

Protecting the names of *Cepaea nemoralis* (Linnaeus, 1758) and some other well-known helicoids

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ABSTRACT

Our research shows that most of the probable syntypes for *Cepaea nemoralis* (Linnaeus, 1758) actually represent *Cepaea hortensis* (O.F. Müller, 1774). This could destabilise the nomenclature of this well-known species. In this paper we select the only remaining syntype of which the type status is not challenged and that represents *C. nemoralis* as currently understood as the lectotype for the taxon. In addition, we discuss nomenclatural issues with a few other well-known helicoids. It is likely that more nomenclatural work is needed on several large-bodied, well-known European and North African helicoids.

Keywords *Cepaea nemoralis* (Linnaeus, 1758), *Cepaea hortensis* (O.F. Müller, 1774), *Eobania constantina* (E. Forbes, 1835), *Soosia diodonta* (A. Férussac, 1832), lectotype

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INTRODUCTION

Cepaea nemoralis (Linnaeus, 1758), the grove snail or brown-lipped snail, is one of the best-known terrestrial snails in North-West Europe. Research into this species has reached a point at which many detailed studies into its biology are available, as the following examples show. The anatomy of *C. nemoralis* and its sibling species *C. hortensis* (O.F. Müller, 1774) were investigated in detail in the early 1900's (Kleiner 1912, Aubertin 1927); *C. nemoralis* was used in early studies into mendelian genetics (Lang 1904, 1906, 1908, Reichert 1928, Fisher & Diver 1934); classical studies into evolutionary genetics were carried out by Cain & Sheppard (1959), while contemporary evolutionary change in colour pattern has been

evaluated by citizen science and resampling (Silvertown *et al.* 2011; Özgo & Schilthuizen 2011); it is known that *Cepaea nemoralis* can defend itself against nematodes by encapsulating them against the wall of its shell (Williams & Rae 2016); its invasion as non-native species in other countries is well documented (e.g. Örstan *et al.* 2011, Gural-Sverlova *et al.* 2021), and most of its genome is known (Saenko *et al.* 2021). Many more examples of detailed studies into its ecology, behaviour, evolution, morphology, and physiology are available.

Recently, the first author of this paper (MR) intended to evaluate the suitability of *Cepaea nemoralis* to be commercially farmed. The reason for this is that the species is edible and classified as such in archaeological studies (e.g. Thomas

& Zapata 2018). Non-scientific sources indicate it is still eaten by some people, it is native to Western Europe, is quite eurytopic within its range (Jansen & Majoor 2025) and is similar in size and shape to some better-known edible, and farmed, Mediterranean species. Snails in general are also thought to be a more sustainable, healthy source of protein than conventional livestock for meat (e.g. Garkov & Nikovska 2024).

As part of the legislation around farming is (or in the future will be) tied to the scientific names of taxa, this experiment triggered an evaluation of the stability of the nomen *Cepaea nemoralis*. While investigating type material, we found that most of the syntypes of this species belong to *Cepaea hortensis*, were lost or cannot definitively be tied to *C. nemoralis* without interpretation. Hanley (1855) already noted that the type material consists of multiple species, while Westerlund (1873) considered Linnaeus's (1758) definition of *C. nemoralis* to be *C. hortensis* and considered the description in Müller (1774) to be the first description of true *C. nemoralis*. Kennard & Woodward (1920), in their text on this species, only considered a cited syntype in Lister (1678) and Petiver (1695), which indeed represents *C. nemoralis*. The mixed type material combined with several interpretations that are not aligned with each other and do not pose a valid solution under the International Code of Zoological Nomenclature (ICZN), could destabilise the nomen *Cepaea nemoralis*, if a taxonomist were to fix a white-lipped shell as the lectotype of the species.

Therefore, in this paper we designate the only extant specimen of which the syntype status cannot be contested and that fits the current interpretation of *C. nemoralis* as the lectotype of *Helix nemoralis* to preserve the long-established name of this common species.

MATERIAL & METHODS

All museum collections known to contain molluscs that were seen by Linnaeus (1758) or possibly containing specimens from literature cited in the original description of *Helix nemoralis* (Linnaeus 1758: 773, species 604) were consulted to track all existing syntypes of this species. Images were requested from these institutes if a specimen was found that unequivocally belongs to the type series. All these recovered syntypes were assessed and a suitable lectotype was selected based on the current definition of *C. nemoralis* as accepted in recent field guides (Kerney & Cameron 1979, Jansen & Majoor 2025). The collections we consulted were: The Linnean Society of London, London, United Kingdom (LINN), The Natural History Museum, London, United Kingdom (NHMUK), Natural History Museum Rotterdam, Rotterdam, The Netherlands (NMR), and Museo di Storia Naturale, Università di Pisa, Pisa, Italy (MSNUP).

RESULTS

Only nine probable syntypes of *Helix nemoralis* were recovered. Eight specimens (Fig. 1) were in the collection of the Linnean Society of London, labelled LINN 560, and all represent the species currently known as *Cepaea hortensis* (O.F. Müller, 1774). They are easily identifiable as that species as the colour is well preserved on all shells. The main difference between *C. nemoralis* and *C. hortensis* is that *C. nemoralis*

usually has a brown or black lip while the lip of *C. hortensis* is normally completely white. *Cepaea hortensis* is also slightly smaller. Aside from this there are population level differences, like differences in how common different banding types are. The lips of all specimens in the collection of the Linnean society of London are white and they are not particularly large, so we identify them as *C. hortensis*. Although the specimens were not cited in the description, we do consider them probable syntypes, as they were part of Linnaeus's private collection, currently housed at the Linnean Society of London. In addition, early descriptions of *C. nemoralis* were already given in Linnaeus (1745, 1746, 1747), which indicates that these specimens were available before Linnaeus (1758) was published. The more elaborate description in Linnaeus (1746) shows that he did not use the colour of the lip as a significant character for species delimitation, making it more likely that the type material consists partially of *C. hortensis* specimens. That said, the *C. hortensis* specimens in lot LINN 560 could also have been added by the son of Linnaeus and J.E. Smith or could have been misplaced at a later stage (Dance 1967).

