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Greenhouse gastropods of the Czech Republic: current stage of research

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Abstract: All published and known unpublished data concerning the occurrence of gastropods in the Czech greenhouses are presented. The species were divided into three categories: exclusively greenhouse species, non-native species penetrating into open landscape, and native species occurring in greenhouses.
Key words: gastropods, greenhouse fauna, non-native species, check-list

Introduction

Since the recent check-list of molluscs of the Czech Republic (Juřičková, L. et al. 2001) contains only wildlife species, there is a need to compose an actual list of species whose occurrence is restricted to greenhouses. The main purpose of this work is to supplement that check-list. Therefore this paper is especially focused on gastropods that occur exclusively in greenhouses. The species that were introduced into the nature through greenhouses and these from natural fauna that regularly live in greenhouses, are added only to give a true picture of complete malacofauna of Czech greenhouses.

There is a long-term tradition of mollusc research of European greenhouses; Eichler W. (1952) published the first synthesis and the last one was made by Kerney, M.P. et al. (1983). Also in the Czech Republic mollusc fauna was not overlooked. I. Flasar was the first person who regularly studied Gastropods in the Czech greenhouses. In the first paper (Flasarová, M. & Flasar, I. 1962), he did not report any typical greenhouse species from Teplice (N Bohemia). In 1962, *Boettgerilla pallens* was published as a new species for the Czech Republic (Flasar, I. 1962). After these papers, he continued with the research of greenhouses in North Bohemia. This time he found typical greenhouse species: *Lehmannia valentiana* (Flasar I., 1964), *Pseudosuccinea columella*, and *Zonitoides arboreus* (Flasarová, M. & Flasar, I. 1965).

S. Mácha and O. Ditrich studied greenhouses in Moravia in the 1970s. Mácha, S. (1971) reported the first records of *Melanoides tuberculatus*, *Planorbella duryi/anceps* (originally as *Helisoma trivolvis*), and *Opeas pumilum*. Ditrich, O. (1974) published for the first time *Ferrisia clessiniana* (orig. as *Ferrisia parallela*) and *Pomacea bridgesii* (orig. as *Ampullaria australis*). Other greenhouse species were recorded in last 25–30 years: *Lucilla singleyana* (as *Helicodiscus inermis*) (Flasar, I. 1977, 1978), *Hawaiia minuscula* (Mácha, S. 1988), *Lamellaxis clavulinus* (Horsák, M. 2001), and *Deroceras panormitanum* (Horsák, M. & Dvořák, L. 2003).

Localities under study

Records of individual species are based on the extensive literary sources and on the new material collected by the authors. Some localities in Brno probably correspond with localities studied by Ditrich, O. (1974).

1 – Babor, J.F. & Novák, J. (1909). **2** – Flasarová, M. & Flasar, I. (1962). **3** – Flasar, I. (1964). **4** – Flasarová, M. & Flasar, I. (1965). **5** – Mácha, S. (1971). **6** – Ditrich, O. (1974). **7** – Mácha, S. (1988). **8** – Horsák, M. (2001). **9** – Brno, greenhouses of Masaryk University, 2 Kotlářská street, 2000, Horsák lgt., 7 March 2001 and 14 November 2001, Horsák et Dvořák lgt. **10** – Brno, greenhouses of arboretum of Mendel Forestry University, 15 November 2001 and 11 February 2004, Horsák et Dvořák lgt. **11** – Brno, greenhouses of "Nature Station Kamenáčky", Kamenáčky 4A, 16 November 2001, Dvořák lgt. **12** – Sušice, greenhouses of Gardening "Studio Garden", 23 April 2001 and 10 July 2002, Dvořák lgt. **13** – Brno, greenhouses in park of Lužánky, 11 February 2004, Horsák et Dvořák lgt. **14** – Brno, greenhouse in pavilion F of Mendel Agriculture University, 11 February 2004, Horsák et Dvořák lgt. **15** – Prague 2, tropical greenhouse of Botanic garden "Na Slupi", 18 February 2004, Juřičková lgt. **16** – Prague 2, sub-tropical greenhouse of Botanic garden "Na Slupi", 18 February 2004, Juřičková lgt.

List of snail species encountered only in the greenhouses

Prosobranchia

Pomacea bridgesii (Reeve, 1856) – 6.
In older Czech literature it was called *Ampullaria australis*. This neotropical snail is frequently for sale in aquarium shops. It can be introduced into greenhouses, but it has low fitness if compared with the other aquatic snails.

