cindrel (Zibinsgebirge), Dus	1894	HNHM
244	UA pow. Nadwórna, Jaremcze, g. Makowica	1926	MIZ	278	ROM Cindrel (Zibinsgebirge), La Dusi		NHWM
245	UA pow. Nadwórna, Jaremcze, g. Pasiczafiskie	1926	MIZ	279	ROM Cindrel (Zibinsgebirge), Taru	1889	HNHM
246	UA pow. Nadwórna, Jamna / Jaremcze	1926	MIZ	280	ROM Cisnădie (Heltau)		NHWM
247	UA pow. Turka, Sokoliki	1927	MIZ	281	ROM Cisnădie (Heltau)	1894	PhM
248	UA Rus'ki Komarivtsi		HNHM	282	ROM Capraret	2009	RADC
249	ROM Moara Dracului	1886	HNHM	283	ROM Lotrioara	2009	RADC
250	ROM Moara Dracului (Kiralyko)	1998	HNHM	284	ROM Predeal	2009	RADC
251	ROM Bistra	2009	RADC	285	ROM Retezat	2009	RADC
252	ROM Braşov, Pojana		HNHM	286	ROM Lotru, Valea Latorişei, Ciungetu	1999	HNHM
253	ROM Braşov, Pojana	1867	HNHM	287	ROM Lotru, Valea Latorişei	2001	HNHM
254	ROM Braşov, Pojana	1974	HNHM	288	ROM Mehadia		HNHM
255	ROM Braşov, Postăvarul	1976	HNHM	289	ROM Cisnădioara (Michelsberg)	1884	HNHM
256	ROM Braşov, Postăvarul	1974	HNHM	290	ROM Santa Răşinari		NHWM
257	ROM Braşov, Postăvarul (Schulergebirge)		HNHM	291	ROM Sadu (Zoodt)		NHWM
258	ROM Postăvarul (Schulergebirge)		HNHM	292	ROM Căpăţina	1999	HNHM
259	ROM Braşov, Tampa (Kapellenberg)		NHWM	293	ROM Anina (Steyerdorf)		PhM
260	ROM Nova Brasov	1930	NHWM	Western Romanian Carpathians			
261	ROM Ciucaş	2001	HNHM	294	ROM Ampoiţa	1926	NHWM
262	ROM Ciucaş	1998	HNHM	295	ROM Crişul Negru, Baita	1926	NHWM
263	ROM Lacu Roşu (Gyilkos-tó)	1992	HNHM	296	ROM Bihor, Gârda de Sus	1984	HNHM
264	ROM Bicz	2009	RADC	297	ROM Bihor, Gârda de Sus	1985	HNHM
265	ROM Piatra Mare		NHWM	298	ROM Chişcau, Peştera Urşilor	1998	HNHM
266	ROM Piatra Mare / Piatra Mica	1889	HNHM	299	ROM Gyalui-havasok	1959	HNHM
267	ROM Piatra Mica		HNHM	300	ROM Gilau	2009	RADC
268	ROM Piatra Mica	1886	HNHM	Pannonian Plain			
269	ROM Tuşnad	1891	HNHM	301	A Oberösterreich, Falkenstein Donau		NHWM
Southern Carpathians				302	H Veszprém	1951	HNHM
270	ROM Azuga	1903	PhM	303	H Mecsek: Kisújbánya	1965	HNHM
271	ROM Bucegi	1903	PhM	304	H Tiszatelek	1953	HNHM
272	ROM Bucegi	ca 1890	HNHM	Romanian Lowlands			
273	ROM Bucegi		HNHM	305	ROM Bucureşti, Pădurea Băneasa	1969	HNHM
274	ROM Bucegi, Bucsei	1900	HNHM	Balkans			
275	ROM Bucegi, Sinaia	1973	HNHM	306	BG Sipka Balkan	1937	NHWM