Aside from these types, the specimen illustrated by Gualtieri (1742) was found in the Zoological collections of the Museo di Storia Naturale, University of Pisa (Italy). This specimen was cited directly in the original description by Linnaeus (1758) and thus should be considered a syntype. This syntype has a brown lip and does not have the notable axial sculpture of *Caucasotachea vindobonensis* (C. Pfeiffer, 1828), thus it belongs to *C. nemoralis* as currently understood. It is designated as the lectotype of *C. nemoralis* below.

Linnaeus (1758) cited more papers beside Gualtieri (1742) and all specimens cited belong to the syntype series. An example of this is the shell illustrated by Lister (1678), which is known to have originated from the United Kingdom. The black lip in the illustration implies this specimen fits the current definition of *C. nemoralis*. Additionally, five out of six specimens in fig. 54 of Lister (1685-1692), which was also cited by Linnaeus, 1758, are clearly *C. nemoralis*. The last figured specimen could belong to *C. hortensis*. An attempt was made to track these syntypes at the NHMUK, where some of Lister's shells were deposited as part of the Sloane collection, but the specimens could not be located there. Some material from the Lister collection is supposed to be in the Zoological Museum of the University of Oxford, but these shells were never found (pers. comm. Jonathan Ablett 2025). We therefore consider these syntypes lost. Although absent specimens are sometimes designated to be the lectotype of a species to confine the type locality and to make it easier to replace it by a neotype (for example Dubois *et al.* 2024), we refrain from doing so. We made this decision in order to prevent discussion about whether a type does or does not exist and to prevent complications when an original type is recovered and turns out to be a different species than we expected.

Petiver (1695) is also cited by Linnaeus (1758), but this book does not mention or illustrate a specific specimen except for the specimen imaged by Lister (1678). It seems that no possible syntype is tied to this publication, aside from Lister's shell.

Last, the *C. nemoralis* specimens described in Linnaeus (1764a) should also be considered. These specimens were



Figure 1 Possible paralectotypes of *Helix nemoralis* Linnaeus, 1758 (8 specimens, dry shells, collection Linnean Society of London, LINN 560), that are reidentified as *Cepaea hortensis* (O.F. Müller, 1774), recognizable mainly by their white peristome. No collection locality given. Scale bar 5 millimetres. Images made available for non-commercial use by the Linnean Society of London.

part of the collection of the then queen of Sweden and were studied by Linnaeus. The shells are still extant in the Museum of the Uppsala University (Wallin 2001). However, recently a debate was started on whether or not the specimens published in Linnaeus (1764a,b) were seen by Linnaeus before the publication of Linnaeus (1758) (Dubois *et al.* 2024; Wüster *et al.* 2024). Although this discussion primarily revolves around *Eunectes murinus* (Linnaeus, 1758), the green anaconda, the decisions made around the type status of this material will also impact the interpretation of possible Linnean syntypes of other animals. We think that specimens studied in Linnaeus (1764a,b) should be considered strong evidence of Linnaeus's views on species delimitation and in absence of other material are as close as possible to a true syntype. It should be noted that Lovén (1887) and Dance (1967) reported that Linnaeus finished the study of the queen's collection in 1755

based on studies of unpublished letters and manuscripts by Lovén (1887), which would make all specimens studied in Linnaeus (1764a) possible syntypes of species described by Linnaeus (1758). Other syntypes that fit the current definition of *C. nemoralis* are available, so we refrain from designating a lectotype within the Uppsala University collection.

Systematics

Class Gastropoda Cuvier, 1795

Order Stylommatophora A. Schmidt, 1855

Family Helicidae Rafinesque, 1815

Genus *Cepaea* Held, 1838

Cepaea Held, 1838: 910. Type species (by subsequent designation): *Helix nemoralis* Linnaeus, 1758

Country	Location	Coll. Nummer	Diameter (mm)	Height (mm)
France	Champlieu	NMR993000175270	24.6	19.8
France	Champlieu	NMR993000175270	25.9	20.8
Germany	Königswalde	NMR993000176595	24.5	19.3
Germany	Rothenburg	NMR993000060856	24.7	18.6
The Netherlands	Schoonrewoerd	NMR993000076394	24.2	21.0
The Netherlands	Terwolde	NMR993000176598	24.7	19.6
The Netherlands	Terwolde	NMR993000176598	21.8	17.7
The Netherlands	Terwolde	NMR993000176598	23.2	18.6
The Netherlands	Terwolde	NMR993000176598	24.7	20.0
The Netherlands	Terwolde	NMR993000176598	24.1	19.4
The Netherlands	Terwolde	NMR993000176598	23.6	18.6
The Netherlands	Terwolde	NMR993000176598	24.1	20.4
The Netherlands	Terwolde	NMR993000176598	23.4	18.7
The Netherlands	Terwolde	NMR993000176598	20.5	16.7
Spain	Guipúzcoa	NMR993000048106	27.6	21.8
Spain	Guipúzcoa	NMR993000048106	26.2	19.1
Switzerland	Leysin	NMR993000063546	24.7	19.5

Table 1 Large shelled specimens of *Cepaea nemoralis* (Linnaeus, 1758) occur throughout its range. Collection Natural History Museum Rotterdam. All measurements are in millimetres.

