Pleistocene *Vertigo* species from Hungary

Endre Krolopp & Pál Sümegi

Krolopp, E., & P. Sümegi. Pleistocene *Vertigo* species from Hungary. — Scripta Geol., Spec. Issue 2: 263-268, 1 fig., Leiden, December 1993.
Endre Krolopp, Hungarian Geological Survey, Stefánia út 14, H-1143 Budapest, Hungary; Pál Sümegi, Kossuth Lajos University, Pf. 4, H-4010 Debrecen, Hungary.

Key words: Quaternary, Pleistocene, malacology, palaeoecology, *Vertigo*.
This paper contains a short palaeoecological and biostratigraphical evaluation of twelve *Vertigo* species known from Pleistocene sediments in Hungary. Of these species seven are extant in the Recent Hungarian fauna, three species live in neighbouring areas, and two species became extinct in Europe at the end of the Pleistocene.

Contents

Introduction

The genus *Vertigo* (Gastropoda, Stylommatophora, Vertiginidae) developed already at the beginning of the Tertiary. Its numerous species are found in various Tertiary and Quaternary formations and several species are still present in the Recent European fauna.

In Quaternary malacology the *Vertigo* species merit special interest, as they are highly responsive to environmental changes and therefore excellent ecological indicators. Presence or absence of certain species, or the percentage of their occurrence in a fauna help to make a more precise palaeoecological reconstruction. Furthermore, some *Vertigo* species are of biostratigraphical importance in the Hungarian Pleistocene (Krolopp, 1973, 1983). The stratigraphical ranges of the various species are represented in Fig. 1.

The Recent distribution of the *Vertigo* species was established by using the data of Soós (1943), Pintér et al. (1979) and Kerney et al. (1983) on the ecological demands of the different species. For the palaeoecological ranging we used data from Ložek (1964).

Characterisation of species

Twelve *Vertigo* species are known so far from the Pleistocene formations in Hungary of which seven form still part of the Recent Hungarian malacofauna (*V. pusilla*, *V. antivertigo*, *V. substriata*, *V. pygmaea*, *V. moulinsiana*, *V. alpestris*, and *V. angustior*). Three species (*V. geyeri*, *V. genesii* and *V. modesta*) had withdrawn from the examined region at the beginning of the Holocene, and two species (*V. parcedentata*, *V. pseudo-*

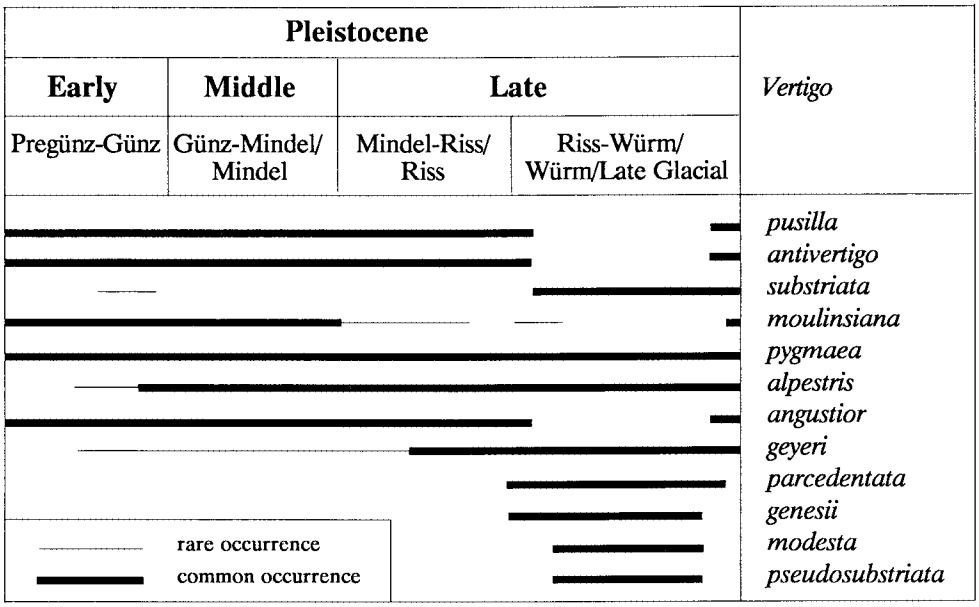

Fig. 1. Chronostratigraphical range of *Vertigo* species in the Pleistocene of Hungary.

substriata) became extinct all over Europe at the end of the Pleistocene.

