

## *Helix lutescens* (Gastropoda: Helicidae) expands its range in Ukraine

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We analysed the records of *Helix lutescens* in Ukraine from the 19th century to the present. We found that the range of this species has expanded significantly. At the beginning of the 21st century, *H. lutescens* was discovered for the first time in six administrative regions of Western (Transcarpathian), Central (Kyiv, Chernihiv, Sumy, Kirovohrad) and Eastern (Donetsk) Ukraine. The expansion of the range of *H. lutescens* due to anthropochory is also the case in other European countries, as evidenced by literature data and some observations in the iNaturalist citizen science database.

**Key words:** land snail, terrestrial molluscs, introduction, spreading

### Introduction

In recent times, there have been an increasing number of publications analysing the anthropogenic expansion of the ranges of some species of land molluscs in Ukraine (VYCHALKOVSKAYA 2008; GURAL-SVERLOVA et al. 2009; GURAL-SVERLOVA & GURAL 2017; GURAL-SVERLOVA et al. 2022; BALASHOV & MARKOVA 2023a; GURAL-SVERLOVA & RODYCH 2023; GURAL-SVERLOVA & GURAL 2023, 2024a; GURAL-SVERLOVA & LYZHECHKA 2024, etc.) or on a wider scale in Eastern Europe (GURAL-SVERLOVA et al. 2021; BALASHOV & MARKOVA 2023b; GURAL-SVERLOVA & GURAL 2024b). One of the most striking trends of the last decades is the gradual movement of a number of species from the south of Ukraine to the north (VYCHALKOVSKAYA 2008; GURAL-SVERLOVA & GURAL 2017; BALASHOV & MARKOVA 2023b; GURAL-SVERLOVA & GURAL 2023, 2024a), caused by anthropochory and global climate change. No less interesting is the rapid dispersal across Ukraine of some land molluscs of Caucasian origin (GURAL-SVERLOVA et al. 2009; GURAL-SVERLOVA & GURAL 2024b), as well as species that penetrate Ukraine from other European countries through garden centres (BALASHOV et al. 2018; GURAL-SVERLOVA et al. 2021; GURAL-SVERLOVA et al. 2024). Cases where land molluscs native to the western part of Ukraine successfully expand their ranges to the east can be found in the literature much less frequently. Recently, such a trend was described for the steppe snail *Xerolenta obvia* (Menke, 1828), native to the Podolian Upland (GURAL-SVERLOVA et al. 2022). It is also worth mentioning here the Carpathian slug *Bielzia coerulans* (M. Bielz, 1851), whose natural range in Ukraine extends to the east no further than the Vinnytsia region. Since 2002, this species has been periodically observed on one of the outskirts

of Kyiv, near the residential area of Teremky (SVERLOVA et al. 2006; BALASHOV 2008; iNATURALIST 2024). Even more indicative may be the range expansion of *Helix lutescens* Rossmässler, 1837, which has not yet been analysed in malacological publications, despite a number of recent observations made by amateur naturalists (iNATURALIST 2024). However, namely amateur observations have recently often helped to promptly track the dispersal of introduced species of land molluscs, which was clearly demonstrated for Ukraine (BALASHOV et al. 2018; BALASHOV & MARKOVA 2023a, 2023b; GURAL-SVERLOVA et al. 2024, etc.), Eastern Europe (GURAL-SVERLOVA et al. 2021; GURAL-SVERLOVA & GURAL 2024b), Hungary (PÁLL-GERGELY et al. 2019), New Zealand (SALVADOR et al. 2022).

### Material and methods

To compile maps and analyse the expansion of the range of *H. lutescens* in Ukraine, data on its records in different time periods were used, taken from the following sources: 1) the malacological collection of the State Museum of Natural History in Lviv (hereafter referred to as SMNHL), which contains numerous samples of land molluscs from the second half of the 19th century (BAKOWSKI 1891) to the present day (GURAL-SVERLOVA & GURAL 2020), shown in red in Fig. 1; 2) the authors' own observations made from 1994 to 2024, many of which are confirmed by samples transferred to the malacological collection of SMNHL, see above, shown in red in Fig. 1; 3) some samples of A. Shklyaruk, an Odesa collector of mollusc shells, made in the 1990s in the Odesa and Mykolaiv regions and examined by us, shown in red in Fig. 1;

4) analysed literature data (BAKOWSKI 1880, 1881, 1882, 1884, 1891; URBANSKI 1933; ADAMOWICZ 1939; PUT 1954; GITILIS & KASHCHUK 1960; GITILIS & POLISHCHUK 1960; BALASHOV & BAIDASHNIKOV 2012; BALASHOV et al. 2013; RYBKA 2017), including data from other researchers summarised in a collective monograph (SVERLOVA et al. 2006), shown in blue in Fig. 1;

5) information on *H. lutescens* samples in two collections of land molluscs stored in Kyiv – in the Schmalhausen Institute of Zoology and the National Museum of Natural History, shown in blue in Fig. 1;

6) observations from two citizen science databases (iNATURALIST 2024; UKRBIN 2024), if the accompanying photographs allowed reliable identification of *H. lutescens*, shown in green in Fig. 1;

7) two posts in one thematic group on Facebook dedicated to the animal world of Ukraine (KOVTON 2021; TSUSHKO 2021), shown in green in Fig. 1.