Species included in the genus — *Cepaea hortensis* (O.F. Müller, 1774); *Cepaea nemoralis* (Linnaeus, 1758).

Remarks — Some extinct species might also belong to the genus *Cepaea*, but all those taxa are only known by their shell and have not recently been assessed. Comparing them to recent species and establishing whether they actually belong to *Cepaea* is a different research topic, so they are not discussed here. *Cepaea hortensis* and *C. nemoralis* are the only species that are currently recognized in *Cepaea* and still extant. *Cepaea nemoralis etrusca* (Rossmässler, 1835) is recognized as an accepted, living subspecies of *C. nemoralis* (Molluscabase 2025), but this requires further research as size is the only character separating it from the nominal subspecies, intermediate populations are known and giant forms are reported from other mountainous regions (Cook & O'Donald 1971, Forni & Sacchi 2003). For now, we regard it as an ecophenotype of *C. nemoralis*, as shells varying from 24.0 to 27.6 mm diameter (the average size of *C. n. etrusca*) were recognized in material from The Netherlands, Germany, France, Switzerland and Spain in the NMR collection (Table 1). These large shelled individuals are thus not limited to mountainous areas.

***Cepaea nemoralis* (Linnaeus, 1758)**

Fig. 2

Helix nemoralis – Linnaeus 1758: p. 773, n. 604.

Helicogena libellula – Risso 1826: p. 62, pl. 3, fig. 21.

Type material — MSNUP 2376, (**lectotype**, empty shell, **designated herein**), from an unknown locality, leg. unknown.

Measurements — Height: 20.2 mm; Width: 26.2 mm.

Diagnosis — Medium sized helicoid shell, with a variable colour pattern that consists of a yellow to brown base colour and (often) dark brown spiral bands. Aperture subcircular, deflected, with reflected, brown to black coloured, peristome.

Geographic range — Native to Western and Central Europe, but introduced into Eastern Europe and North America. A (now deleted) iNaturalist observation suggested that one juvenile specimen was found in a greenhouse in the inter-Andean valley of Ecuador as well, but this needs to be confirmed (iNaturalist entry viewed by M.T. Roosen in 2023-2024, but since deleted). *Cepaea nemoralis* has not previously been recorded from Ecuador (Breure *et al.* 2022).

Comparisons — It is most similar to *C. hortensis*, from which it differs by having a brown or black peristome (*C. nemoralis*) instead of a white peristome (*C. hortensis*). As *C. hortensis* and *C. nemoralis* were subject of many investigations, their anatomy is well known and can be used to separate these species as well (Kleiner 1912, Aubertin 1927). Although there are more differences, we highlight the following characters in genital anatomy: 1) The flagellum is longer and more variable in length in *C. nemoralis*. 2) The upper part of the receptaculum seminis is considerably shorter in *C. hortensis*. 3) the arrangement of the diverticula per pair of mucous glands differs per species, 4+4 being the most common combination in *C. hortensis*, while 3+2 is the most common in *C. nemoralis* (see Aubertin 1927). 4) The dart sack is smaller in *C. hortensis*. 5) the love dart of *C. hortensis* has bifurcated blades, while



Figure 2 Lectotype of *Helix nemoralis* Linnaeus, 1758 (Museo di Storia Naturale, University of Pisa, MSNUP 2376, dry shell), from an unknown locality. The specimen lost most of its colour, but the black lip combined with the smooth shell make it identifiable as the current definition of *Cepaea nemoralis*. The writing '1P' is not visible on the photos. Scale bar 5 millimetres. Pictures made by the second author (AC).

the love dart of *C. nemoralis* has simple blades.

Caucasotachea vindobonensis (C. Pfeiffer, 1828) is similar in size and has a brown peristome, but the shell differs by having a relatively high spire and more prominent axial sculpture than *C. nemoralis*.

Remarks — The specimen selected as lectotype in this paper was illustrated by Gualtieri (1742: pl. 1, fig. P). Aside from being in the Gualtieri collection, Gualtieri himself wrote the number "1 P" on the shell and there was a label, probably from the nineteenth century, with the shell that reads: "*Helix nemoralis* Gualt. tav 1 fig P" (Fig. 3). This is the exact figure cited in Linnaeus (1758) and the specimen imaged in that figure (MSNUP 2376) should be considered an original syntype. The black lip and nearly smooth shell make it identifiable as the species currently known as *Cepaea nemoralis*. With a diameter of 26 mm it is larger than most typical *C. nemoralis*, but it falls within the variability of various populations throughout its range (Table 1).

Currently, the shell does not look much like the original drawing published in Gualtieri (1742), but it seems to have lost its colour over time as remnants of the colour bands can still be seen in the lateral view near the lip. It is also possible that the shell already was in this state when Gualtieri added it to his collection and the colour bands were reconstructed in the drawing. Regardless of the original state of the specimen, it is likely that the colour bands were inverted during the printing process, as the placement of the white bands on the shell matches the placement of the black bands in the original drawing. Moreover, the original text refers to two whitish bands in apical view, not two black bands on a whitish background.

