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Rare and endangered terrestrial gastropods of Lower Silesia (SW. Poland) – current status and perspectives

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Abstract

The terrestrial malacofauna of Poland includes 177 species, 18 of which are introduced. The distribution borders of quite many of them cross Poland, and the highest concentration of such borders (41 species) is found in Lower Silesia (Silesian Lowland plus Sudetes). The area is under heavy human impact, hence there is a need to protect, and fparticularly to study the land mollusc species that are locally or globally important from a conservation viewpoint: *Discus perspectivus* (Megerle von Mühlfeld, 1818), *Eucobresia diaphana* (Draparnaud, 1805), *E. nivalis* (Dumont et Mortillet, 1852), *Semilimax kotulai* (Westerlund, 1883), *S. semilimax* (Férussac, 1802), *Aegopinella epipedostoma* (Fagot, 1879), *Tandonia rustica* (Millet, 1843), *Lehmannia macroflagellata* Grossu et Lupu, 1962, *Bielzia coerulans* (M. Bielz, 1851), *Deroceras praecox* Wiktor, 1966, *Cochlodina costata* (C. Pfeiffer, 1828), *Charpentieria ornata* (Rossmässler, 1836), *Macrogastra badia* (C. Pfeiffer, 1828), *Clausilia parvula* (Férussac, 1807), *Balea perversa* (Linnaeus, 1758), *Helicodonta obvoluta* (O.F. Müller, 1774), *Helicigona lapicida* (Linnaeus, 1758) and *Causa holosericum* (Studer, 1820). For each of these species we present current data on local and European distribution, habitat preferences, conservation status and the state of knowledge of life histories. We also delineate the directions of future studies and necessary conservation actions.

Key words: conservation, Lower Silesia, Poland, terrestrial malacofauna.

Introduction

In recent years the decline in the number and abundance of populations of many European gastropod species has become especially dramatic, even in spite of launching seemingly sensible and well-planned protection programmes in many countries. One of the reasons for this, apart from continuing human interference, is that in many cases threat factors have not been identified. The protection measures taken seem to be targeted at individual species rather than at malacocoenoses of which they form a part, which is due to the still very scanty knowledge of gastropod communities. In this context, it has become crucial to: (1) study all the various aspects of life histories of endangered species in order to identify critical stages in their life cycles, and (2) identify the respective malacocoenoses to protect whole gastropod communities and to use them as indicators of potentially adequate conditions when re-introduction of a species becomes necessary.

Below we discuss the status, perspectives and knowledge of thr ecology and life history of 18 rare and/or endangered species (see also Tables 1 and 2) of Lower Silesia, a region

which due to its specific character favours their survival. Although our paper is entirely based on literature information, many of the publications we cite (Maltz 1999; 2003a; 2003b; 2003c; Cameron, Pokryszko 2004; Pokryszko, Cameron 2005; Pokryszko et al. 2005; Cameron, Pokryszko 2006; Maltz 2006; Maltz, Pokryszko 2006) contain the results of our recent studies regarding the composition of malacocoenoses of which the endangered species form a part, or with various aspects of life histories of such species.

Species accounts

Discus perspectivus (Megerle von Mühlfeld, 1818; Fig. 1A, 2) is a Carpathian-Dinaric-East Alpine species with a disjunct distribution. In Poland, apart from the eastern part of the Carpathians and their foothills, it is found in a few isolated localities in the Sudetes. It is a forest-dweller closely associated with rotting timber (Kuźnik-Kowalska 2005). Apart from habitat destruction (clear-felling), the main threat is intensive forest management (removal of dead timber). Its life cycle has been studied both in the field and in the laboratory, which has made it possible to identify the main threat factor (Kuźnik-Kowalska 2005). One of the Lower Silesian localities, the Muszkowicki Las Bukowy Nature Reserve, supports the highest population densities (Kuźnik-Kowalska 2005), and the composition of the associated malacocoenosis there has been thoroughly studied (Wiktor 1972; Pokryszko, Cameron 2005; Pokryszko, Cameron unpublished data).

Eucobresia diaphana (Draparnaud, 1805; Fig. 2) is an Alpine-Central European montane species, in Poland practically limited to Lower Silesia (Umiński 1983; Wiktor 2004). It prefers humid places, with mainly herbaceous vegetation close to streams. Reasons for it being endangered are unclear, but its populations seem to have declined in recent years. Its life history has been studied in the field only, therefore only population dynamics are known (Umiński 1975, 1983). The composition of its associated malacocoenosis has been studied in five Lower Silesian sites (Pokryszko 1984; Maltz 1999; Pokryszko et al. 2004; Pokryszko, Cameron 2005; Pokryszko, Cameron unpublished data); four of its localities in Lower Silesia are nature reserves in which it does not seem to be endangered.