The few localities for which even an approximate collection time was not known are shown in Fig. 1, but are absent in Fig. 2.

## Results

To date, *H. lutescens* can be considered reliably recorded in 17 of the 25 administrative regions of Ukraine, marked with numbers on the maps (Figs 1, 2). In six of these regions, *H. lutescens* was found only in the early 21st century (Fig. 2), often in recent years (Table 1). The presence of this species in the Kyiv, Chernihiv, Sumy, Kirovohrad, and Donetsk regions has not yet been reflected in publications or museum collections. However, it is clearly confirmed by photographs posted in the citizen science database iNATURALIST (2024) and one of the dedicated Facebook groups (KOVTON 2021; TSUSHKO 2021), see Material and methods. Two samples from the Transcarpathian region, where *H. lutescens* was first recorded in 2011 by I. Obednina (Velyka Dobron), and in 2015 also found by us (Mukachevo), are stored in the malacological collection of SMNHL. Most of the analysed finds of *H. lutescens* were made in the Podolian Upland, which extends from the Lviv region in the west to the northern part of the Odesa region in the southeast and in the adjacent plain and foothill areas in the west of Ukraine (Fig. 1). In the Mykolaiv region, almost all known records of *H. lutescens* are concentrated along the Southern Bug River. *H. lutescens* is also now distributed, at least sporadically, throughout northern Ukraine, from the Volyn region in the west to the Sumy region in the east.

## Discussion

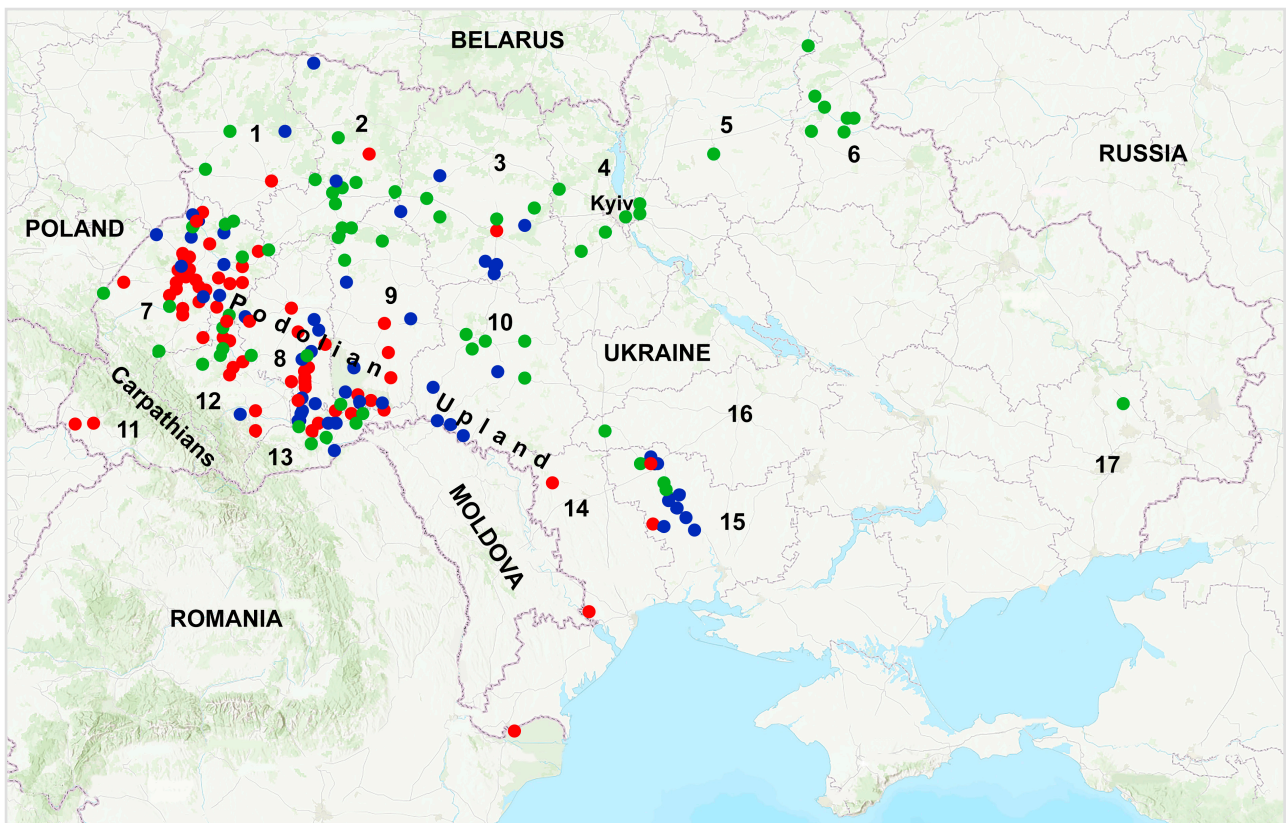
In addition to *H. lutescens*, other *Helix* species are found in Ukraine: *H. pomatia* Linnaeus, 1758, *H. albescens* Rossmässler, 1839, *H. lucorum* Linnaeus, 1758 (SCHILEYKO 1978; GURAL-SVERLOVA & GURAL 2012; BALASHOV 2016b), and, according to a recent study (KORÁBEK et al. 2023), also *H. thessalica* Boettger 1886. However, in most cases, *H. lutescens* can be reliably identified even in photographs due to its characteristic appearance. The excep-