However, this is all speculation. As drawings can be modified and mistakes can be made while drawing or printing, documentation like the original collection label, notes on the shell itself or an archive that links the specimen to a researcher should carry more weight than comparisons of specimens to these drawings when tracing types. In addition, we also think that textual descriptions of a colour pattern are less prone to mistakes than drawings or plates printed by a printing press. The label, textual description and number on the shell fit with

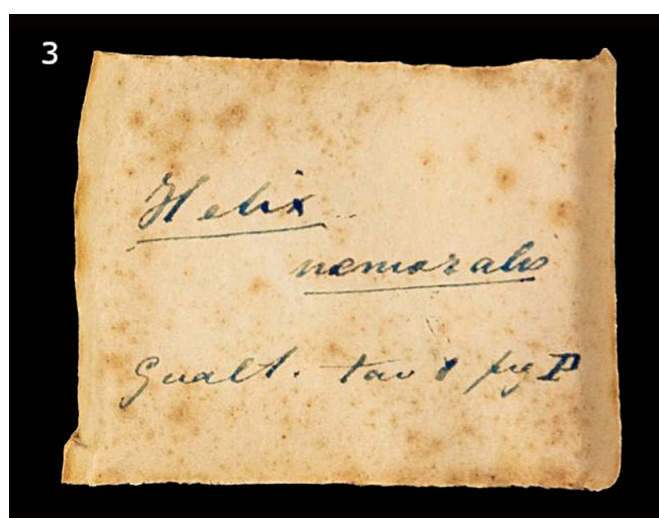


Figure 3 The original label of the lectotype of *Helix nemoralis* Linnaeus, 1758 (Museo di Storia Naturale, University of Pisa, MSNUP 2376), indicating it is the original specimen from the Gualtieri collection that was cited by Linnaeus (1758). Picture made by the second author (AC).

what we would expect of a syntype from the Gualtieri collection.

DISCUSSION

This short note stabilises the name *Cepaea nemoralis* and prevents it from becoming another target for taxonomic debate. Yet, the situation in *C. nemoralis* exemplifies the (in)stability of the basal taxonomy of European snails in general.

A few members of the Helicoidea were briefly studied by us to obtain a better understanding as to whether other well-known European land snails need more basal taxonomic revisions. These cursory investigations showed that *Helix lucorum* Linnaeus, 1758, a commercially important snail, until recently also had no extant type that fits the current usage of this species (Van Osselaer et al. 2001, ICZN 2002, Neubert 2014). The only extant shell that was a syntype is at the Linnean Society of London (LINN 556), but this is a speci-

men of what is currently known as *Otala lactea* (O.F. Müller, 1774). Consequently, to protect both names, a neotype fitting the current understanding of *H. lucorum* was proposed to the Commission of Zoological Nomenclature (Van Osselaer et al. 2001, ICZN 2002).

Unresolved homonyms are also still present in the European fauna. One particularly complicated example is *Helix diodonta* A. Férussac, 1832 (= *Soosia diodonta* (A. Férussac, 1832)), which is a junior homonym of *Helix diodonta* Say, 1824 (= *Appalachina sayana* (Pilsbry & Ferriss, 1906)). Because of confusion about the correct publication date of *Helix diodonta* A. Férussac, 1832, Binney (1840) replaced the older homonym by *Helix sayii* Binney, 1840 (not *Helix sayi* Wood, 1828), which in turn got replaced by *Polygyra sayana* by Pilsbry & Ferriss (1906). This accidental replacement of the older homonym threatens the stability of both taxa. For *Helix diodonta* Férussac, 1832 we can resolve this issue relatively easy, as the name *Helix diodonta* Say, 1824 to our knowledge has not been used after 1899, while *Helix diodonta* Férussac, 1832 was used more than 25 times by more than 10 different authors within the last 50 years (Kukla 1978, Brunnacker et al. 1980, Gittenberger 1980, Meijer 1987, Skompski 1990,

Krolopp 1992, Ložek 1992, Rousseau 1992, Gasparik 1993, Krolopp & Sümegi 1995, Ložek 2000, Quintana et al. 2007, Pawłowski et al. 2008, Peney et al. 2008, Moser et al. 2009, Páll-Gergely & Roibu 2011, Deli 2013, Juřčková et al. 2013, Gheoca 2014, Pazonvi 2014, Pazonvi et al. 2014, Korábek et al. 2016, Sabol et al. 2017, Dedoy et al. 2021, Gojšina et al. 2025, Horáček et al. 2025, Nelson et al. 2025). This means the criteria for reversal of precedence under ICZN article 23.9.1 and 23.9.2 are met. *Helix diodonta* Férussac, 1832 should be considered valid (a *nomen protectum*) and *Helix diodonta* Say, 1824 becomes a *nomen oblitum* in this context. However, a case to suppress *Helix diodonta* Say, 1824 at the International Commission of Zoological Nomenclature is still necessary to protect the junior synonym of *Helix diodonta* Say, 1824: *Polygyra sayana*. Moreover, if someone accepts *Helix diodonta* Say, 1824 as valid name for *Polygyra sayana*, this could still create complications for *Helix diodonta* Férussac, 1832. As we have all information to fix this available to us, a case will be submitted to the International Commission of Zoological Nomenclature (Roosen & Dourson in prep.).

In some other cases, species are fairly well defined, but the type material was never recovered. An example of this is



Figure 4 Syntype of *Helix constantina* E. Forbes, 1835 (The Natural History Museum, NHMUK 20250102, dry shell), from Bougia (= Béjaïa, Algeria). Scale bar 10 millimetres. Images made available for non-commercial use by Jonathan Ablett (NHMUK).

Eobania constantina (E. Forbes, 1835). This is a commercially important edible snail that occurs in North Africa and that was recently reconfirmed to be separate from *E. vermiculata* (O. F. Müller, 1774) (Bouaziz-Yahiatene *et al.* 2017, Holyoak *et al.* 2020). Bouaziz-Yahiatene *et al.* (2017) did not recover the type in the E. Forbes collection at the National Museums of Scotland (Edinburgh, Scotland). This is not surprising, as part of E. Forbes's material ended up in the NHMUK. Two syntypes were recovered in the NHMUK collection, with a label in Forbes's handwriting, of which the type that best fits Forbes's (1835) original drawing is figured here (Fig. 4). As the shell is not finely malleated, this type specimen matches the current definition of the species as proposed in Bouaziz-Yahiatene *et al.* (2017). That said, the results in Holyoak *et al.* (2020) suggest *E. constantina* might consist of at least three cryptic species. If that is the case, a more elaborate study of the type material is needed to decide which of these three clades is the true *E. constantina*.

