

# Ecological groups of snails

## - use and perspectives

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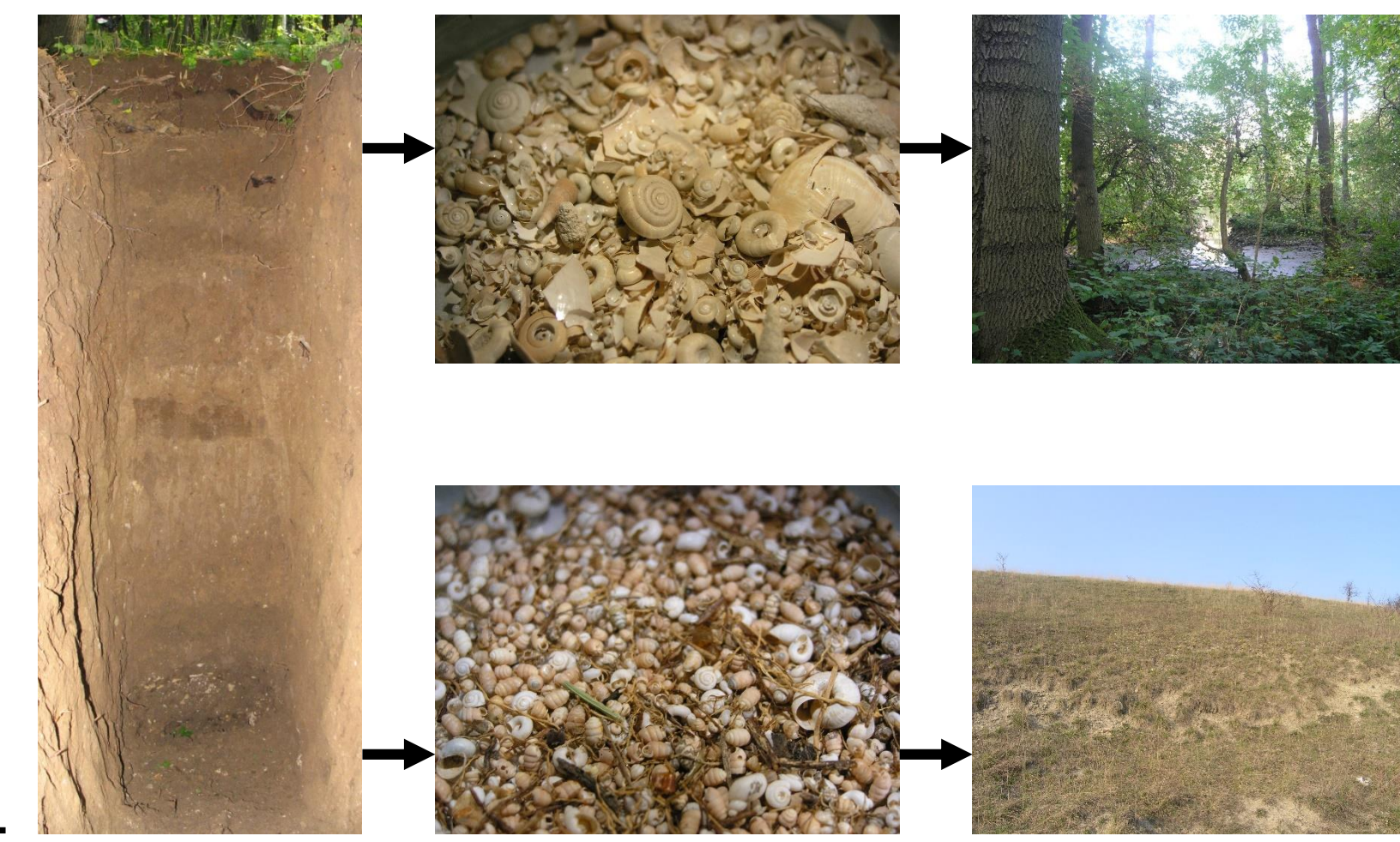
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Land snail assemblages have been traditionally used to describe Quaternary environmental changes. But recently, snails have been rather overlooked in palaeoreconstructions.