tions are usually poor-quality images, images taken from bad angles, or very young snails. *H. lutescens* is characterised by a pale (yellowish or whitish) shell, often without spiral bands (Figs 3A, D–F, 4B–G) or with barely noticeable traces of them (Figs 3B, C, 4A, 5A), only occasionally with distinct bands (Figs 5B, C). In *H. pomatia*, the shell may become whitish due to the periostracum exfoliation, although specimens with a uniform light-coloured shell and a well-preserved periostracum are occasionally also found. But even in the latter case, the shells of *H. pomatia* are easily distinguished by the coarser radial wrinkles. *H. albescens*, distributed mainly in the south of Ukraine, also sometimes has a uniform whitish shell without bands. However, in this species, the initial whorls of the shell appear disproportionately wide compared to subsequent whorls. Therefore, *H. albescens* is easily distinguished from all other *Helix* species found in Ukraine.

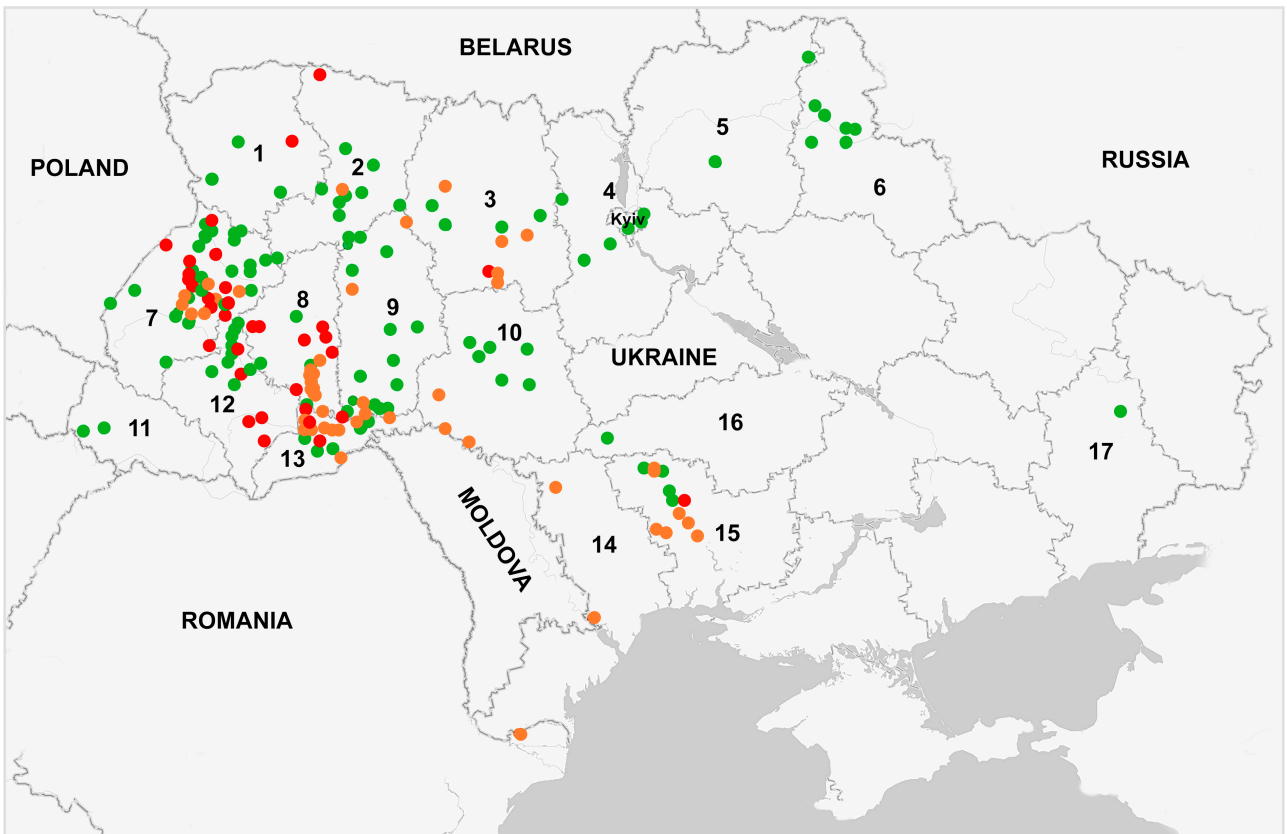
In living specimens of *H. lutescens*, the last whorl of the shell before the aperture often appears more or less brownish, which can create a clear contrast with the light rest of the shell (Figs 4E, F). This can also be considered quite characteristic, although not obligatory, for *H. lutescens*. However, snails, in which the brownish tint extends over most of the last whorl, are often mistaken for *H. pomatia* by non-specialists. In addition to the shell, *H. lutescens* also has a well-recognisable body colouration – greyish, with more or less pronounced longitudinal light bands on the sides (Figs 3A, D, E, 4B). This does not apply to very young snails, whose body may appear more whitish than grey. KORALEWSKA-BATURA (1999) also considers such body colouration in *H. lutescens* to be species-specific.