Vertigo pusilla (Müller, 1774)

This species is widespread all over Europe. In Hungary it is recorded first of all from the midmountains and it is sporadically present on the Great Hungarian Plain (Sümegi, 1988). It is found in forests and forest fringes, living on trunks and moss-grown rocks. Kormos (1926) was the first to report this species from Hungarian Pleistocene formations. Additionally to its occurrence in the Riss-Würm interglacial fauna it is also known to be present during the Early and Middle Pleistocene (Krolopp, 1958, 1977, 1982). In the Pleistocene accompanying association a significant ratio of forest elements is observed, e.g. *Acanthinula aculeata* (O.F. Müller, 1774), *Ruthenica filograna* (Rossmässler, 1836), and *Discus rotundatus* (O.F. Müller, 1774). In palaeoecological reconstructions therefore *Vertigo pusilla* is one of the important index species for a forest environment.

Vertigo antivertigo (Draparnaud, 1801)

V. antivertigo is a faunal element with a palaearctic distribution pattern. In Hungary it is widespread in forests in Transdanubia and in the northern midmountains. On the Great Hungarian plain it has only a scattered occurrence on the shores of calcareous swamps and marshes.

It is a highly characteristic species of mollusc faunas of Early and Middle Pleistocene ages. In malacofaunas recovered from fossil soils of the Riss-Würm interglacial

and of the Early Würm it is one of the dominant elements (Krolopp, 1964, 1965, 1982). After the Early Würm its occurrence decreases and it is only rarely found in Middle and Late Würm sediments. In the Late Glacial period (11000-12000 BP according to radiocarbon data) the species re-appears (Sümegi, in press). It is a highly hygrophilous species. indicative of a mild and moist climate, and a forest and shrubby environment. Also in the associated faunas hygrophilous species characteristic for forest environment are dominant, e.g. *Carychium minimum* O.F. Müller, 1774, *C. tridentatum* (Risso, 1876), *Vertigo angustior*, *Clausilia pumila* Pfeiffer, 1828, and *Euomphalia strigella* (Draparnaud, 1801).

Vertigo substriata (Jeffreys, 1833)

This species has a boreo-alpine distribution pattern and is only rarely encountered in Hungary (Erőss, 1981). It is found living in moist, humid, cool valleys, at moss-grown places. In the Hungarian Pleistocene the presence of this species is especially characteristic for sediments formed during the Würm period. A more large-scale appearance is characteristic for the Late Würm and Late Glacial infusion loesses (flood-plain loessy sylt), and of sediments accumulated on flood-plains and at shore lines. On the basis of radiocarbon dating its conspicuous dominance in the Great Hungarian Plain lies between 25000 and 22000 BP, and again from 16,000 to 13,000 BP (Sümegi, in press). *V. substriata* is an indicator element of cold to cool, and moist climate phases. In its accompanying fauna other cold-preferring, cold-resistant and hygrophilous species are present, e.g. *Columella edentula* (Draparnaud, 1805), *C. columella* (Martens, 1830), and *Trichia hispida* (Linné, 1758).

Vertigo moulinsiana (Dupuy, 1849)

This is a species with an Atlanto-Mediterranean distribution. In the Recent fauna it has a sporadic occurrence in Transdanubia (Hungary), while in the Great Hungarian Plain it is found living on the shores of calciferous swamps and lakes in the zone of matgrass (*Typha*-zone) and sledge (*Carex*-zone). The species is rare in Pleistocene formations and mainly known from the Early Pleistocene. *V. moulinsiana* is a highly hygrophilous species, with preference for a mild climate. In its accompanying fauna forest elements and highly hygrophilous waterside species are found, e.g. *Carychium minimum*, *Acanthinula aculeata*, *Cochlodina laminata* (Montagu, 1803), and *Perforatella bidentata* (Gmelin, 1791). In palaeoecological reconstructions the presence of this species suggests moist, mild breading seasons.

Vertigo pygmaea (Draparnaud, 1801)

The distribution of this species is holarctic. In Hungary it is found widespread, both in the mid-mountains and in the lowland area. Its habitat comprises grass and mosses in meadows and forest fringes.

V. pygmaea is known from various formations of Pleistocene age. Although it is occasionally found in loesses, its presence is first of all connected with humic zones, i.e. steppe-like soils, indicating interstadial periods between loess-formations. In its

accompanying fauna high-resistance, as well as xerophilous steppe and forest-steppe species are dominating (e.g. *Pupilla muscorum* (Linné, 1758), *P. triplicata* (Studer, 1820), *Chondrula tridens* (O.F. Müller, 1774), and *Vallonia costata* (O.F. Müller, 1774). In palaeoecological interpretations the present species is recorded as a mesophilous steppe-dwelling species of high resistance.