**Advantages:** fossil shells can be identified to species level  
shells are usually deposited directly in the places where snails lived  
mollusc assemblages show landscape detail

**Problems:** lack of uniform interpretation of fossil assemblages throughout Europe

**Solution:** unified using of ecological groups for characterisation of palaeoenvironment



The presented updated ecological groups of land snails reflect conditions in central Europe, and may differ in other parts of the continent.

General problem: Are there snails, which can live only in woodland?

**shade demanding** species in western European vs. **canopy forest** species in central European conception

**Different ecology of species in centre vs. at margins of their distribution ranges.**

Examples: *Cepaea vindobonensis*: central Europe: steppe xeric habitats  
south and southeast Europe: open - forest, xeric - damp habitats

*Clausilia bidentata*: western Europe: indifferent  
central Europe: canopy forest



Tasks for future:

- to describe and delimit changes of ecological requirements of snail species throughout Europe
- to establish an Europe-wide system of ecogroups application for palaeoenvironmental reconstructions
- to show other palaeontologists that snails are the best!!!

What we need? Experienced field malacologists willing to help.

ecological group	Glacial	Early Holocene	Middle Holocene	Late Holocene (sensu Walker et al 2012)	modern immigrants	comment
WOODLAND	<i>Acanthinula aculeata</i>	<i>Acanthinula aculeata</i>	<i>Acanthinula aculeata</i>	<i>Acanthinula aculeata</i>		
		<i>Acicula parcellinata</i>	<i>Acicula parcellinata</i>	<i>Acicula parcellinata</i>		
		<i>Agopina nitens</i>	<i>Agopina nitens</i>	<i>Agopina nitens</i>		one sites
		<i>Agopina nitida</i>	<i>Agopina nitida</i>	<i>Agopina nitida</i>		few sites
		<i>Agopina pura</i>	<i>Agopina pura</i>	<i>Agopina pura</i>		
		<i>Argna bielzi</i>	<i>Argna bielzi</i>	<i>Argna bielzi</i>		
		<i>Bulgaria cana</i>	<i>Bulgaria cana</i>	<i>Bulgaria cana</i>		
		<i>Carpathica calophana</i>	<i>Carpathica calophana</i>	<i>Carpathica calophana</i>		one site; undated
		<i>Causa holosericea</i>	<i>Causa holosericea</i>	<i>Causa holosericea</i>		
		<i>Clausilia bidentata</i>	<i>Clausilia bidentata</i>	<i>Clausilia bidentata</i>		no fossil data
		<i>Clausilia cruciata</i>	<i>Clausilia cruciata</i>	<i>Clausilia cruciata</i>		
		<i>Cochlodina laminata</i>	<i>Cochlodina laminata</i>	<i>Cochlodina laminata</i>		
		<i>Cochlodina orthostoma</i>	<i>Cochlodina orthostoma</i>	<i>Cochlodina orthostoma</i>		
		<i>Daudebardia rufa</i>	<i>Daudebardia rufa</i>	<i>Daudebardia rufa</i>		
	WOODLAND (canopy forest)	<i>Discus ruderatus</i>	<i>Discus ruderatus</i>	<i>Discus ruderatus</i>	<i>Discus ruderatus</i>	
<i>Era montana</i>		<i>Era montana</i>	<i>Era montana</i>	<i>Era montana</i>		
<i>Faustina faustina</i>		<i>Faustina faustina</i>	<i>Faustina faustina</i>	<i>Faustina faustina</i>		