*H. lutescens* can be characterised as a Dacian-Podolian species (KERNEY et al., 1983; RIEDEL 1988; KORALEWSKA-BATURA 1999; WIKTOR 2004), distributed mainly in the Danube basin and the Podolian Upland. However, in a number of recent publications its range was erroneously described as “Carpathians and adjacent regions” (BALASHOV & BAIDASHNIKOV 2012; WELTER-SCHULTES 2012; ZEMOGLYADCHUK 2020) or “mainly the Carpathians” (BALASHOV 2016a, 2016b). Judging by the map we compiled (Fig. 1), *H. lutescens* rather avoids the mountainous part of the Ukrainian Carpathians, although it is often found in Ciscarpathia. It is not without reason that this species was even not mentioned in the composition of the Carpathian malacofauna by BAIDASHNIKOV (1988, 1989). Outside Ukraine, *H. lutescens* is distributed in a similar manner (KERNEY et al., 1983; RIEDEL 1988; KORALEWSKA-BATURA 1999; Fig. 1). WIKTOR (2004) characterises *H. lutescens* as a lowland species with a range divided by the Carpathian arc.

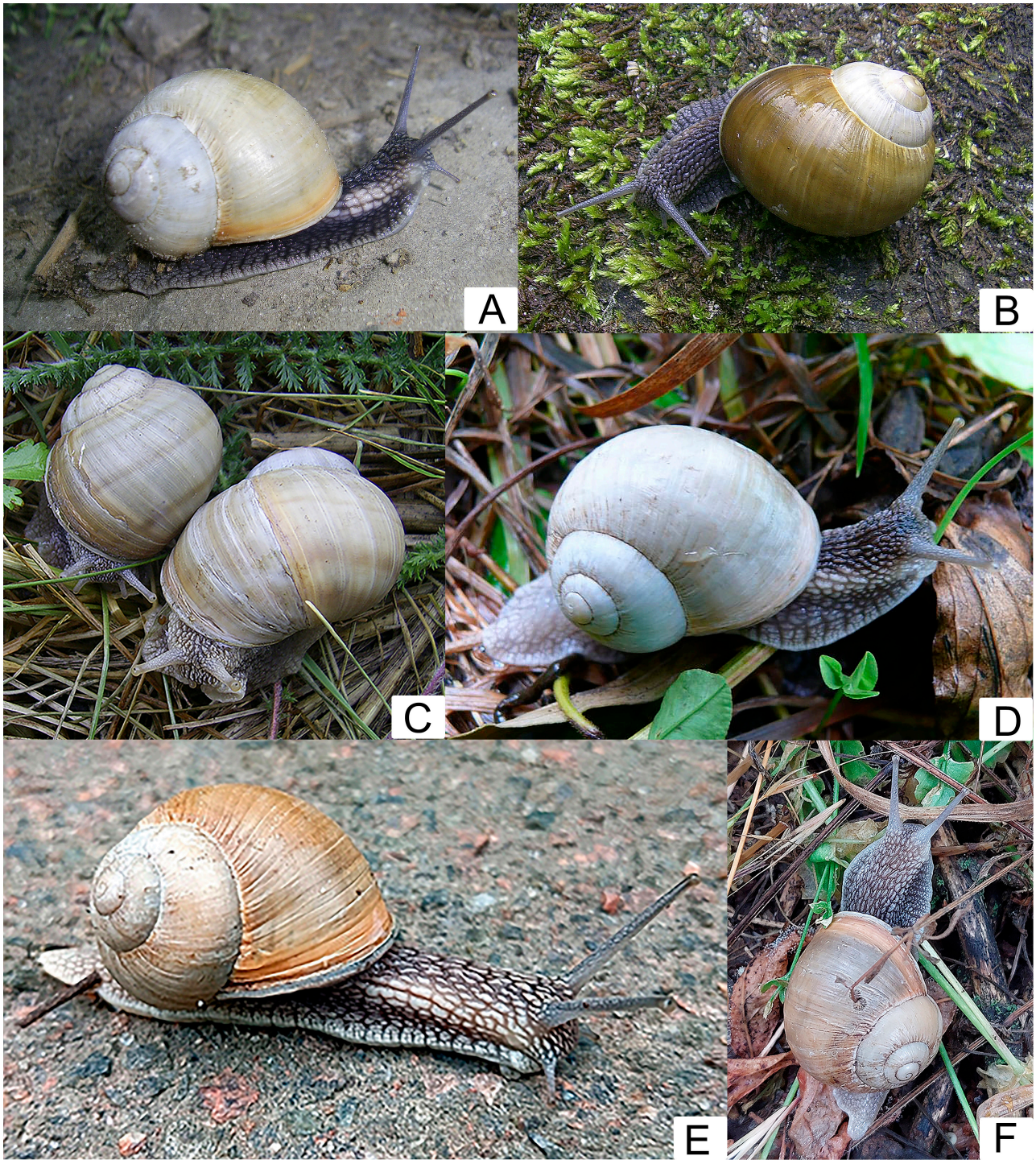
In addition to Ukraine, *H. lutescens* occurs in Moldova, Romania, Slovakia, Hungary, Poland (RIEDEL 1988; KORALEWSKA-BATURA 1999; WELTER-SCHULTES 2012), Belarus (ZEMOGLYADCHUK 2020) and the European part of Russia, where its introduction to Moscow City was recently described (EGOROV 2021). According to iNATURALIST (2024), in 2022–2024 *H. lutescens* was observed several times much further east than Moscow – in Cheboksary City, the capital of the Chuvash Republic in Russia (observations Nos. 157941257, 223057742, 223156703).



