An overview of the *Vertigo* species in Hungary: their distribution and habitat preferences
(Gastropoda, Pulmonata: Vertiginidae)

By

ELISABETH HORNUNG, GÁBOR MAJOROS, ZOLTÁN FEHÉR & ANDRÁS VARGA

With 7 Maps

**Introduction**

The species of *Vertigo* in Hungary were last revised by Szigethy (1973). She reidentified the material in four Museums and several private collections and came to the conclusion that there are six extant, valid *Vertigo* species in Hungary, deleting *V. (Vertigo) substria* from the list because all specimens of this species examined proved to be fossil/subfossil. She gave an identification key and rather detailed morphological descriptions and locality lists for the species covered. Since then living populations of *V. substria* have again been found in Hungary (Eróss 1981; Varga 1979, 1980). Distribution maps of all the *Vertigo* species present in Hungary can be found in Pintér & al. (1979) and Fehér & Gubányi (2001). Updated maps for these species accompany the present text.

The *Vertigo* species known in Hungary are as follows: *Vertigo alpestris*, *Vertigo angustior*, *Vertigo antivertigo*, *Vertigo moulininsiana*, *Vertigo pusilla*, *Vertigo pygmaea*, *Vertigo substria*.

**Methods**

The terms used here for types of distribution follow mainly Kerney & al. 1983. The maps presented are modified, updated versions of those in Feher & Gubányi (2001). These maps are prepared according to the widely applied 10 x 10 km UTM grid system. In the maps open circles indicate that for these UTM-squares malacological data exist. Additional distribution data incorporated into the maps derive from material in the collections of the Hungarian Natural History Museum, the Matra Museum at Görgyös, and the collections of A. Uherkovich, T. Domótos, G. Majoros.

**Distribution of and notes on the Hungarian *Vertigo* species**

*Vertigo (Vertilla) angustior* JEFFREYS, 1830

**Distribution:** Palaeartic. This species occurs typically at lower levels of the montane zone, primarily at the transition between montane and lowland landscape types.

**Habitat:** calciphile, in alder swamps; along streams, fish-pond banks in flood-zones.

**Microhabitat:** low among grasses, sedge tussocks, doesn’t climb plants.

**Possible co-occurrence:** *V. antivertigo*, *V. pygmaea*.

**Dispersal:** can be transported by ungulates, while adhering to their fur; can also be water-borne for short distances (4-5 km), attached to flood debris (unpublished observations of G. Majoros).
Vertigo (Vertigo) alpestris ALDER, 1838

Distribution: Alpine. Fragmented, patchy distribution in the mountains, consistent with the view that in Hungary this species is a cold-climate relict from early in the post-glacial period.

Habitat: similar to that of V. pusilla, but in rocky places, within heavy shade in forest.

Microhabitat: moist leaf litter.

Possible co-occurrence: Vertigo pusilla.

Dispersal: no information.

Vertigo (Vertigo) antiovertigo (DRAPARNAUD, 1801)

Distribution: Palaearctic. Common throughout the country except for in central lowland areas.

Habitat: fens and marshes, shores of lakes and streams. Doesn't live on banks of big rivers.

Microhabitat: mainly on dead leaves and decaying reed stems. Climbs to a height of 0.1-0.2 m on upwardly-growing vegetation.
Possible co-occurrence: *V. moulinsiana*.

Dispersion ability: no information.

**Map 3.** The known distribution of *Vertigo antivertigo* (after FEHER & GUBÁNYI 2001).

**Vertigo (Vertigo) moulinsiana (DUPUY, 1849)**

Distribution: W-Palaearctic. A mainly European species with scattered distribution all over Europe. In Hungary it is typically a wetland species distributed sporadically in the lowlands and in low-altitude valleys in the mountains.

**Map 4.** The known distribution of *Vertigo moulinsiana* (after FEHER & GUBÁNYI 2001).

**Habitat:** reed-sedge transition zone (water edge); fishpond banks, marsh, swamp.

**Microhabitat:** on the underside of reed fronds, in permanently flooded sites; climbs to a height of 0.5 m on upwardly-growing vegetation; it always occurs at low density.

**Possible co-occurrence:** *V. antivertigo*.

**Dispersal:** can be transported by mammals (unpublished observations of G. MAJOROS).
Vertigo (Vertigo) pusilla O. F. Müller, 1774

Distribution: European. In Hungary this species is common at moderate altitude in the mountains. It does not occur in the lowlands.

Habitat: rather calciphile but sometimes lives also in areas of volcanic rock. It prefers oak forest and other similar types of open deciduous woodland on yellow or sandy soils.

Microhabitat: in dry leaf litter under trees, with or without undergrowth.

Possible co-occurrence: V. alpestris

Dispersion ability: no information.

Map 5. The known distribution of Vertigo pusilla in Hungary (after FeHér & Gubányi 2001).