Melanoides tuberculata (O. F. Müller, 1774) – 5, 6, 15.
This species lives in aquariums with sandy bottom. In the present, it is the cosmopolitan parthenogenetic species that tolerates moderate salinity (Brown, D.S. 1980). In neighbouring countries it is also known from natural thermal water habitats [e.g., from Slovakia (Varga, A. 1976) and from Austria (Stagl, V. 1993)].

Pulmonata: Basommatophora

Pseudosuccinea columella (Say, 1824) – 4, 5, 6, 9, 12.
This snail lives in greenhouse aquariums and pools. Sometimes it can appear in nature (Mácha, S. 1971), where the specimens are sometimes flushed by effluent water from waste water plants. The specimens are not able to survive in nature during the colder parts of the year.

Planorbella duryi (Wetherbey, 1879) / *anceps* (Menke, 1830) – 5, 6, 9, 11, 15.
These North-American snails were called *Helisoma trivolvis* (Say, 1818) in former Czech literature. This species is the most common snail of aquariums through the whole territory.

Unfortunately, we are not able to identify the material to the species level, but the occurrence of both mentioned species is very probable. Obviously, there are some inconsistencies in the recent malacological literature. Glöer, P (2002) assesses *P. duryi* as a rare species and does not mention its occurrence in aquariums. On the contrary, he regards *P. anceps* as a common snail of European aquariums and expects its penetration to the wild nature. On the other hand, Leiss, A. & Reischütz, P.L. (1996) published many findings of *P. duryi* from aquariums. That material was identified according to Burch, J.B. & Tottenham, J.L. (1980) (Reischütz, pers. comm.). When we perform identification according to Glöer, P (2002) and Burch, J.B. & Tottenham, J.L. (1980) we can obtain different results. A juvenile of *P. anceps*, figured by Glöer, P (2002), is conchologicaly very close to *P. duryi* f. *seminole* after Burch, J.B. & Tottenham, J.L. (1980). Therefore, we conclude that more correct will be to label our material as *P. duryi* with respect to encountering some population of *P. duryi* f. *seminole* [sensu Burch, J.B. & Tottenham, J.L. (1980)]. The species was also introduced to Africa. In general, identification of non-native species will be connected with some problems either due to their occurrence in different conditions or because their population are fragmented. Further investigation on European *Planorbella* population is badly needed.

Pulmonata: Stylommatophora

Discus rotundatus f. *pyramidalis* Jeffreys – 2, 5, 6, 9, 10, 12, 13, 15, 16.
This species is the most common greenhouse snail. Mostly it reaches very rich abundance.

Zonitoides arboreus (Say, 1816) – 1, 4, 5, 6, 9, 10, 12, 13, 14, 15.
This is a common inhabitant of our greenhouses that occurs in large population densities. Sometimes it can be found in nature, but no survival of the winter period by specimens introduced outdoors with greenhouse soil has been observed.

Hawaiia minuscula (Binney, 1840) – 7, 9, 10, 13, 14, 15.
A rare species, but it can reach rich abundance.

Lehmannia valentiana (Férussac, 1823) – 3, 4, 5, 6, 9, 10, 12, 15.
Almost a common species often occurs in abundant population. Therefore it can cause some damages via feeding on plants.

Opeas pumilum (L. Pfeiffer, 1840) – 5, 6, 9.
Probably a rare species of our greenhouses and even when it occurs, it usually reaches low abundance.

Lamellaxis clavulinus (Potiez et Michaud, 1838) – 8, 9.
So far, the species has been found only in greenhouses of botanic garden of Masaryk University in Brno. In this site it reaches rich abundance.

Appendix. List of unpublished records of gastropods from individual greenhouses.
For numbers of localities see the chapter "Localities under study".