All of this shows that, even in such a well-studied fauna as the European and North African Helicoidea, there is still plenty of work for taxonomists. As community science, ecological legislation, and agricultural legislation are generating more and more users of taxonomy, the need for recognizing and fixing vulnerabilities in the taxonomy of well-known species is becoming urgent.

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REFERENCES

- Aubertin, D., 1927 - On the anatomy of the land snails (Helicidae) *Cepaea hortensis* (Mull.) and *Cepaea nemoralis* (L.) – *Proceedings of the Zoological Society of London* 97: 553-582.
- Binney, A., 1840 - A monograph of the helices inhabiting the United States – *Boston Journal of Natural History* 3: 353-394
- Bouaziz-Yahiatene, H., Pfarrer, B., Medjdoub-Bensaad, F. & Neubert, E., 2017 - Revision of *Massylaea* Möllendorff, 1898 (Stylommatophora, Helicidae) – *Zookeys* 694: 109-133.
- Breure, A.S.H., Roosen, M.T. & Ablett, J.D., 2022 - Land and freshwater molluscs of mainland Ecuador: An illustrated checklist - *Iberus* 40 (1): 1-290.
- Brunnacker, K., Jánosy, D., Krolopp, E., Skoflek, I. & Urban, B., 1980 - Das jungmittelpleistozäne Profil von Süttö 6 (Westungarn) - *Eiszeitalter und Gegenwart* 30: 1-18
- Cain, A.J. & Sheppard, P.M., 1954 - Natural Selection in *Cepaea* – *Genetics* 39: 89-116. doi: 10.1093/genetics/39.1.89.
- Cook, L.M. & O'Donald, P., 1971 - *Shell Size and Natural Selection in Cepaea nemoralis*. In: Creed, R. (eds) *Ecological Genetics and Evolution* - Springer, New York. https://doi.org/10.1007/978-1-4757-0432-7_5
- Dance, S.P., 1967 - Report on the Linnean shell collection – *Proceedings of the Linnean Society of London* 178 (1): 1-24, pls 1-10.
- Dedov, I., Georgiev, D., Schnepat, U.E. & Knechtle Glogger, F., 2021 - New data on the rare snail *Soosia diodontia* (A. Ferussac, 1821) (Gastropoda: Helicodontidae) in Bulgaria - *Historia naturalis bulgarica* 42: 59-64
- Deli, T., 2013 - A Banaticum állatföldrajzi értékelése és jelentősége - *Soosiana* 32: 53-58
- Dubois, A., Denzer, W., Entiauspe-Neto, O.M., Frétey, T., Ohler, A., Bauer, A.M. & Pyron, A., 2024 - Nomenclatural problems raised by the recent description of a new *Anaconda* species (Squamata, Serpentes, Boidae), with a nomenclatural review of the genus *Eunectes* – *Bionomina* 37: 8-58.
- Férussac, A.E.J.P.F. d'Audebard de., 1819-1832 - *Histoire naturelle générale et particulière des mollusques terrestres et fluviatiles tant des espèces que l'on trouve aujourd'hui vivantes, que des dépouilles fossiles de celles qui n'existent plus; classés d'après les caractères essentiels que présentent ces animaux et leurs coquilles* – Paris, J.-B. Baillière, Tome deuxième, première partie. Livraison 1: [3 pp. = dedication], i-xvi (= Préface) (6-III-1819); livr. 2: 1-16 (5-VI-1819); livr. 3: 17-56 (10-VII-1819); livr. 4: 57-72 (18-IX-1819); livr. 5: 73-96 (4-XII-1819); livr. 7: 97-128 (17-VI-1820); livr. 9: xvi pp. (= Explication des planches du premier volume) (6-IV-1821); livr. 17: v pp. (= Explication des planches supplémentaires et de celles qui ne font pas partie du premier volume) (2-XI-1822); livr. 19/21: 96a-z, 96a-λ (27-IX-1823); livr. 22/27: iv pp. (= Explication des planches des livraisons XXII, XXIII, XXIV, XXV, XXVI et XXVII) (4-VIII-1832).
- Fisher, R.A. & Diver, C., 1934 - Crossing-over in the Land Snail *Cepaea nemoralis*, L. – *Nature* 133: 834-835.
- Forbes, E., 1838 - On the land and freshwater mollusca of Algiers and Bougia – *Annals of Natural History* 2: 250-255, pl. 11-12.
- Forni, G. & Sacchi, C.F., 2003 - Ricerche sulle variazioni di *Cepaea nemoralis* (L.) (Gastropoda Pulmonata) nell'Italia settentrionale - *Studi Trentini di Scienze Naturali, Acta Biologica* 80: 261-266.
- Garkov, M. & Nikovska, K., 2024 - Health and sustainability: The nutritional value of snail meat – *Kroatian Journal of Food Science and Technology* 16(2): 236-245.
- Gasparik, M., 1993 - Late Pleistocene gastropod and vertebrate fauna from Tokod (NE Transdanubia, Hungary) - *Fragmenta Mineralogica et Palaeontologica* 16: 89-116
- Gheoca, V., 2014 - Land snail fauna of "Porțile de Fier" ("Iron Gates") Nature Park (Banat, Romania) - *Transylvanian Review of Systematical and Ecological Research* 16(3): 131-138
- Gittenberger, E., 1980 - Three notes on Iberian terrestrial gastropods - *Zoologische Mededelingen* 55(17): 201-213
- Gojšina, V., Vujić, M., Kocić, K., Stojnić, B., Karan-Žnidarić, T., Mitrović, B. & Dedov, I., 2025 - A review of the Helicoidea of Serbia (Gastropoda: Stylommatophora) - *Animal Taxonomy and Ecology* 71(3): 472-632
- Gualtieri, N., 1742 - *Index testarum conchyliorum quae*