Eucobresia nivalis (Dumont et Mortillet, 1852; Fig. 2) is an Alpine-Carpathian species of disjunct and incompletely studied distribution; in Poland it is found in the Carpathians and a part of the Sudetes. Although in the Alps it reaches up to 3,100 m a.s.l., in the Polish part of its range it is usually found below the timberline where it prefers humid places in forests and remains in leaf litter or under stones. In Lower Silesia it seems to be rare; reasons for the decline of some of its populations are not clear. Because its life history has been studied in the field only, only population dynamics are known (Umiński 1979, 1983); the composition of the accompanying malacocoenosis has been studied in one site in Lower Silesia (Pokryszko, Cameron 2005; Pokryszko, Cameron unpublished data). It is not protected in any nature reserve in that area.

Semilax kotulai (Westerlund, 1883; Fig. 2) is an Alpine-Carpathian species of disjunct distribution. In Poland, apart from Lower Silesia, it is found in the Carpathians with their foothills, in the Cracow-Częstochowa Upland and the Świętokrzyskie Mts. A mostly montane forest-dweller, it prefers shaded, humid and rather cool places. It is a rare species whose populations seem to be declining for no apparent reason. Its life history has been studied in the field only, thaus only the population dynamics are known (Umiński 1975; 1983). It is protected in one nature reserve in Lower Silesia.