<i>Helicodonta obvolvata</i>		<i>Helicodonta obvolvata</i>	<i>Helicodonta obvolvata</i>	<i>Helicodonta obvolvata</i>		few sites
<i>Isog. isognomostomos</i>		<i>Isog. isognomostomos</i>	<i>Isog. isognomostomos</i>	<i>Isognomostoma isognomostomos</i>		
		<i>Lucania transylvanica</i>	<i>Lucania transylvanica</i>	<i>Lucania transylvanica</i>		no fossil data
		<i>Macrogastra latestriata</i>	<i>Macrogastra latestriata</i>	<i>Macrogastra latestriata</i>		few sites
		<i>Macrogastra pilicula</i>	<i>Macrogastra pilicula</i>	<i>Macrogastra pilicula</i>		
		<i>Meringia obscurus</i>	<i>Meringia obscurus</i>	<i>Meringia obscurus</i>		
		<i>Oxychilus depressus</i>	<i>Oxychilus depressus</i>	<i>Oxychilus depressus</i>		
		<i>Oxychilus orientalis</i>	<i>Oxychilus orientalis</i>	<i>Oxychilus orientalis</i>		few sites
		<i>Pagodulina pagodula</i>	<i>Pagodulina pagodula</i>	<i>Pagodulina pagodula</i>		one site; undated
		<i>Perforatella dibothrium</i>	<i>Perforatella dibothrium</i>	<i>Perforatella dibothrium</i>		one site; undated
		<i>Petrasina bielzki</i>	<i>Petrasina bielzki</i>	<i>Petrasina bielzki</i>		one site; undated
WOODLAND (open forest)		<i>Petrasina unidentata</i>	<i>Petrasina unidentata</i>	<i>Petrasina unidentata</i>	<i>Petrasina unidentata</i>	
	<i>Platyla polita</i>	<i>Platyla polita</i>	<i>Platyla polita</i>	<i>Platyla polita</i>		
		<i>Pseudofusus stabilis</i>	<i>Pseudofusus stabilis</i>	<i>Pseudofusus stabilis</i>		few sites
		<i>Pseudofusus varians</i>	<i>Pseudofusus varians</i>	<i>Pseudofusus varians</i>		few sites; undated
		<i>Ruthenica filigrana</i>	<i>Ruthenica filigrana</i>	<i>Ruthenica filigrana</i>		
		<i>Semilimax semilimax</i>	<i>Semilimax semilimax</i>	<i>Semilimax semilimax</i>		
		<i>Sphyradium dolium</i>	<i>Sphyradium dolium</i>	<i>Sphyradium dolium</i>		
		<i>Vertigo pusilla</i>	<i>Vertigo pusilla</i>	<i>Vertigo pusilla</i>		
		<i>Vertigo ronnayensis</i>	<i>Vertigo ronnayensis</i>	<i>Vertigo ronnayensis</i>		one site; undated
		<i>Vestia elata</i>	<i>Vestia elata</i>	<i>Vestia elata</i>		few sites
		<i>Vestia rancogisi moravica</i>	<i>Vestia rancogisi moravica</i>	<i>Vestia rancogisi moravica</i>		few sites
		<i>Vitrea diaphana</i>	<i>Vitrea diaphana</i>	<i>Vitrea diaphana</i>		
		<i>Vitrea substriata</i>	<i>Vitrea substriata</i>	<i>Vitrea substriata</i>		
		<i>Vitrea transylvanica</i>	<i>Vitrea transylvanica</i>	<i>Vitrea transylvanica</i>		
	WOODLANDS AND PARTLY SEMI-OPEN HABITATS	<i>Agopina minor</i>	<i>Agopina minor</i>	<i>Agopina minor</i>	<i>Agopina minor</i>	
<i>Alinda biplicata</i>		<i>Alinda biplicata</i>	<i>Alinda biplicata</i>	<i>Alinda biplicata</i>		
		<i>Cepaea horrensis</i>	<i>Cepaea horrensis</i>	<i>Cepaea horrensis</i>		<i>Cepaea nemoralis</i>
		<i>Cochlodina cerata cerata</i>	<i>Cochlodina cerata cerata</i>	<i>Cochlodina cerata cerata</i>		
		<i>Discus rotundatus</i>	<i>Discus rotundatus</i>	<i>Discus rotundatus</i>		
		<i>Eucobresia diaphana</i>	<i>Eucobresia diaphana</i>	<i>Eucobresia diaphana</i>		