- adservantur in Museo Nicolai Gualtieri – C.A. Albizziniana, Florentiae. XXIII pp. + 110 pls.
- Gural-Sverlova, N., Egorov, R., Kruglova, O., Kovalevich, N. & Gural, R., 2021 - Introduced land snail *Cepaea nemoralis* (Gastropoda: Helicidae) in Eastern Europe: spreading history and the shell colouration variability – *Malacologica Boemoslovaca* 20: 75–91.
- Hanley, S., 1855 - Ipsa Linnaei Conchyli. The shells of Linnaeus, determined from his manuscripts and collection – London, Williams & Norgate. 556 pp., 5 plates.
- Held, F., 1837-1838 - Notizen über die Weichthiere Bayerns – *Isis* (Oken) 30(4): 303-309; 30(12): 901-919.
- Holyoak, D.T., Holyoak, G.A., Gómez Moliner, B.J. & Chueca, L.J., 2020 - Phylogeny, species-limits and taxonomic revision of *Otalini* (Helicidae) from North-West Africa – *Journal of Conchology* 43: 551-611.
- Horáček, I., Dubjelová, N., Juříčková, L., Trávníčková, E., Pažitková, B., Ivanov, M. & Čermák, S., 2025 - An Early Pleistocene vertebrate and mollusc fauna from Dreveník (northern Slovakia), with remarks on the early/late Biharian transition - *Fossil Imprint* 81(1-2): 43-59
- International Commission on Zoological Nomenclature [ICZN], 2002 - Opinion 1996 (Case 3158) *Helix lucorum* Linnaeus, 1758 and *H. punctata* Müller, 1774 (currently *Otala punctata*; Mollusca, Gastropoda): usage of the specific names conserved by the replacement of the syntypes of *H. lucorum* with a neotype – *Bulletin of Zoological Nomenclature* 59: 135–136.
- Jansen, B. & Majoor, G., 2025 - *Veldgids Land- en Zoetwatermollusken* – KNNV Uitgeverij, Zeist. 328 pp.
- Juříčková, L., Horáčková, J., Jansová, A. & Ložek, V., 2013 - Mollusc succession of a prehistoric settlement area during the Holocene: A case study of the České středohoří Mountains (Czech Republic) - *The Holocene* 23(12): 1811-1823
- Kerney, M.P. & Cameron, R.A.D., 1979 - *A field guide to the land snails of Britain and north-west Europe* – Collins, London. 288 pp.
- Kleiner, E., 1912 - *Untersuchungen am Genitalapparat von Helix nemoralis und hortensis und einer Weitern reihe von Lang gezüchteter Bastarde der Beiden Arten* – Doctoral Thesis, University of Zürich, 48 pp.
- Korábek, O., Juříčková, L. & Petrusek, A., 2016 - Hlemýžď pruhovaný, nový druh pro evropskou i českou faunu - *Živa* 64(1): 31-34
- Krolopp, E. 1992 - The Pleistocene mollusc fauna of the Bükk Mountains - *Abstracta Botanica* 16(2): 95-100.
- Krolopp, E. & Sümegi, P. 1995 – Palaeoecological reconstruction of the late pleistocene, based on loess malacofauna in Hungary – *GeoJournal* 36: 213–222 <https://doi.org/10.1007/BF00813173>
- Kukla, G., 1978 - The Classical European Glacial Stages: Correlation with Deep-Sea Sediments - *Transactions of the Nebraska Academy of Sciences* 6: 57-93
- Lang, A., 1904 - Über Vorversuche zu Untersuchungen über die Varietätenbildung von *Helix hortensis* Müller und *Helix nemoralis* L. – *Denkschriften der Medizinisch-Naturwissenschaftlichen Gesellschaft zu Jena* 11: 437–506.
- Lang, A., 1906 - Über die Mendelschen Gesetze, Art- und Varietätenbildung, Mutation und Variation, insbesondere bei unsern Hain- und Gartenschnecken – *Verhandlungen der Schweizerischen Naturforschenden Gesellschaft in Luzern* 88: 209–254.
- Lang, A., 1908 - Über Bastarde von *Helix hortensis* Müller und *Helix nemoralis* L. eine Untersuchung zur experimentellen Vererbungslehre – Verlag von Gustav Fischer, Jena. 112 pp.
- Linnaeus, C., 1745 - *Öländska och Gothländska resa på rikens högloflige ständers befallning förrättad åhr 1741. Med anmärkningar uti oeconomien, natural-historien, antiquiteter &c. med åtskillige figurer* – G. Kiesewetter, Stockholm, Upsala. 344 pp.
- Linnaeus, C., 1746 - *Fauna Svecica sistens animalia Sveciae Regni: quadrupedia, aves, amphibia, pisces, insecta, vermes, distributa per classes & ordines, genera & species. Cum differentiis specierum, synonymis autorum, nominibus incolarum, locis habitationum, descriptionibus insectorum* – C. Wishoff et G.J. Wishoff, Lugduni Batavorum. 411 pp.
- Linnaeus, C., 1747 - *Wästgöta-Resa, på rikens högloflige ständers befallning, förrättad år 1746. Med anmärkningar uti oeconomien, naturkunngheten, antiquiteter, invånarnes seder och lefnads-sätt* – Laurentius Salvius, Holmiae. 280 pp.
- Linnaeus, C., 1758 - *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis* - Editio decima, reformata. Vol. 1. Laurentius Salvius, Holmiae. 824 pp.
- Linnaeus, C., 1764a - *Museum S:ae R:ae M:tis Ludovicae Ulricae Reginae Svecorum, Gothorum, Vandalarumque, &c. In quo animalia rariora, exotica, imprimis insecta & conchilia describuntur & determinantur. Prodrumi instar* - Laurentius Salvius, Holmiae. 8 pp. + 720 pp.
- Linnaeus, C., 1764b - *Museum S:ae R:ae M:tis Adolphi Friderici regis Svecorum, Gothorum, Vandalarumque &c. &c. &c. In quo animalia rariora imprimis & exotica: Aves, amphibia, pisces describuntur. Tomi secundi prodromus* - Laurentius Salvius, Holmiae. 111 pp.
- Lister, M., 1678 - *Historiae animalium Angliae, tres tractatus. Unus de araneis. Alter de cochleis tum terrestribus, tum fluviatilibus. Tertius de cochleis marinis. Quibus adjectus est quartus de lapidibus ejusdem insulae ad cochlearum quandam imaginem figuratis* - Apud Joh. Martyn Regiae societatis typographum, Londini (London). 175 pp.
- Lovén, S., 1887 - *On the Species of Echinoidea Described by Linnaeus in His Work Museum Ludovicae Ulricae* - Kongl. Boktryckeriet P. A. Norstedt & Söner, Stockholm. 185 pp.
- Ložek, V. 1992 - Der Beitrag der Karstforschung zur holozänen Klimageschichte. In: Billwitz, K., Janke, W., Jäger, K.D. (eds) *Jungquartäre Landschaftsräume*. Springer, Berlin, Heidelberg.
- Ložek, V., 2000 - Palaeoecology of Quaternary Mollusca - *Sborník geologických věd - Antropozoikum* 24: 35-59
- Meijer, T., 1987 - De molluskenfauna van het Waalien in Nederland - *Correspondentieblad van de Nederlandse Malacologische Vereniging* 236: 288-297.
- MolluscaBase eds., 2025 - MolluscaBase. *Cepaea nemoralis* (Linnaeus, 1758). Accessed at: <https://molluscabase.org/aphia.php?p=taxdetails&id=235792> on 2025-09-11
- Moser, M., Niederhöfer, H.-J. & Falkner, G., 2009 - Continental molluscs of the fossil site Sandelzhausen (Miocene;