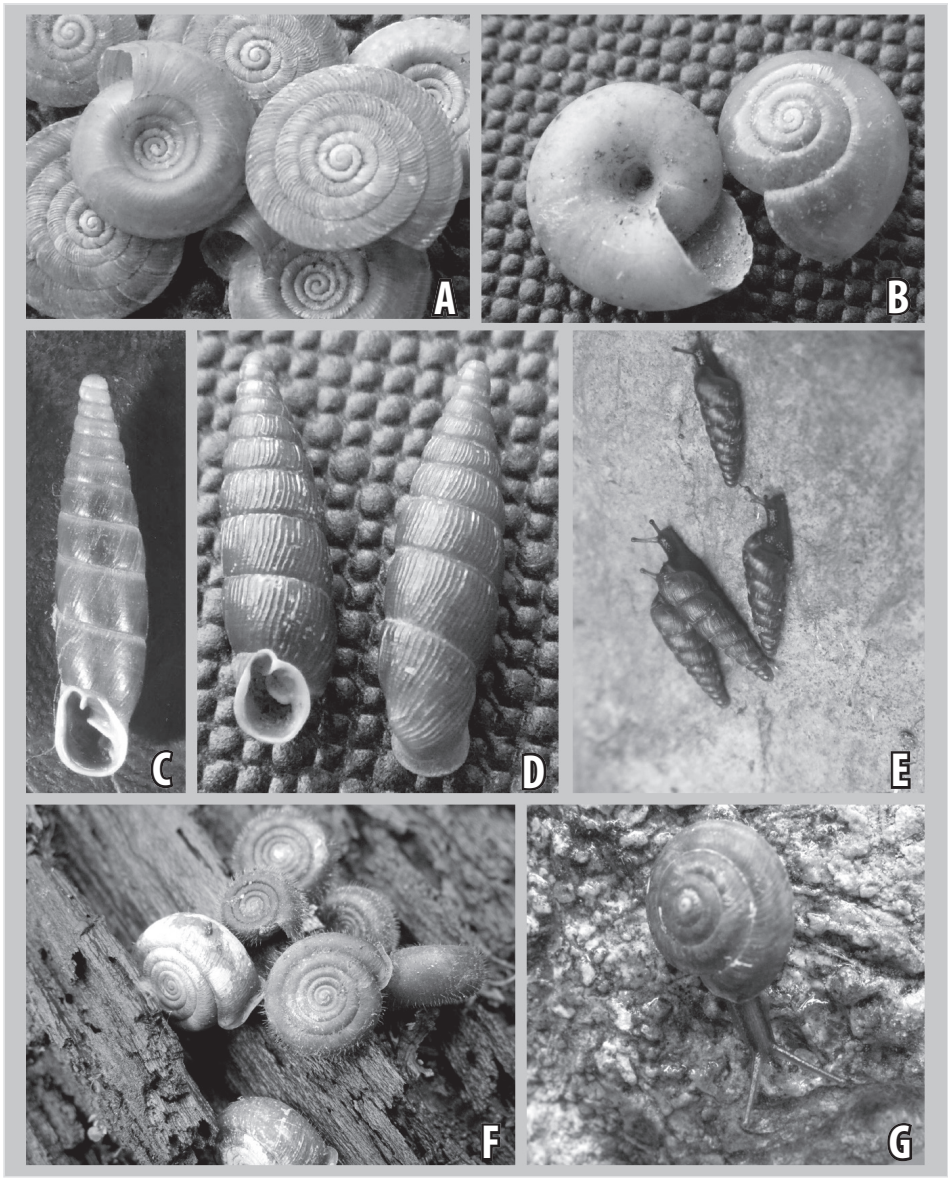

Fig. 1. Some rare and endangered snail species from Lower Silesia. A, *Discus perspectivus*; B, *Aegopinella epipedostoma*; C, *Cochlodina costata*; D, *Macrogastra badia*; E, *Balea perversa*; F, *Helicodonta obvoluta*; G, *Helicigona lapicida* (photo: C – R.A.D. Cameron, all other photos – T.K. Maltz).

Semilimax semilimax (Férussac, 1802; Fig. 2) is a montane Central-European or Alpine-Central European species. In Poland there is an isolated fragment of its range in Lower Silesia and the Carpathians with their foothills. Much like the preceding species, it is mainly a forest-dweller of shaded, humid microhabitats. Like the other three above-mentioned vitrinids, it seems to have increasingly fewer populations, and its local abundance is also

decreasing. The threat factors are not clear. Population dynamics are the only known aspect of its life history (Umiński 1983). The composition of its accompanying malacocoenosis has been studied in five sites in Lower Silesia (Pokryszko 1984; Maltz 1999; Pokryszko et al. 2004; Pokryszko, Cameron 2005; Pokryszko, Cameron unpublished data); four Lower Silesian localities of the species are nature reserves.

Aegopinella epipedostoma (Fagot, 1879; Fig. 1B, 2) is a montane species of rather little known distribution range. It is found in the Pyrenees and adjacent parts of France, in Germany and Slovenia, and in Poland it occurs in the Carpathians excepting the Tatra and Sudetes. It lives in leaf litter and among rock debris of humid and mesic forests. The small and few isolated populations in Lower Silesia are threatened by random events. Its life cycle is partly known (Kuźnik-Kowalska 2006) and is being currently studied in the field and in the laboratory. The composition of its accompanying fauna has been studied in two of its Lower Silesian sites, both of which are nature reserves; in one it reaches high densities (Pokryszko et al. 2004; Pokryszko, Cameron 2005; Pokryszko, Cameron unpublished data).

Tandonia rustica (Millet, 1843; Fig. 2) is a South and Central European species, in Poland it is regarded as a thermophile relict of the Atlantic Period, found only in the foothills of the Western Sudetes and inhabiting forested screes and sometimes ruins. Its few and scattered populations are threatened by random events and habitat destruction. Knowledge of its life cycle is very fragmentary (Wiktor 1989). The composition of its associated malacocoenosis has been studied in three sites (Pokryszko 1984; Maltz 1999; Pokryszko, Cameron 2005; Pokryszko, Cameron unpublished data), two of which are nature reserves where the slug is fairly abundant.

Lehmannia macroflagellata (Grossu et Lupu, 1962; Fig. 2), probably a Carpathian species of imprecisely known range, is a montane arboreal snail, during the vegetation season staying mostly on beech and sycamore trunks. In Poland it is known from higher mountains, in Silesia the Karkonosze and the Śnieżnik Kłodzki Mt. Massif. It feeds on lichens and algae from tree bark (Wiktor 1989). Nothing is known of its life cycle. It is threatened by habitat destruction; some of the populations, being small and scattered may suffer as a result of random events. It is protected in one nature reserve and one national park.

Bielzia coerulans (M. Bielz, 1851; Fig. 2) is a Carpathian, montane species. In Poland, apart from the Carpathians, it is found in the Śnieżnik Kłodzki Massif. A forest-dweller staying mostly on the forest floor, it is sometimes found above the timberline. In Silesia it may be threatened by random events; its populations in two national parks in the east of Poland (Tatra NP and Babia Góra NP) do not seem to be endangered. Its only Silesian population appears to have a very low density; its only locality is a nature reserve. Its life cycle has been studied, though incompletely (Smoleńska 1936; Wiktor 1989).

Deroceras praecox (Wiktor, 1966; Fig. 2) is one of the very few basically Sudetic species, eastwards reaching the Babia Góra Massif. Outisde Poland it has been recorded from the Czech Republic and Slovakia. An inhabitant of deciduous forests and their edges in lower montane and submontane zone, it prefers humid places near streams or springs. Some, but not all, aspects of its life history and genetics have been very thoroughly studied (Reise 1995, 2001). The composition of its associated malacocoenosis has been studied in two sites in Silesia (Wiktor 1972; Maltz 1999; Pokryszko, Cameron 2005; Pokryszko, Cameron unpublished data). Although rather rare, it does not seem to be threatened in Lower Silesia where it is protected in three nature reserves; in one of them it occurs in very high numbers.