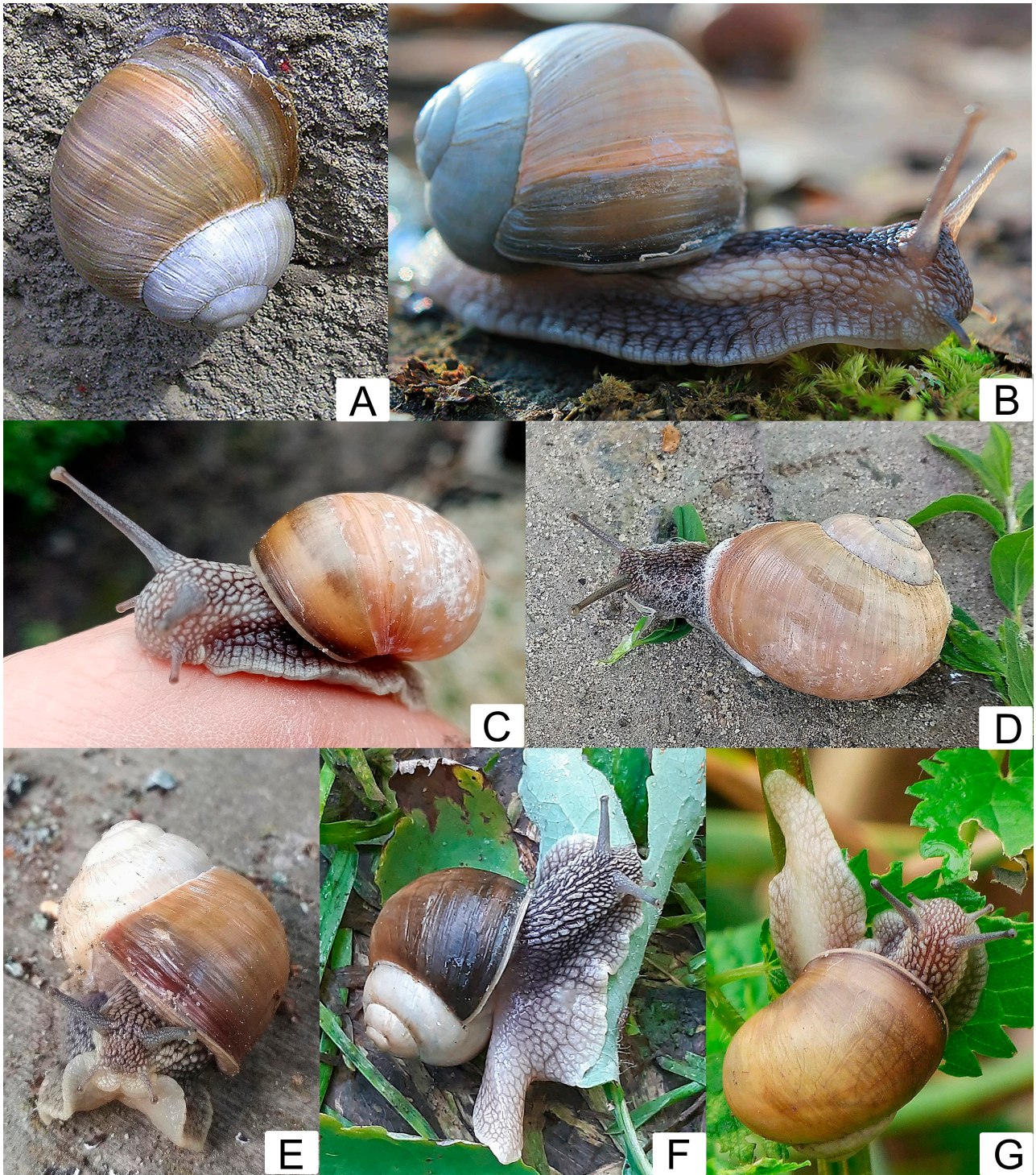
**Fig. 1.** Distribution of *H. lutescens* in Ukraine: in red – the malacological collection of SMNHL and other personally examined samples; in blue – localities that are given only according to literature data and two Kyiv collections; in green – according to photographs in citizen science databases and Facebook (for more details, see Material and methods). The following administrative regions are indicated by numbers: 1 – Volyn, 2 – Rivne, 3 – Zhytomyr, 4 – Kyiv, 5 – Chernihiv, 6 – Sumy, 7 – Lviv, 8 – Ternopil, 9 – Khmelnytskyi, 10 – Vinnytsia, 11 – Transcarpathian, 12 – Ivano-Frankivsk, 13 – Chernivtsi, 14 – Odesa, 15 – Mykolaiv, 16 – Kirovohrad, 17 – Donetsk.