- Upper Freshwater Molasse from Bavaria) and their value for palaeoecological assessment - *Paläontologische Zeitschrift* 83: 25-54
- Müller, O. F. 1774 - *Vermium terrestrium et fluviatilium, seu animalium infusorium, Helminthicorum, et testaceorum, non marinorum, succincta historia*. vol 2 - Havniae et Lipsiae, apud Heineck et Faber, ex officina Mölleriana. 214 pp.
- Nelson, E., White, D., Wheeler, L., Wedel, J., Hoselmann, C., Heggemann, H., Rähle, W. & Penkman, K., 2025 - An aminostratigraphy of the northern Upper Rhine Graben, Germany - *Journal of Quaternary Science* 40(7): 1147-1175
- Neubert, E., 2014 - Revision of *Helix* Linnaeus, 1758 in its eastern Mediterranean distribution area, and reassignment of *Helix godetiana* Kobelt, 1878 to *Maltzanella* Hesse, 1917 (Gastropoda, Pulmonata, Helicidae) - *Contributions to Natural History* 26: 1-200.
- Örstan, A., Sparks Jr., J.L. & Pearce, T.A., 2011 - Wayne Grimm's legacy: A 40-year experiment on the dispersal of *Cepaea nemoralis* in Frederick County, Maryland - *American Malacological Bulletin* 29: 139-142
- Van Osselaer, C., Chérot, F. & Tursch, B., 2001 - *Helix lucorum* Linnaeus, 1758 and *Helix punctata* Müller, 1774 (currently *Otala punctata*; Mollusca, Gastropoda): proposed conservation of usage of the scientific names by the replacement of the syntypes of *H. lucorum* with a neotype - *Bulletin of Zoological Nomenclature* 58: 8-12.
- Ozgo, M. & Schilthuizen, M., 2012 - Evolutionary change in *Cepaea nemoralis* shell colour over 43 years - *Global Change Biology* 18: 74-81.
- Páll-Gergely, B. & Roibu, C.-C., 2011 - Land snail fauna of the Humosu Secular Forest (Suceava County, Romania); a new locality of *Serrulina serrulata* (L. Pfeiffer, 1847) (Gastropoda: Pulmonata: Clausiliidae) - *Malacologica Bohemoslovaca* 10: 48-50
- Pawłowski, J., Nadachowski, A. & Stworzewicz, E., 2008 - *Geneza fauny Płaskowyżu Ojcowskiego i jej przemiany w plejstocenie i holocenie*. In: Klasa, A. & Partyka, J. (eds) *Monografia Ojcowskiego Parku Narodowego. Przyroda - Ojcowski Park Narodowy, Ojców*: 387-411
- Pazonyi, P. - 2014. Archaeological sites of the Süttő Travertine Complex (Hungary) with stratigraphical and paleoecological implications from their faunas - *Quaternary International* 326-327: 184-190.
- Pazonyi, P., Kordos, L., Magyari, E., Marinova, E., Füköh, L. & Venczel, M., 2014 - Pleistocene vertebrate faunas of the Süttő Travertine Complex (Hungary) - *Quaternary International* 319: 50-63
- Penev, L., Stoyanov, I., Dedov, I. & Antonova, V., 2008 - *Patterns of urbanisation in the City of Sofia as shown by carabid beetles (Coleoptera, Carabidae), ants (Hymenoptera, Formicidae), and terrestrial gastropods (Mollusca, Gastropoda Terrestria)*. In: Penev, L., Erwin, T. & Assmann, T. (eds) *Back to the Roots and Back to the Future. Towards a New Synthesis amongst Taxonomic, Ecological and Biogeographical Approaches in Carabidology* - Pensoft Publishers, Sofia-Moscow: 483-509.
- Petiver, J., 1695 - *Musei Petiveriani centuria prima, rariora naturae; continens: viz. animalia, fossilia, plantas, ex variis mundi plagis advecta, ordine digesta, et nominibus propriis signata* - S. Smith and B. Walford, Londini (London, UK). 93 pp.
- Pilsbry, H.A. & Ferriss, J.H., 1906 - Mollusca of the Southwestern States. II - *Proceedings of the Academy of natural Sciences of Philadelphia* 58: 123-175.