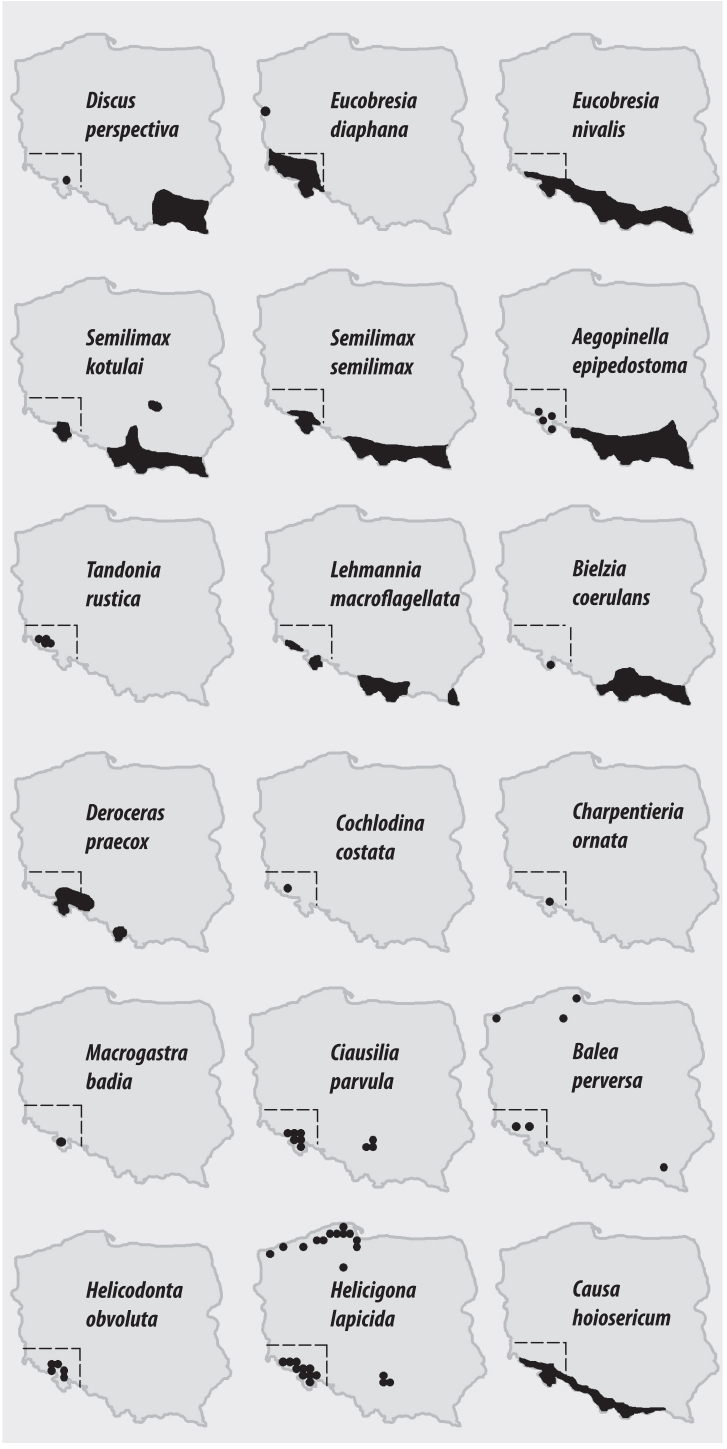

Fig. 2. Distribution of rare and endangered gastropod species in Poland and Lower Silesia.

Table 1. Red-booked, red-listed and protected species in Lower Silesia. Species discussed in this paper indicated in bold. Threat categories (Wiktor, Riedel 2002; Głowaciński 2004) EX – extinct; CR – critically endangered; EN – endangered; VU – vulnerable; NT – near threat; DD – data deficient.