		<i>Fruticicola fruticum</i>	<i>Fruticicola fruticum</i>	<i>Fruticicola fruticum</i>		
		<i>Helicigona lapicida</i>	<i>Helicigona lapicida</i>	<i>Helicigona lapicida</i>		
		<i>Helix pomatia</i>	<i>Helix pomatia</i>	<i>Helix pomatia</i>		
		<i>Lacinaia plicata</i>	<i>Lacinaia plicata</i>	<i>Lacinaia plicata</i>		
		<i>Monachoides incarnatus</i>	<i>Monachoides incarnatus</i>	<i>Monachoides incarnatus</i>		
		<i>Orcula dolium</i>	<i>Orcula dolium</i>	<i>Orcula dolium</i>		
		<i>Semilimax kotulae</i>	<i>Semilimax kotulae</i>	<i>Semilimax kotulae</i>		
		<i>Vertigo alpestris</i>	<i>Vertigo alpestris</i>	<i>Vertigo alpestris</i>		
DAMP AND ALLUVIAL WOODLANDS		<i>Clausilia pumila</i>	<i>Clausilia pumila</i>	<i>Clausilia pumila</i>	<i>Clausilia pumila</i>	
	<i>Columella edentula</i>	<i>Columella edentula</i>	<i>Columella edentula</i>	<i>Columella edentula</i>		
		<i>Macrogastra ventricosa</i>	<i>Macrogastra ventricosa</i>	<i>Macrogastra ventricosa</i>		few sites
		<i>Monachoides vicinus</i>	<i>Monachoides vicinus</i>	<i>Monachoides vicinus</i>		no fossil records
		<i>Urticicola umbrosus</i>	<i>Urticicola umbrosus</i>	<i>Urticicola umbrosus</i>		one site; undated
		<i>Vestia guilo</i>	<i>Vestia guilo</i>	<i>Vestia guilo</i>		
		<i>Vestia turgida</i>	<i>Vestia turgida</i>	<i>Vestia turgida</i>		one site; undated
		<i>Candula unifasciata</i>	<i>Candula unifasciata</i>	<i>Candula unifasciata</i>		
		<i>Cecilioidea acicula</i>	<i>Cecilioidea acicula</i>	<i>Cecilioidea acicula</i>		
						<i>Cecilioidea pentiana</i> <i>Cermelella neglecta</i>
		<i>Graniaria frumentum</i>	<i>Graniaria frumentum</i>	<i>Graniaria frumentum</i>		few sites
		<i>Helicopsis striata</i>	<i>Helicopsis striata</i>	<i>Helicopsis striata</i>		
		<i>Chondrina avenacea</i>	<i>Chondrina avenacea</i>	<i>Chondrina avenacea</i>		<i>Helix lutescens</i>
		<i>Chondrina clienta</i>	<i>Chondrina clienta</i>	<i>Chondrina clienta</i>		
		<i>Chondrina tatraica</i>	<i>Chondrina tatraica</i>	<i>Chondrina tatraica</i>		
	<i>Chondrula tridens</i>	<i>Chondrula tridens</i>	<i>Chondrula tridens</i>			
OPEN COUNTRY		<i>Oxychilus inopinitus</i>	<i>Oxychilus inopinitus</i>	<i>Oxychilus inopinitus</i>		time of spread unknown
		<i>Oxychilus montilei</i>	<i>Oxychilus montilei</i>	<i>Oxychilus montilei</i>		time of spread unknown
		<i>Pupilla sternii</i>	<i>Pupilla sternii</i>	<i>Pupilla sternii</i>		
		<i>Pupilla triplicata</i>	<i>Pupilla triplicata</i>	<i>Pupilla triplicata</i>		
		<i>Pyramidula pusilla</i>	<i>Pyramidula pusilla</i>	<i>Pyramidula pusilla</i>		
		<i>Truncatellina clausstralis</i>	<i>Truncatellina clausstralis</i>	<i>Truncatellina clausstralis</i>		
		<i>Truncatellina costulata</i>	<i>Truncatellina costulata</i>	<i>Truncatellina costulata</i>		
		<i>Urticicola obvia</i>	<i>Urticicola obvia</i>	<i>Urticicola obvia</i>		one site
		<i>Zebirina dentata</i>	<i>Zebirina dentata</i>	<i>Zebirina dentata</i>		endemic of small area
		<i>Columella columella</i>	<i>Columella columella</i>	<i>Columella columella</i>		