Vertigo (Vertigo) pygmaea (Draparnaud, 1801)

Distribution: Holarctic. This is the most common Vertigo species in Hungary, occurring all over the country.

Habitat: xerotolerant, and found in open land (not in forest), including microclimatically humid patches within dry areas.

Map 6. The known distribution of Vertigo pygmaea (after FeHér & Gubányi 2001).
Microhabitat: among plant debris at the base of grasses. During rainy weather may occasionally climb up the vegetation for short distances.

Possible co-occurrence: *V. angustior* (*V. antivertigo*).

Dispersal: no information.

Vertigo (*Vertigo* substriata) (Jeffreys, 1833)

Distribution: Boreo-Alpine. In Hungary this species is found only in the mountainous northern region of the country. It exhibits a relict distribution pattern, but is more frequent than indicated previously (von Proschwitz & Hornung 2002).

Habitat: along streams in mountains; alder woods, shaded places.

Microhabitat: in moss, among alder litter-layer debris.

Dispersal: water acts as a short-distance dispersal agency, but the snail has a fragile shell, which cannot withstand the conditions accompanying more substantial flooding events (unpublished observations of G. Majoros).

This species is endangered in Hungary as a consequence of habitat destruction and pollution. Its populations continue to decline.

![Map 7. The known distribution of *Vertigo substriata* in Hungary (after Feher & Gubanyi 2001).](image)

General remarks

Autecological research is needed in the case of all of the *Vertigo* species occurring in Hungary, for example on their longevity (which may be more than 1 year in all species), reproductive characteristics and microhabitats.

All of the species can be endangered as a result of man's activities, including drainage, fire, grazing, mowing, tillage and pollution. Two of the Hungarian *Vertigo* species (*V. angustior* and *V. moulinsiana*) are listed on Annex II of the EU Habitats Directive, but it is *V. substriata* and *V. alpestris* that seem to be most threatened in Hungary. These latter species have a fragmented distribution (Feher & Gubanyi 2001) and occur at only few localities. There is need to both map and conserve their habitats.

Methodology recommended in Hungary for survey and conservation of *Vertigo* species (from Majoros 1987, 1999).
Collecting

Collection of the species is usually difficult technically because of their small size and special micro-habitats. The most appropriate method varies with the species:

1. extraction from soil core samples: *V. pusilla*, *V. angustior*, *V. pygmaea*, *V. alpestris*.
2. sieving of ground litter: *V. pusilla*, *V. angustior*, *V. pygmaea*, *V. alpestris*, *V. substriata*.
3. sweep net: *V. antivertigo*, *V. moulinsiana*.
4. aspirator: *V. pygmaea*, *V. angustior* (species living on the ground surface of grasslands).
5. investigation of potential habitats by searching for snails on fallen leaves and on stems: *V. antivertigo*, *V. moulinsiana*.

Monitoring and Conservation

For monitoring purposes it is recommended that a species should be sampled annually, at the same sampling stations, using the same methodology, and possibly by the same person (and during an appropriate season).

The use of standardised data record sheets is recommended, that allow for recording of date of survey, weather conditions, site characteristics (e.g. humidity conditions, plant associations and species, soil parameters, etc.), numbers of live adults and juveniles, proportion of specimens dead and alive per unit area, quantitative or at least qualitative data on other gastropod species present, the extent and boundary location of the occupied area.

A range of population parameters can be calculated from the information recorded: population density and fluctuations; changes in the ratio between dead and live specimens; relative frequency of different species (species ranking); diversity indices; tendencies in spatial population change.

*Vertigo* species have a high indicator value: their disappearance signals habitat degradation.

Species re-establishment and translocation risk disturbance in micro-evolutionary processes. Translocation of species with their associated soil and plants can also result in unintentional translocation of other organisms, including some with potential to adversely affect the recipient site.

Acknowledgements: The authors wish to thank Ákos Uherkovich (Janus Pannonius Museum, Pécs, Hungary) and Tamás Domokos (Munkácsy Mihály Museum, Békéscsaba, Hungary) for the data used for this study. Grateful thanks are due to Martin Speight and Evelyn Moorens for improving our English text.

References


Addresses of the authors: 
ELISABETH HORNUNG, Department of Ecology, Szént István University, Faculty of Veterinary Science, P.O. Box 2, H-1400 Budapest  
ev-mail: hornung@univet.hu

GÁBOR MAJOROS, Central Veterinary Institute, Department of Fish and Bee Disease, Tétényi u. 2,  
H-1149 Budapest  
ev-mail: majoros@indigo2.srl.hu

ZOLTÁN FEHÉR, Department of Zoology, Hungarian Nature History Museum, Baross u. 13, H-1086 Budapest  
ev-mail: feher2@zooe.nhmus.hu

ANDRÁS VARGA, Mátra Museum, Department of Natural Sciences, Kossuth u. 40, H-3200 Győngyös  
ev-mail: avarga20@dp.gu