Species	Red book	Red list	Legal status
Pyramidula rupestris		NT	
Vertigo angustior	EN	EN	×
Orcula doliolum		VU	
Vallonia enniensis		NT	
Vallonia declivis		DD	
Chondrula tridens		NT	
Discus perspectivus		VU	
Semilimax kotulai		NT	
Semilimax semilimax		NT	
Eucobresia diaphana		NT	
Eucobresia nivalis		NT	
Aegopinella epipedostoma		NT	
Nesovitrea petronella		NT	
Oxychilus glaber		NT	
Daudebardia brevipes		VU	
Tandonia rustica		NT	
Limax bielzi		DD	
Lehmannia macroflagellata		NT	
Bielzia coerulans		NT	
Deroceras praecox		NT	
Cecilioides acicula		DD	
Cochlodina costata	EX	CR	×
Charpentieria ornata	CR	CR	×
Macrogastra badia	CR	CR	×
Macrogastra tumida		NT	
Clausilia parvula		NT	
Clausilia cruciata		NT	
Balea perversa	CR	CR	×
Perforatella umbrosa		NT	
Trichia lubomirskii		NT	
Trichia unidentata		NT	
Helicodonta obvoluta	CR	CR	×
Helicigona lapicida		NT	×
Causa holosericum		NT	

Cochlodina costata (C. Pfeiffer, 1828; Fig. 1C, 2) is an East Alpine species, in Poland reported from several localities in the Sudetes and the Ślęża Massif. After repeated unsuccessful attempts at re-finding the localities, it was pronounced extinct, but was recently re-found on Mt. Miłek near Jelenia Góra (Pokryszko et al. 2004) where it now seems to have

its only population in Poland. It is a forest-dweller, in Poland threatened by random events. Nothing is known of its life cycle. The composition of the associated malacocoenosis has been studied (Pokryszko et al. 2004); its only site is a nature reserve.

Charpentieria ornata (Rossmässler, 1836; Fig. 2) is a South- and East-Alpine species which in Poland has only a small group of closely situated localities in Żelazno near Kłodzko. In these localities, which are its northernmost, it is a species of intermediate stages of forest succession, inhabiting abandoned limestone quarries where it lives on or at the base of half-shaded rock faces. It is threatened by habitat desctruction, random events and ecological succession, and requires active protection (Głowaciński 2004); in spite of this none of its sites is a nature reserve. In at least two sites it is abundant (Maltz 2006; Maltz, Pokryszko 2006). The composition of its associated malacocoenosis has been studied in all its localities; its life cycle is currently under study both in the field and in the laboratory (Maltz 2006; Maltz, Pokryszko 2006), and the obtained information has made it possible to identify the main threat factor – ecological succession.

Macrogastra badia (C. Pfeiffer, 1828; Fig. 1D, 2) is an East-Alpine species with its main range in S. Bavaria and Austria and with very few isolated sites in Poland, in the Orlickie, Bystrzyckie and Stołowe Mts; only one of them has been recently confirmed – Zieleniec (2007: Wiktor, Maltz, Pokryszko unpublished data). It is a forest-dweller of deciduous and deciduous-coniferous stands. Although in the recently confirmed locality it is abundant, the species is threatened by random events and habitat destruction; none of its sites is in a protected area. Its life cycle is being currently studied in the laboratory.

Clausilia parvula (Férussac, 1807; Fig. 2) is a Central European species; in Poland found only in the Sudetes and the Cracow-Częstochowa Upland. It is a forest-dwelling petrophile and calciphile, living mostly in leaf-litter and among rock rubble, sometimes climbing rocks; in non-limestone areas it is associated with old castle ruins (Maltz 1999). It has always been rare and, apart from habitat destruction, it is difficult to envisage any definite threat factors. Its life cycle is being currently studied in the laboratory. The composition of its associated malacocoenosis has been studied in four sites (Maltz 1999; Pokryszko et al. 2004; Pokryszko, Cameron 2005; Pokryszko, Cameron unpublished data); four of them are nature reserves.

Balea perversa (Linnaeus, 1758; Fig. 1E, 2) is a West-European species of a rather large but much disjunct distribution range. In Poland it has a few scattered sites mainly in Lower Silesia and the Carpathian foothills. Regarded as a thermophile relict from the Atlantic Period, in our climatic zone it inhabits mainly castle ruins. The main threat factor is cleaning and renovation of old castles. Some aspects of its life history have been published (Baur 1990; Baur, Baur 1992), others are being currently studied. None of its localities is a nature reserve.

Helicodonta obvoluta (O. F. Müller, 1774; Fig. 1F, 2) is a Central-European species of disjunct distribution. In Poland, on its northern distribution border, it has several isolated localities in Lower Silesia, many of which support very small populations; only in two localities does it reach a high population density (Maltz 1999; 2003a). An inhabitant of natural forests, in our climatic zone it is dependent on large fragments of dead deciduous logs for egg-laying and hibernation. It is threatened by forest management. Its life history has been studied in detail (Maltz 2003b, c), making it possible to identify the main threat factor. The composition of its malacocoenoses has been studied in two sites with the largest populations (Wiktor 1972; Maltz 1999; Pokryszko, Cameron 2005; Pokryszko, Cameron unpublished data). The two largest populations are protected in nature reserves.