- Quintana Cardona, J., Pons i Buades, G.X. & Vicens Xamena, D., 2007 - Algunas anotaciones críticas sobre *Oestophora cuerdai* Quintana, Vicens et Pons, 2006 (Mollusca: Pulmonata: Helicodontidae) - *Spira* 2(3): 157-162
- Reichert, W., 1928 - Die Schalenmerkmale der Gartenschnecke - *Zeitschrift für Morphologie und Ökologie der Tiere* 11: 624-666.
- Risso, A., 1826 - *Histoire naturelle des principales productions de l'Europe méridionale et particulièrement de celles des environs de Nice et des Alpes Maritimes*. Tome quatrième - F.-G. Levrault, Paris. 439 pp.
- Rousseau, D.-D., 1992 - Is causal ecological biogeography a progressive research program? - *Quaternary Science Reviews* 11: 593-601
- Rossmässler, E. A. 1835-1837 - *Iconographie der Land- & Süßwasser- Mollusken, mit vorzüglicher Berücksichtigung der europäischen noch nicht abgebildeten Arten*. (1) 1 (1), VI + 1-132. pl. 1-5 [≥ Apr. 1835]; (1) 1 (2), 6 + 1-26. pl. 6-10 [≥ Aug. 1835]; (1) 1 (3), 4 + 1-33. pl. 11-15 [≥ Mar. 1836]; (1) 1 (4), 4 + 1-27. pl. 16-20 [≥ Sept. 1836]; (1) 1 (5/6), 4 + 1-70. pl. 21-30 [≥ Jul. 1837].
- Sabol, M., Slyšková, D., Bodoriková, S., Čejka, T., Čerňanský, A., Ivanov, M., Joniak, P., Kováčová, M. & Tóth, C., 2017 - Revised floral and faunal assemblages from Late Pleistocene deposits of the Gánovce-Hrádok Neanderthal site - biostratigraphic and palaeoecological implications - *Fossil Imprint* 73(1-2): 182-196.
- Saenko, S.V., Groenenberg, D.S.J., Davison, A., Schilthuizen, M., 2021 - The draft genome sequence of the grove snail *Cepaea nemoralis* - *G3: Genes, Genomes, Genetics* 11: jkaa071.
- Silvertown, J., Cook, L., Cameron, R., Dodd, M., McConway, K., Worthington, J., Skelton, P., Anton, C., Bossdorf, O., Baur, B., Schilthuizen, M., Fontaine, B., Sattmann, H., Bertorelle, G., Correia, M., Oliveira, C., Pokryszko, B., Ozgo, M., Stalažs, A., Gill, E., Rammul, Ü., Sólomos, P., Féher, Z. & Juan, X., 2011 - Citizen Science Reveals Unexpected Continental-Scale Evolutionary Change in a Model Organism - *PLoS ONE* 6(4): e18927.
- Skompski, S., 1990 - Rozwój badań bezkręgowców czwartorzędowych w Polsce - *Kwartalnik Geologiczny* 34(2): 355-368
- Thomas, K.D. & Zapata, L., 2017 - The efficiency of flotation compared with other methods for recovering assemblages of terrestrial and aquatic gastropods from archaeological deposits, with reference to the site of Pico Ramos (Basque Country, Spain) - *Environmental Archaeology* 22: 283-296.
- Wallin, L., 2001 - *Catalogue of type specimens. 4. Linnaean specimens. Sixth version* - Uppsala University Museum of Evolution, Zoology section, Sweden. 128 pp.
- Westerlund, C.A., 1873 - Fauna molluscorum terrestrium et fluviatilium Sveciae, Norvegiae et Daniae. Sveriges, Norges och Danmarks land- och sötvatten-mollusker - Adolf Bonnier,

Stockholm. 651 pp.
Williams, A. & Rae, R., 2016 - *Cepaea nemoralis* (Linnaeus, 1758) uses its shell as a defence mechanism to trap and kill parasitic nematodes - *Journal of Molluscan Studies* 82: 349–350.
Wüster, W., Kaiser, H., Hoogmoed, M.S., Ceríaco, L.M., Dirk-

sen, L., Dufresnes, C., Glaw, F., Hille, A., Köhler, J., Koppetsch, T. & Milto, K.D., 2024 - How not to describe a species: lessons from a tangle of anacondas (Boidae: *Eunectes* Wagler, 1830) - *Zoological Journal of the Linnean Society* 201 (4): zlae099. <https://doi.org/10.1093/zoolinnean/zlae09>

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