**Fig. 2.** Localities in Ukraine where *H. lutescens* has been known for different time periods: in red – until the 1950s; in orange – from 1960 to 2000; in green – from 2001 to present. The numbers indicate the administrative regions where *H. lutescens* was found, similar to Fig. 1.



**Fig. 3.** Specimens of *H. lutescens* from some administrative regions of Ukraine, where this species was known no later than the mid-20th century: A, B – Lviv City (Lviv region, 2015 and 2012); C – Kamianets-Podilskyi town (Khmelnitskyi region, 2013); D – near Shypyntsi village (Chernivtsi region, 2018); E – Zhytomyr City (Zhytomyr region, 2024); F – Pervomaisk district (Mykolaiv region, 2024). Photos by N. Gural-Sverlova (A–C), N. Smirnov (D), R. Gleb (E), H. Drabyniuk (F).



**Fig. 4.** Specimens of *H. lutescens* from some administrative regions of Ukraine, where this species was recorded only at the beginning of the 21st century: A – Mukachevo town (Transcarpathian region, 2015); B – Krolevets town (Sumy region, 2021); C – Nizhyn town (Chernihiv region, 2024); D – Kyiv City (Kyiv region, 2021); E – Myhalky village (Kyiv region, 2020); F – near Kniazhychi village (Kyiv region, 2022); G – near Bakhmut town (Donetsk region, 2019). Photos by N. Gural-Sverlova (A), A. Kovtun (B), Ye. Revenchyk (C), O. Levon (D), T. Borysova (E), V. Andrushchyk (F), I. Pyshnyi (G).