Table 2. Knowledge of life histories of red-listed, red-booked and protected species of Lower Silesia. Species discussed in this paper indicated in bold.

Species	Knowledge of life cycle	Source
Pyramidula rupestris	no data	
Vertigo angustior	population dynamics	Cameron 2003
Orcula doliolum	no data	
Vallonia enniensis	no data	
Vallonia declivis	no data	
Chondrula tridens	no data	
Discus perspectivus	complete	Kuźnik-Kowalska 2005
Semilimax kotulai	population dynamics	Umiński 1970, 1975, 1983
Semilimax semilimax	population dynamics	
Eucobresia diaphana	population dynamics	
Eucobresia nivalis	population dynamics	
Aegopinella epipedostoma	population dynamics; other aspects currently studied	Kuźnik-Kowalska 2006 and unpublished
Nesovitrea petronella	no data	
Oxychilus glaber	no data	
Daudebardia brevipes	no data	
Tandonia rustica	fragmentary, based on field observations	Wiktor 1989
Limax bielzi	no data	
Lehmannia macroflagellata	no data	
Bielzia coerulans	nearly complete	Smoleńska 1936; Wiktor 1989
Deroceras praecox	nearly complete	Wiktor 1989, Reise 1995; 2001
Cochlodina costata	no data	
Charpentieria ornata	currently studied	Maltz 2006; Maltz, Pokryszko 2006
Macrogastra badia	currently studied	Maltz unpublished
Macrogastra tumida	no data	
Clausilia parvula	currently studied	Maltz unpublished
Clausilia cruciata	no data	
Balea perversa	fragmentary, curently studied	Baur 1990; Baur, Baur 1992
Perforatella umbrosa	no data	
Trichia lubomirskii	no data	
Trichia unidentata	no data	
Helicodonta obvoluta	complete	Maltz 2003a; 2003b; 2003c
Helicigona lapicida	currently studied	Maltz unpublished
Causa holosericum	no data	

Helicigona lapicida (Linnaeus, 1758; Fig. 1G, 2) is a West- and Central-European species, with its eastern distribution border in Poland. Extinct in some parts of Poland, it still has scattered sites in the Cracow-Częstochowa Upland, Western Pomerania and the Sudetes. A forest-dweller (in the north of the country) and petrophile (in the south), it lives under

bark of deciduous tree trunks or on rock faces and in rock crevices. Its life history is being currently studied. It is mainly threatened by climatic changes (aridisation). The composition of the accompanying malacofauna has been studied in five Lower Silesian sites (Pokryszko 1984; Maltz 1999; Pokryszko et al. 2004; Maltz, Pokryszko 2006; Pokryszko, Cameron 2005; Maltz 2006; Pokryszko, Cameron unpublished data). It is protected in four nature reserves.

Causa holosericum (Studer, 1820; Fig. 2) is an Alpine species, with its northern distribution border in Poland where it inhabits the southernmost fringes and is rather rare. It is a montane snail, a forest-dweller preferring rocky substratum and living on the forest floor. Many of its populations seem to have a very low density. Threats, apart from habitat destruction, have not been identified. Nothing is known of the life history of the species. The composition of its malacocoenosis has been studied in three sites (Maltz 1999; Pokryszko, Cameron 2005; Pokryszko, Cameron unpublished data); it is protected in two nature reserves and in one of them is rather abundant.

Discussion

The terrestrial malacofauna of Poland includes 177 species (Riedel 1988; Wiktor 2004 and subsequent corrections: Horsák, Hájek 2005; Juřičková et al. 2005; Reise et al. 2005). The reason for its relative poverty is the Pleistocene glaciation, which, at its maximum, covered virtually the whole country. As a result, the fauna is composed mainly of widely distributed species, many of which have their distribution borders within Poland. Like in the remaining parts of Central Europe, numerous species are in various degrees endangered. The Red List of Endangered Animals in Poland (Wiktor, Riedel 2002) includes 75 species of snails and slugs, and according to a different list (Pawłowska, Pokryszko 1998), the number is even higher (88); thus the proportion of endangered species includes 42 - 50 % of the fauna. Published and unpublished life history and/or associated malacocoenoses data exist for 20 (ca. 23 %) of them, and in most cases are incomplete. The Polish Red Data Book of Animals (Głowaciński 2004) lists 20 species, all of which are also red-listed. The list of legally protected terrestrial molluscs in Poland [Rozporządzenie Ministra Środowiska 2004 (Decree of the Minister of Environment 2004)] includes 28 species, plus one with a legally restricted collecting period; paradoxically, two of them are neither red-booked nor red-listed, while seven are only red-listed. Of these 29 species, life history data exist only for nine, and reasonably complete life history data for two.