		<i>Faustina cingulella</i>	<i>Faustina cingulella</i>	<i>Faustina cingulella</i>		<i>Itala ornata</i> time of spread unknown
		<i>Pupilla loessica</i>	<i>Pupilla loessica</i>	<i>Pupilla loessica</i>		
		<i>Pupilla atpicola densegyrata</i>	<i>Pupilla atpicola densegyrata</i>	<i>Pupilla atpicola densegyrata</i>		
		<i>Pupilla muscorum</i>	<i>Pupilla muscorum</i>	<i>Pupilla muscorum</i>		
		<i>Quickella arenaria</i>	<i>Quickella arenaria</i>	<i>Quickella arenaria</i>		no fossil record
WOODLAND / OPEN COUNTRY	<i>Truncatellina cylindrica</i>	<i>Truncatellina cylindrica</i>	<i>Truncatellina cylindrica</i>	<i>Truncatellina cylindrica</i>		one site; undated
	<i>Vallonia costata</i>	<i>Vallonia costata</i>	<i>Vallonia costata</i>	<i>Vallonia costata</i>		
	<i>Vallonia pulchella</i>	<i>Vallonia pulchella</i>	<i>Vallonia pulchella</i>	<i>Vallonia pulchella</i>		
	<i>Vallonia tenuilabris</i>	<i>Vallonia tenuilabris</i>	<i>Vallonia tenuilabris</i>	<i>Vallonia tenuilabris</i>		
	<i>Vertigo pygmaea</i>	<i>Vertigo pygmaea</i>	<i>Vertigo pygmaea</i>	<i>Vertigo pygmaea</i>		
		<i>Bulgaria nitidosa</i>	<i>Bulgaria nitidosa</i>	<i>Bulgaria nitidosa</i>		
		<i>Eumorphialis strigella</i>	<i>Eumorphialis strigella</i>	<i>Eumorphialis strigella</i>		
		<i>Cepaea vindobonensis</i>	<i>Cepaea vindobonensis</i>	<i>Cepaea vindobonensis</i>		
		<i>Cochlicopa lubricella</i>	<i>Cochlicopa lubricella</i>	<i>Cochlicopa lubricella</i>		one site; undated
		<i>Tandonia rustica</i>	<i>Tandonia rustica</i>	<i>Tandonia rustica</i>		no fossil record
		<i>Monacha cartusiana</i>	<i>Monacha cartusiana</i>	<i>Monacha cartusiana</i>		
		<i>Abida secalis</i>	<i>Abida secalis</i>	<i>Abida secalis</i>		
		<i>Balea perversa</i>	<i>Balea perversa</i>	<i>Balea perversa</i>		
		<i>Clausilia dubia</i>	<i>Clausilia dubia</i>	<i>Clausilia dubia</i>		one site; undated
		<i>Cochlicopa lubrica</i>	<i>Cochlicopa lubrica</i>	<i>Cochlicopa lubrica</i>		no fossil record
WOODLAND / OPEN COUNTRY	<i>Euconulus fulvus</i>	<i>Euconulus fulvus</i>	<i>Euconulus fulvus</i>	<i>Euconulus fulvus</i>		<i>Cornu aspersum</i>
		<i>Helix lucorum</i>	<i>Helix lucorum</i>	<i>Helix lucorum</i>		
		<i>Hygromia cinctella</i>	<i>Hygromia cinctella</i>	<i>Hygromia cinctella</i>		
	<i>Chilostoma achates</i>	<i>Chilostoma achates</i>	<i>Chilostoma achates</i>	<i>Chilostoma achates</i>		<i>Lucilia scintilla</i> <i>Lucilia singleyana</i> <i>Oxychilus altianus</i>
		<i>Oxychilus cellarius</i>	<i>Oxychilus cellarius</i>	<i>Oxychilus cellarius</i>		
		<i>Oxychilus draparnaudi</i>	<i>Oxychilus draparnaudi</i>	<i>Oxychilus draparnaudi</i>		
		<i>Perpallia hammonis</i>	<i>Perpallia hammonis</i>	<i>Perpallia hammonis</i>		
		<i>Pisicaria lubomirski</i>	<i>Pisicaria lubomirski</i>	<i>Pisicaria lubomirski</i>		
		<i>Punctum pygmaeum</i>	<i>Punctum pygmaeum</i>	<i>Punctum pygmaeum</i>		
		<i>Trochulus hispidus</i>	<i>Trochulus hispidus</i>	<i>Trochulus hispidus</i>		