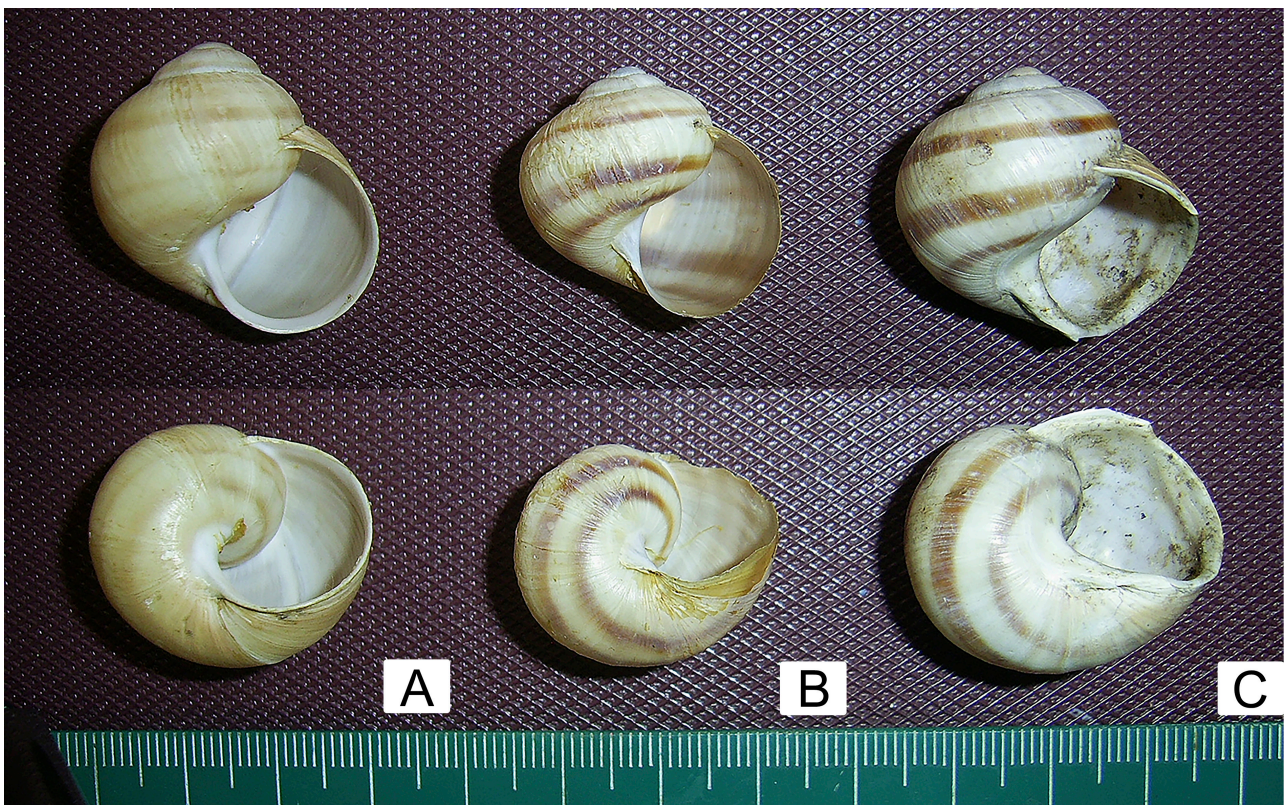
Isolated populations of *H. lutescens* in the southwest of Belarus (Brest region) are also considered to have been introduced (ZEMOGLYADCHUK 2020), although hypothetically the boundary of the natural range of this species could also lie there. However, the record of an immature specimen of *H. lutescens* in Minsk City in 2020, also posted in the citizen science database mentioned above (observation No. 52557745), is already an unambiguous result of anthropochory. Thus, the expansion of the range of *H. lutescens* has been observed recently not only in Ukraine. Even in Poland, where the species was considered to be receding (RIEDEL 1988; WIKTOR 2004) or near threatened (WIKTOR & RIEDEL 2002), *H. lutescens* has been observed in recent years much further north than the distribution area known by the end of the 20th century (KORALEWSKA-BATURA 1999: Fig. 1; WIKTOR 2004: map 174) – in Warsaw and its surroundings as well as near Olsztynek (Nadrowo) in northern Poland (iNATURALIST 2024).

For the western part of present Ukraine, *H. lutescens* was mentioned for the first time in the original species description (ROSSMÄSSLER 1837). Its locus typicus is “Lemberg in Galicien”, now Lviv. By the end of the 19th century, *H. lutescens* was mentioned not only for the environs of Lviv, but also for many other localities within the administrative boundaries of the present Lviv, Ternopil, and Ivano-Frankivsk regions of Ukraine (BAKOWSKI 1880, 1881, 1882, 1884, 1891), as well as for Bukovina (BAKOWSKI 1891), the northern part of which is now the Chernivtsi region of Ukraine. By the middle of the 20th century, it became known that the range of *H. lutescens* in Ukraine is

much larger, reaching the Zhytomyr and Vinnytsia regions in the east, and the Odesa and Mykolaiv regions in the southeast (LIKHAREV & RAMMELMEYER 1952). The same data were repeated in malacological literature in the second half of the 20th century (SCHILEYKO 1978) and even at the beginning of the 21st century (SVERLOVA 2006; GURAL-SVERLOVA & GURAL 2012; BALASHOV 2016a).

The only administrative region in Western Ukraine, where *H. lutescens* has not been recorded until recently, is the Transcarpathian one (Fig. 2). Despite the fact that in the second half of the 20th century, the land molluscs of this region were studied by different authors (POLEVINA 1959; ZDUN 1960; BAIDASHNIKOV 1985), none of them found *H. lutescens* here. Until now, only two localities of *H. lutescens* are known in the Transcarpathian Lowland (GURAL-SVERLOVA & GURAL 2016), as mentioned in Table 1. In both cases, the snails were found in an anthropogenically transformed environment: on a household plot on the outskirts of the Velyka Dobron village and along the access road to Mukachevo castle, where tourist buses often stop. Therefore, the current presence of *H. lutescens* in the Transcarpathian region is likely to be the result of a relatively recent introduction or some independent introductions. The potential source of introduction could have been other administrative regions of Western Ukraine, as well as neighbouring countries where *H. lutescens* is also found (see above).