Vertigo alpestris Alder, 1838

Although a species with a holarctic distribution pattern *V. alpestris* is considered a boreo-alpine faunal element, on the basis of its European area. In the Recent Hungarian fauna this species is found at a few cool, moist-vaporous habitats in Transdanubia and in the northern mid-mountains. It prefers a calcareous environment, like limestone rocks in forests, living in between mosses and other plants.

Its presence during the Pleistocene was recorded by Krolopp (1961). *V. alpestris* is present from the Early Pleistocene onwards, but it became more frequent only during the Late Würm.

The ecological range of the Recent populations and the ranges and distribution of their accompanying faunas, including e.g. *Discus ruderatus* (de Férussac, 1821), *Semilimax kotulai* (Westerlund, 1883), *Punctum pygmaeum* (Draparnaud, 1801) and *Vestia turgida* (Rossmässler, 1836), indicate that in palaeoecological reconstructions *V. alpestris* can be applied as a good marker species for forest and shrubby environments, and of a cool, moist climate.

Vertigo angustior Jeffreys, 1830

This species is a palaearctic fauna element. In Hungary it is known from the Late Miocene onwards as *Vertigo angustior oecsensis* (Halaváts, 1911)

The Recent distribution of this species, as well as its occurrence during the Pleistocene are highly similar to those of *V. antivertigo*. Both during the Early and the Middle Pleistocene it frequently was a fauna-forming species. It is one of the most common elements of faunas present in fossil soil levels of Early Würm age (Krolopp, 1965). Among the accompanying faunas the percentage of hygrophilous species is significant: *Carychium minimum*, *C. tridentatum*, *Vertigo antivertigo*, and *Clausilia pumila*. In the middle and upper parts of the Late Pleistocene sequence the importance of this species decreases, but it appears again near the end of the Late Glacial (11000-12000 BP) in the Carpathian Basin, together with the species *V. antivertigo*. Like the latter species *V. angustior* indicates a mild, moist climate.

Vertigo geyeri (Lindholm, 1925)

In Hungary this species with a boreo-alpine distribution pattern became extinct near the end of the Pleistocene. In Middle and Late Würm sediments and in Late Glacial formations it is especially frequent in sediments (infusion loesses, flood-plain loessy silt) accumulated in flood-plains and wet meadows with a high carbonate content. On the basis of its ecological demands, its distribution pattern and its accompanying fauna (*Succinea oblonga* Draparnaud, 1801, *Columella* spp., *Trichia hispida*, *Vertigo parcedentata*).

V. geyeri is considered to be a hygrophilous, cold-resistant faunal element.

Vertigo parcedentata (Braun, 1847)

Near the end of the Pleistocene this species became extinct all over Europe. In Hungary it is so far only recorded from Würm sediments (Krolopp, 1973, 1983), being a typical element of Late Würm and Late Glacial loesses and infusion loesses. An acme in its occurrence is found between 16,000 and 13,000 BP.

The accompanying fauna of *V. parcedentata* comprises hygrophilous, cold-resistant and cold-preferring elements in high percentages, such as *Succinea oblonga*, *Columella* spp., *Vertigo geyeri*, and *Trichia hispida*. We consider this species to be a cold-resistant, hygrophilous species.

Vertigo pseudosubstriata Ložek, 1954

This species likewise became extinct in Europe at the end of the Pleistocene. Its presence in Hungarian Pleistocene deposits was demonstrated by Krolopp (1958). It is a rare species, exclusively known from Würm formations at two Hungarian localities (Krolopp, 1958; Sümegi, in press). The accompanying fauna yields dominant elements of cold-preferring, cold-resistant, hygrophilous species, such as *Columella* spp. and *Vertigo parcedentata*.

As indicated by Ložek (1954, 1956, 1964) and our own studies we consider this species to be a cold-preferring, hygrophilous faunal element.

Vertigo genesii (Gredler, 1856)

A boreo-alpine species, living mostly in marshy areas (Coles & Colville, 1980). In Hungary the species became extinct near the end of the Pleistocene. It is known from Würm sediments, but only from a few localities. On the basis of Hungarian material its morphological distinction from *V. parcedentata* seems to be problematical. As indicated by its mode of life and its accompanying fauna *V. genesii* is a cold-resistant, hygrophilous faunal element.

Vertigo modesta (Say, 1824)

In Europe *V. modesta* has an arctic-alpine distribution. Its nearest place of actual occurrence are the Tatra Mountains, where it lives at an altitude of 1900-2150 m (Ložek, 1964). From the Hungarian Pleistocene the present species is known at only one locality, in loess of Late Würm age (new record, unpublished), in the southern part of the Great Hungarian Plain. No doubt the palaeogeography and -ecology of this Pleistocene species need further research.

Acknowledgements

Dr Pál Sümegi was supported by the Hungarian Credit Bank and the Soros Foundation, which are duly thanked for their much appreciated help.