Several regions in Poland, such as the calcareous parts of the Carpathians and the Sudetes, and the primeval Białowieża Forest, have preserved especially rich terrestrial malacocoenoses (e.g. Cameron, Pokryszko 2004; Pokryszko, Cameron 2005; Cameron, Pokryszko 2006) with many endangered species. One of these areas is Lower Silesia in the south-west. In a broad sense it includes the Polish part of the Sudetes and the adjacent lowlands. Its malacological uniqueness has two reasons. One is its biogeographical position, as altogether 41 species have their distribution borders there (mostly eastern, north-eastern, northern and, for some Carpathian species, north-western (for distribution data see Riedel 1988; Wiktor 2004). The other is its partly mountainous character, combined with the presence of limestone. This has favoured preservation of pockets of rich natural forests (e.g. Wiktor 1959; 1964; 1972; Pokryszko 1984; Maltz 1999), and in places, castle ruin that now provide refuges for the malacofauna (Juřičková, Kucera 2005).

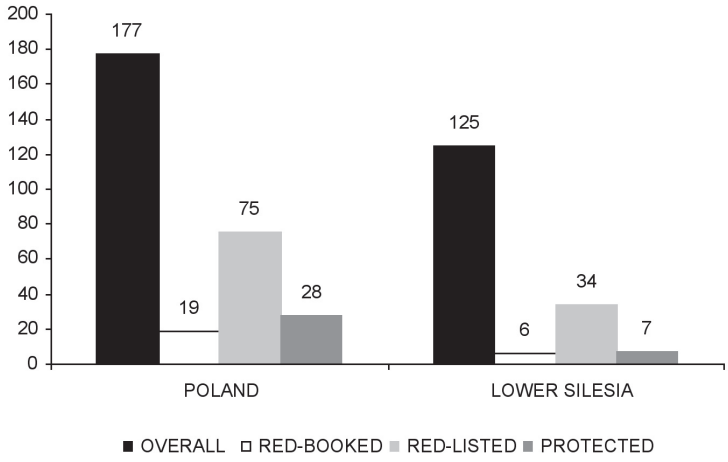

Fig. 3. Graph showing the total number of terrestrial gastropods, number of red-listed, red-booked and protected gastropod species in Poland and Lower Silesia.

Based on the literature, museum collections and unpublished data, in his 1988 catalogue Riedel listed 125 terrestrial gastropod species from Lower Silesia in a broad sense: lowland Lower Silesia plus the Sudetes. This list included more than 70 % of the entire Polish terrestrial malacofauna. However, subsequent verification of distribution data and/or identification revealed that not all of them were actually present in the discussed area. *Columella columella* (Martens, 1830) and *Vertigo arctica* (Wallenberg, 1858), earlier recorded from the Karkonosze Mts. (Wiktor, Wiktor 1968), actually occur only in the Tatra Mts (Pokryszko 1990). The record of *Cernuella neglecta* (Draparnaud, 1805) (Wiktor 1964) was most probably a case of misidentification (Juřičková et al. 2005), and the record of *Trichia plebeia* (Draparnaud, 1805) (Wiktor 1964) pertained to an extreme form of variation of *T. hispida* (Linnaeus, 1758) (Proćków 1997). Thirty four Lower Silesian species are red-listed (Wiktor, Riedel 2002); some are red-booked and/or legally protected (Głowaciński 2004; Rozporządzenie Ministra Środowiska 2004) (Fig. 2, Table 1). Among these, 16 that are rare and/or endangered, are found in various other localities in Poland, for 18 species Lower Silesia is important from a conservation viewpoint: six (*Eucobresia diaphana*, *Tandonia rustica*, *Cochlodina costata*, *Charpentieria ornata*, *Macrogastra badia*, *Helicodonta obvoluta*) have their only localities in Poland in that area, another ten (*Discus perspectivus*, *Eucobresia nivalis*, *Semilimax kotulai*, *S. semilimax*, *Aegopinella epipedostoma*, *Lehmannia macroflagellata*, *Bielzia coerulans*, *Deroceras praecox*, *Clausilia parvula*, *Causa holosericum*) have isolated localities there and otherwise are found in SE. Poland, and the localities of two (*Balea perversa* and *Helicigona lapicida*) outside Lower Silesia are very few and scattered.