		<i>Trochulus sericeus</i>	<i>Trochulus sericeus</i>	<i>Trochulus sericeus</i>		
		<i>Trochulus striolatus d.</i>	<i>Trochulus striolatus d.</i>	<i>Trochulus striolatus d.</i>		one site
		<i>Vertigo modesta arctica</i>	<i>Vertigo modesta arctica</i>	<i>Vertigo modesta arctica</i>		one site; undated
		<i>Vitrea contracta</i>	<i>Vitrea contracta</i>	<i>Vitrea contracta</i>		
		<i>Vitina pellucida</i>	<i>Vitina pellucida</i>	<i>Vitina pellucida</i>		
WOODLAND / OPEN COUNTRY	<i>Arianta arbustorum</i>	<i>Arianta arbustorum</i>	<i>Arianta arbustorum</i>	<i>Arianta arbustorum</i>		<i>Zonitoides arboreus</i>
	<i>Carychium tridentatum</i>	<i>Carychium tridentatum</i>	<i>Carychium tridentatum</i>	<i>Carychium tridentatum</i>		
	<i>Perforatella bidentata</i>	<i>Perforatella bidentata</i>	<i>Perforatella bidentata</i>	<i>Perforatella bidentata</i>		
	<i>Perpallia petronella</i>	<i>Perpallia petronella</i>	<i>Perpallia petronella</i>	<i>Perpallia petronella</i>		
	<i>Succinea oblonga</i>	<i>Succinea oblonga</i>	<i>Succinea oblonga</i>	<i>Succinea oblonga</i>		
	<i>Trochulus villosulus</i>	<i>Trochulus villosulus</i>	<i>Trochulus villosulus</i>	<i>Trochulus villosulus</i>		
	<i>Vertigo angustior</i>	<i>Vertigo angustior</i>	<i>Vertigo angustior</i>	<i>Vertigo angustior</i>		
	<i>Vertigo substriata</i>	<i>Vertigo substriata</i>	<i>Vertigo substriata</i>	<i>Vertigo substriata</i>		
	<i>Vitrea crystallina</i>	<i>Vitrea crystallina</i>	<i>Vitrea crystallina</i>	<i>Vitrea crystallina</i>		
	<i>Carychium minimum</i>	<i>Carychium minimum</i>	<i>Carychium minimum</i>	<i>Carychium minimum</i>		
		<i>Cochlicopa nana</i>	<i>Cochlicopa nana</i>	<i>Cochlicopa nana</i>		few sites
		<i>Euconulus praticola</i>	<i>Euconulus praticola</i>	<i>Euconulus praticola</i>		few sites; undated
		<i>Oxyloma elegans</i>	<i>Oxyloma elegans</i>	<i>Oxyloma elegans</i>		
		<i>Pseudotrichia rubiginosa</i>	<i>Pseudotrichia rubiginosa</i>	<i>Pseudotrichia rubiginosa</i>		
		<i>Pupilla alpicola</i>	<i>Pupilla alpicola</i>	<i>Pupilla alpicola</i>		
	<i>Succinea putris</i>	<i>Succinea putris</i>	<i>Succinea putris</i>			
	<i>Vallonia enniensis</i>	<i>Vallonia enniensis</i>	<i>Vallonia enniensis</i>			
	<i>Vertigo antiverigo</i>	<i>Vertigo antiverigo</i>	<i>Vertigo antiverigo</i>			
	<i>Vertigo geyeri</i>	<i>Vertigo geyeri</i>	<i>Vertigo geyeri</i>			
	<i>Vertigo geyeri</i>	<i>Vertigo geyeri</i>	<i>Vertigo geyeri</i>			
	<i>Vertigo moulinsana</i>	<i>Vertigo moulinsana</i>	<i>Vertigo moulinsana</i>			
	<i>Zonitoides nitidus</i>	<i>Zonitoides nitidus</i>	<i>Zonitoides nitidus</i>		undated	

The subdivision is based on Ložek 1964, 1965 and Juříčková et al. 2014; species characteristic of particular periods are marked with bold; first occurrences or subsiding of species are marked with smaller font; undated species occurrences lack radiocarbon dating. The table is based on 240 processed mollusc successions situated in the Czech and Slovak Republics; 129 of them are radiocarbon dated.