	9	10	11	12	13	14	15	16
Melanoides tuberculata (O.F. Müller)							x	
Physella cf. *acuta* (Draparnaud)	x	x	x					
Galba truncatula (O.F. Müller)	x							x
Pseudosuccinea columella (Say)	x			x				
Bathyomphalus contortus (Linnaeus)	x							
Gyraulus parvus (Say)			x					
Planorbella duryi (Wetherbey) / *anceps* (Menke)	x		x				x	
Ferrissia clessiniana (Jickeli)	x							
Carychium minimum O.F. Müller	x							
Carychium tridentatum (Risso)							x	x
Cochlicopa lubrica (O.F. Müller)	x						x	
Vallonia costata (O.F. Müller)	x				x			
Vallonia pulchella (O.F. Müller)		x	x	x	x	x		x
Alinda biplicata (Montagu)	x							
Laciniaria plicata (Draparnaud)				x				
Lamellaxis clavulinus (Potiez et Michaud)	x							
Opeas pumilum (L. Pfeiffer)	x							
Lucilla singleyana (Pilsbry)							x	
Hawaiia minuscula (Binney)	x	x			x	x	x	
Discus rotundatus f. *pyramidalis* Jeffreys	x	x		x	x		x	x
Zonitoides arboreus (Say)	x	x		x	x	x	x	
Zonitoides nitidus (O.F. Müller)		x						
Euconulus fulvus (O.F. Müller)		x						
Oxychilus draparnaudi (Beck)	x	x	x	x	x		x	x
Tandonia budapestensis (Hazay)		x						
Limax maximus Linnaeus				x				
Lehmannia valentiana (Férussac)	x	x		x			x	
Deroceras laeve (O.F. Müller)	x	x	x	x	x	x	x	x
Deroceras panorminatum (Lessona et Pollonera)				x				
Deroceras reticulatum (O.F. Müller)				x				
Boettgerilla pallens Simroth	x							
Arion distinctus Mabille		x		x			x	
Arion lusitanicus (Mabille)				x				x
Trichia hispida (Linnaeus)			x				x	x
Arianta arbustorum (Linnaeus)				x				
Cepaea hortensis (O.F. Müller)				x			x	
Helix pomatia Linnaeus				x			x	

Further species encountered in Czech greenhouses

Following species can be divided into two groups. The first group includes non-native species: *Physella acuta*, *Gyraulus parvus*, *Ferrissia clessiniana*, *Lucilla singleyana*, *Oxychilus draparnaudi*, *Deroceras panormitanum*, and *Boettgerilla pallens*. At least some of them originally appeared in greenhouses wherefrom they were introduced into nature. This way of spreading is well-documented in case of *Physella acuta* and *Oxychilus draparnaudi*.

The second group contains native species, but most of them prefer sites strongly influenced by activities of man. Up to day, following species have been recorded: *Galba truncatula*, *Stagnicola palustris* s.lat., *Radix auricularia*, *R. ovata*, *Lymnaea stagnalis*, *Physa fontinalis*, *Bathyomphalus contortus*, *Gyraulus albus*, *G. crista*, *Planorbarius corneus*, *Carychium minimum*, *C. tridentatum*, *Cochlicopa lubrica*, *Vallonia pulchella*, *V. costata*, *Cochlodina laminata*, *Alinda biplicata*, *Laciniaria plicata*, *Zonitoides nitidus*, *Euconulus fulvus*, *Oxychilus cellarius*, *Tandonia budapestensis*, *Limax cinereoniger*, *L. maximus*, *Deroceras laeve*, *D. reticulatum*, *Arion lusitanicus*, *A. distinctus*, *A. subfuscus*, *Euomphalia strigella*, *Trichia hispida*, *Monachoides incarnatus*, *Arianta arbustorum*, *Cepaea hortensis*, and *Helix pomatia*.

The most frequent taxa of Czech greenhouses

The most frequent aquatic species of greenhouses is *Physella* cf. *acuta*, after that follow *Pseudosuccinea columella*, *Planorbella* spp., and *Galba truncatula*. Among terrestrial snails, *Oxychilus draparnaudi* and *Discus rotundatus* f. *pyramidalis* are the most frequent. Other species with higher frequency are *Vallonia costata*, *V. pulchella*, *Arion distinctus*, *Zonitoides arboreus*, *Lehmannia valentiana*, *Deroceras leave*, and *D. reticulatum*.

As the above-mentioned results show, strictly greenhouse snails as well as native snail species are among the most frequent taxa.

Conclusions

So far, 10 gastropod species with exclusive greenhouse occurrence have been recorded from the Czech Republic. Four of them are aquatic and six are terrestrial. The most frequent and abundant of aquatic snails are *Planorbella* spp. and *Pseudosuccinea columella*. Among terrestrial snails, *Discus rotundatus* f. *pyramidalis*, *Zonitoides arboreus*, and *Lehmannia valentiana* are the most frequent. In general, the first mentioned snail is also the most abundant.

There are 7 snail species that probably originally appeared in greenhouses wherefrom they have been introduced into the nature. According to known data, altogether 35 native species have been found in greenhouses.

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