Of the 18 above species, life histories are completely known for two, for another 12 the knowledge varies from nearly complete (two species) to very fragmentary and/or they are being studied (five species). The threat factors have been identified for 12 species, partly or wholly, and one has been reported as not being endangered in Lower Silesia. Three of the 12 cases (*Discus perspectivus*, *Charpentieria ornata*, *Helicodonta obvoluta*) provide good examples of the importance of life history studies for identifying the most

important threat factors and/or critical stages in the life cycle. The main threat to *Discus perspectivus* and *Helicodonta obvoluta* is removal of dead timber; the critical stages in the life cycle are egg-laying, incubation, and hibernation, all requiring the presence of rotting deciduous wood (Maltz 2003a, b; Kuźnik-Kowalska 2005). In the Silesian part of its range, *Charpentieria ornata* is a species of habitats of intermediate succession stages and thus is threatened by forest succession, shown in a recent detailed study on its ecology (Maltz 2006). The composition of the accompanying malacofauna in at least some Lower Silesian sites has been systematically studied for 13 species; only data from random observations exist for the remaining five. The malacocoenoses of which these species form a part are very rich, with species richness ranging from 35 to 45 (Maltz 2003a; Pokryszko, Cameron 2005; Pokryszko et al. 2005; Maltz 2006), thus being comparable to the richest malacocoenoses of primeval forests (Cameron, Pokryszko 2004; Pokryszko, Cameron 2005; Cameron, Pokryszko 2006). Indeed, 14 of the 18 conservationally important species are strict forest-dwellers with distribution limited to the remaining patches of natural forests. Such patches can be indetified based on the species richness of their malacocoenoses. Wherever possible, these patches should be excluded from forest management. Fourteen species are protected in one to four nature reserves (mainly floristic), and the localities of four occur outside protected areas. Fifteen species have one to four healthy populations in Lower Silesia, although one species (*Charpentieria ornata*) is critically endangered. The only Silesian population of *Bielzia coerulans* shows a very low density, and there are no recent estimates for the remaining two species. The following species should be regarded as conservation-priority species in Lower Silesia: *Discus perspectivus*, *Cochlodina costata*, *Charpentieria ornata*, *Macrogastra badia*, *Balea perversa* and *Helicodonta obvoluta*. Two of them (*Discus perspectivus*, *Helicodonta obvoluta*) have been studied with respect to their life cycles, three (*Charpentieria ornata*, *Balea perversa* and *Macrogastra badia*) are being studied, and nothing is known about *Cochlodina costata*. Future research should focus on the ecology and life cycles of the remaining four species, and legislation should aim at improving the conservation status of *Charpentieria ornata*, *Macrogastra badia* and *Balea perversa*. Active protection measures should include preventing forest succession in the localities of *Charpentieria ornata*.

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Reti un apdraudēti zemes gliemeži Lejassilēzijā (dienvidrietumu Polijā) – pašreizējais stāvoklis un perspektīvas

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Kopsavilkums

Polijas zemesgliemežu faunā ir 177 sugas, no kurām 18 ir introducētas. Daudzu sugu izplatības robežas šķērso Polijas teriotiju, lielākā šādu robežu koncentrācija (41 sugai) ir atrodama Lejassilēzijā (Silēzijas zemiene un Sudeti). Šis apgabals ir ievērojami pārveidots saimnieciskās darbības rezultātā, tāpēc ir nepieciešams aizsargāt, bet, pirmām kārtām, izpētīt tās molusku sugas, kuras ir lokāli vai globāli svarīgas no saglabāšanas viedokļa: *Discus perspectivus* (Megerle von Mühlfeld, 1818), *Eucobresia diaphana* (Draparnaud, 1805), *E. nivalis* (Dumont et Mortillet, 1852), *Semilimax kotulai* (Westerlund, 1883), *S. semilimax* (Férussac, 1802), *Aegopinella epipedostoma* (Fagot, 1879), *Tandonia rustica* (Millet, 1843), *Lehmannia macroflagellata* Grossu et Lupu, 1962, *Bielzia coerulans* (M. Bielz, 1851), *Deroceras praecox* Wiktor, 1966, *Cochlodina costata* (C. Pfeiffer, 1828), *Charpentieria ornata* (Rossmässler, 1836), *Macrogastra badia* (C. Pfeiffer, 1828), *Clausilia parvula* (Férussac, 1807), *Balea perversa* (Linnaeus, 1758), *Helicodonta obvoluta* (O. F. Müller, 1774), *Helicigona lapicida* (Linnaeus, 1758) un *Causa holosericum* (Studer, 1820). Katrai uzskaitītajai sugai doti pašreizējie dati par vietējo un tālāko izplatību, apdzīvotajiem biotopiem un zināšanu stāvokli par dzīves ciklu. Iezīmēti arī tālāko pētījumu virzieni un darbības, kas nepieciešamas saglabāšanai.