Even more obvious is the expansion of the range of *H. lutescens* along the northern borders of Ukraine (Fig. 2). In the second half of the 20th century, special malacolog-



**Fig. 5.** Shells of *H. lutescens* with poorly visible (A) and distinct (B, C) spiral bands from the malacological collection of SMNHL: A, B – near Ugryn village (Ternopil region, 1998); C – near Chornivka village (Chernivtsi region, 2003). Photos by N. Gural-Sverlova.

ical studies were conducted in these areas as well (BAIDASHNIKOV 1992). However, even then *H. lutescens* was not found east of the Zhytomyr region (No. 3 on the maps we compiled). Particularly indicative is the recent discovery of *H. lutescens* in Kyiv and some other settlements of the Kyiv region (Table 1). The terrestrial malacofauna of Kyiv and its environs has been periodically studied since the second half of the 19th century (JELSKI 1862), see the review in TAPPERT et al. (2001) and SVERLOVA et al. (2006), as well as a later species list of land molluscs of Kyiv in BALASHOV (2016a). Moreover, in recent decades, the attention of malacologists has increasingly been attracted by introduced species, the number of which is constantly increasing in Kyiv (KOROL & KORNIUSHIN 2002; BALASHOV & VASYLIUK 2007; BALASHOV 2008; VYCHALKOVSKAYA & KRAMARENKO 2008; GURAL-SVERLOVA et al. 2009; BALASHOV & MARKOVA 2021a, 2021b, 2023a, 2023b). It is therefore unlikely that the presence of such a large land snail as *H. lutescens* in this area could have remained undetected for a long time. Notably, *H. lutescens* is already the third species of *Helix*, discovered in Kyiv since the beginning of the 21st century (BALASHOV & VASYLIUK 2007; GURAL-SVERLOVA & LYZHECHKA 2024).

*Helix lutescens* is characterised as a steppe (ALEXANDROWICZ 1987: table 2) or xero-thermophilous species (RIEDEL 1988; KORALEWSKA-BATURA 1999). The expansion of its range to the north, like some other heat-loving land molluscs, may be facilitated by global warming and the warmer microclimate of populated areas. Even within its natural range, *H. lutescens* is often found not only in natural habitats (open areas with a predominance of grassy vegetation, shrub thickets, and forest edges) but also in a variety of anthropogenic habitats: in gardens, parks, cemeteries, along railway lines, on the boundaries of fields, pastures, etc. (URBANSKI 1933; GITILIS 1960; GITILIS & KASHCHUK 1960; GITILIS & POLISHCHUK 1960; KORALEWSKA-BATURA 1999, etc.), i.e. it has a fairly well-expressed tendency to synanthropisation. According to our observations in Lviv and some other settlements of the Lviv region, a narrow strip of trees and shrubs between residential buildings and the street roadway is often enough for its successful survival.

### Acknowledgements

We are grateful to all persons who posted their photographs of *H. lutescens* from different parts of Ukraine in citizen science databases or on Facebook. Such amateur observations made it possible to significantly clarify the size of the present range of this species in Ukraine. We especially thank the authors of the images used in this paper: Nazar Smirnov, Ruslan Gleb, Halina Drabyniuk, Andrii Kovtun, Yehor Revenchuk, Oleksandr Levon, Tamara Borysova, Vladyslava Andrushchuk and Ihor Pyshnyi. Thanks to Ihor Balashov (Schmalhausen Institute of Zoology, Kyiv), we received information about *H. lutescens* samples stored in the Kyiv malacological collections. The samples collected by Andrii Shklyaruk (Odesa) and examined by us helped to clarify the present distribution of this species in the southwest of Ukraine, see Material and methods. We

also thank Isabella Obednina (Berehove), who sent us first photographs and then shells of *H. lutescens* from Velyka Dobron in the Transcarpathian region.

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**Table 1.** Records of *H. lutescens* in those administrative regions of Ukraine where this species was not known before the beginning of the 21st century.

Administrative regions	Localities and year of observations	Information sources (for database, observation numbers are given in parentheses)
Western Ukraine		
Transcarpathian	Mukachevo town, 2015	GURAL-SVERLOVA & GURAL 2016
	Velyka Dobron village, since 2011	
Central Ukraine		
Kyiv	Kyiv City, since 2021	iNATURALIST 2024 (Nos. 83752312, 224737038, 225046446)
	Brovary town, 2024	iNATURALIST 2024 (No. 219951902)
	Fastiv town, 2024	iNATURALIST 2024 (No. 224253433)
	Hlevakha settlement, 2022	iNATURALIST 2024 (No. 119544892)
	near Kniazhychi village, 2022	iNATURALIST 2024 (No. 121282988)
	Myhalky village, 2020	iNATURALIST 2024 (No. 50872005)
Chernihiv	Nizhyn town, 2024	iNATURALIST 2024 (Nos. 207118092, 209440099, 209444927)
	Novhorod-Siverskyi town, 2021	iNATURALIST 2024 (No. 81720700)
Sumy	Buryn town, 2022	iNATURALIST 2024 (No. 117268398)
	Konotop district, 2021	(TSUSHKO 2021)
	Krolevets town, 2021	(KOVTON 2021)
	Krolevets district, 2023	iNATURALIST 2024 (No. 183330945)
	Putyvl town, 2022	iNATURALIST 2024 (No. 118248329)
	Putyvl district, 2024	iNATURALIST 2024 (No. 239928114)
Kirovohrad	near Novoselytsia village, 2021	iNATURALIST 2024 (No. 112022332)
Eastern Ukraine		
Donetsk	near Bakhmut town, 2019	iNATURALIST 2024 (No. 148683616)