References

Coles, B., & B. Colville, 1980. A glacial relict mollusc. — Nature, 286: 761.

Erőss, Z., 1981. *Vertigo substriata* (Jeffreys, 1833) a Börzsöny-hegységben [(*Vertigo substriata* (Jeffreys, 1833) im Börzsöny-Gebirge (Ungarn)]. — Soosiana, 9: 47-48 (in Hungarian, with German abstract).

Kerney, M.P., R.A.D. Cameron & J.H. Jungbluth, 1983. Die Landschnecken Nord- und Mitteleuropas. — Parey, Hamburg/Berlin: 1-384.

Kormos, T., 1926. A süttői forrásmészkőkomplexus faunája (Die Fauna des Quellenkalk-Komplexes von Süttő). — Állattani Közl., 22: 159-175 (in Hungarian, with German abstract).

Krolopp, E., 1958. A Budai-hegység csigafaunájának kialakulása [Die Evolution der Schneckenfauna des Budäer (Ofner) Gebirges]. — Állattani Közl., 46: 245-253 (in Hungarian, with German abstract).

Krolopp, E., 1961. A tihanyi felső-pleisztocén Mollusca-fauna (La faune de mollusques du Pléistocène supérieur de Tihany). — Földt. Int. Évi Jel., 1957-1958: 505-511 (in Hungarian, with French abstract).

Krolopp, E., 1964. Die Molluskenfauna. In: L. Vértes (ed.). Tata, eine mittelpaläolithische Travertin-Siedlung in Ungarn. — Arch. Hung., 43: 87-103.

Krolopp, E., 1965. A Dorog-Esztergomi-medence pleisztocén képző dményeinek biosztratigráfiai vizsgálata (Biostratigraphische Untersuchung der Pleistozänbildungen des Dorog-Esztergomer Beckens). — Földt. Int. Évi Jel., 1963: 133-144 (in Hungarian, with German abstract).

Krolopp, E., 1973. Quaternary malacology in Hungary. — Földrajzi Közlem., 21: 161-171.

Krolopp, E., 1977. A vértesszöllősi ősemberi lelőhely középső pleisztocén Mollusca-faunája — Middle Pleistocene mollusc fauna from the Vérteszöllős campsite of prehistoric man. — Földrajzi Közlem., 25: 188-204 (in Hungarian and English).

Krolopp, E., 1982. Negyedidő szaki sztratotipusaink Mollusca-faunája. Süttő (Mollusc fauna of Quaternary stratotypes from Hungary. Süttő). — Földt. Int. Évi Jel., 1980: 371-380 (in Hungarian, with English abstract).

Krolopp, E., 1983. Biostratigraphic division of Hungarian Pleistocene formations according to their mollusc fauna. — Acta Geol. Hung., 26: 69-82.

Ložek, V., 1954. Neue Mollusken aus dem tschechoslowakischen Pleistozän, *Vertigo pseudosubstriata* sp. n., *Pupilla muscorum densegyrata* ssp. n., *Pupilla loessica* sp. n. — Anthropozoicum, 3: 327-342.

Ložek, V., 1956. *Vertigo pseudosubstriata* Ložek, 1954 v pleistocenu v Horkách nad Jizeru (Gastropoda, Stylommatophora) [*Vertigo pseudosubstriata* Ložek, 1954 aus dem Pleistozän von Horkách bei Jizerou (Gastropoda, Stylommatophora)]. — Anthropozoicum, 5: 363-364 (in Czech, with German abstract).

Ložek, V., 1964. Quartärmollusken der Tschechoslowakei. — Rozpravy Ústredniho Ústavu Geologického, 31: 1-374.

Pintér, L., A. Richnovszky & A. Szigethy, 1979. A magyarországi recens puhatestüek elterjedése (Distribution of the recent Mollusca of Hungary). — Soosiana, suppl.: 1-350 (in Hungarian, with English abstract).

Soós, L., 1943. A Kárpát-medence Mollusca-faunája (Mollusc fauna from the Carpathian basin). — Akad. Kiadó, Budapest: 1-478 (in Hungarian).

Sümegi, P., 1988. A *Vertigo pusilla* (O.F. Müller, 1774) Mollusca faj a magyarországi Nagyalföldön [The *Vertigo pusilla* (Müller, 1774) mollusc species in the Great Hungarian Plain]. — Malakol. Táj., 9: 15-17 (in Hungarian, with English abstract).

Sümegi, P., in press. The effect of climatic changes on the Late Pleistocene malakofauna of the Great Hungarian Plain. — Submitted to Acta Biol. Debrecina.

Manuscript received 3 September 1992, revised version accepted 31 March 1993