MALAKOLOGISCHE ABHANDLUNGEN

Staatliches Museum für Tierkunde Dresden

Band 19 | Ausgegeben: 15. Dezember 1999 | Nr. 24

# Shell anomalies and regenerations in some snail species (Gastropoda: Pulmonata)

With 17 figures

MARIA JACKIEWICZ, ELŻBIETA KORALEWSKA-BATURA & ANDRZEJ LESICKI

Abstract. The authors discuss atypical shell structures found in snails of the families Lymnaeidae, Planorbidae, Clausiliidae and Helicidae. The described anomalies concern abnormal coiling of a shell, specially of its youngest whorls, and various whorl malformations. Several malformations are results of the shell regeneration after mechanical damages.

Kurzfassung. **Anomalien und Regenerierung der Gehäuse bei einigen Schneckenarten (Gastropoda: Pulmonata).** – Die Autoren besprechen den untypischen Bau der Gehäuse einiger Schneckenarten aus den Familien Lymnaeidae, Planorbidae, Clausiliidae und Helicidae. Die beschriebenen Anomalien betreffen abnorme Gewinde der Gehäuse, vor allem der jüngsten Umgänge, und verschiedene Deformationen der Windungen. Einige Abnormitäten sind das Ergebnis der Regenerierung der Gehäuse nach mechanischen Beschädigungen.

## Introduction

Atypically built shells are quite a frequent phenomenon among snails. Malformations of different types have been known since a long time. Several papers have described shells with abnormally coiled or malformed whorls (DROZDOWSKI 1962, JACKIEWICZ 1972) as well as shells with doubled apertures (BOETTGER 1944, JACKIEWICZ 1965). There are known shells of uncoiled spire (DROZDOWSKI 1962, JACKIEWICZ 1972, KOVANDA 1956, URBAŃSKI 1985, WŁOSIK & MUSIAŁ 1983). Sinistrally coiled shells of species with usually dextrous shells are a specially interesting type of anomalies (DROZDOWSKI 1962, KORALEWSKA-BATURA 1997, MEISENHEIMER 1912, URBAŃSKI 1963).

Among materials elaborated by us, there are shells with different malformations, especially of the youngest whorls, with deformed apertures, and also with partially or completely untwisted whorls. Moreover, there are shells with sealed up losses which have been caused by mechanical damages.

## Material and methods

Atypically formed shells of the below mentioned species have all but one been collected in Poland and originated from the following localities: *Lymnaea* (*Lymnaea*) *stagnalis* (L.) –

Addresses of the authors:
Prof. dr hab. Maria Jackiewicz, Department of Animal Taxonomy and Ecology, Institute of Environmental Biology, A. Mickiewicz University, Szamarzewskiego 91A, 60-569 Poznań (Poland)
Dr Elżbieta Koralewska-Batura, Department of General Zoology, Institute of Environmental Biology, A. Mickiewicz University, Fredry 10, 61-701 Poznań (Poland)
Prof. Dr hab. Andrzej Lesicki, Department of Animal Physiology, Institute of Experimental Biology, A. Mickiewicz University, Fredry 10, 61-701 Poznań (Poland)

4 specimens, a pond in Dębiec near Poznań, 1989–1993, leg. M. Jackiewicz; *Lymnaea* (*Radix*) *peregra* (O. F. MÜLL.) – 2 specimens, a small pond in the Botanical Garden at Poznań, 06.06.1995, leg. M. Jackiewicz; *Lymnaea* (*L.*) *stagnalis* (L.) – a water frog culture, Jaskółki near Ostrów Wielkopolski, 1995, leg. L. Berger; *Armiger crista* f. *nautileus* (L.) – 3 specimens, culture basins at the Department of Agriculture Biology at Poznań, 1985, leg. E. Koralewska-Batura; *Macrogastra badia* (C. PFR.) – bridge over limestone, Bärenthal, Carinthia (Austria), 23.08.1994, leg. W. Fischer; *Ruthenica filograna* (ROSSM.) – Karpień castle ruins on Karpiak Mount near Lądek Zdrój, 27.09.1994, leg. A. Lesicki; *Alinda biplicata* (MONT.) – rocks near Smocza Jama, Wawel Castle, Kraków, 05.06.1996, leg. A. Lesicki; *Macrogastra plicatula* (DRAP.) – a slope near a stream at Dolina Białego Valley, Zakopane, 07.06.1996, leg. A. Lesicki; *Laciniaria plicata* (DRAP.) – under a piece of wood near a gold mine at Złoty Jar, 26.06.1996, leg. A. Lesicki; *Helicella obvia* (MENKE) – a stone-pit Wietrznia Mount at Kielce, 19.10.1993, leg. P. Degórski. All shells of the above species are presented in photographs.

## Results and discussion

The shell of *Lymnaea* (*Radix*) *peregra* (O. F. MÜLL.) represents an exceptional type of the last whorl malformation. At the beginning, the shell have been developed in a normal way. In the middle of the last whorl, growth bands abruptly become longer and more convex. This results in a large fault between the typically developed initial part of the shell and the more expanded final part (Fig. 1). It also causes a protrusion of the aperture upwards, so it is raised slightly over the apex (Fig. 1).

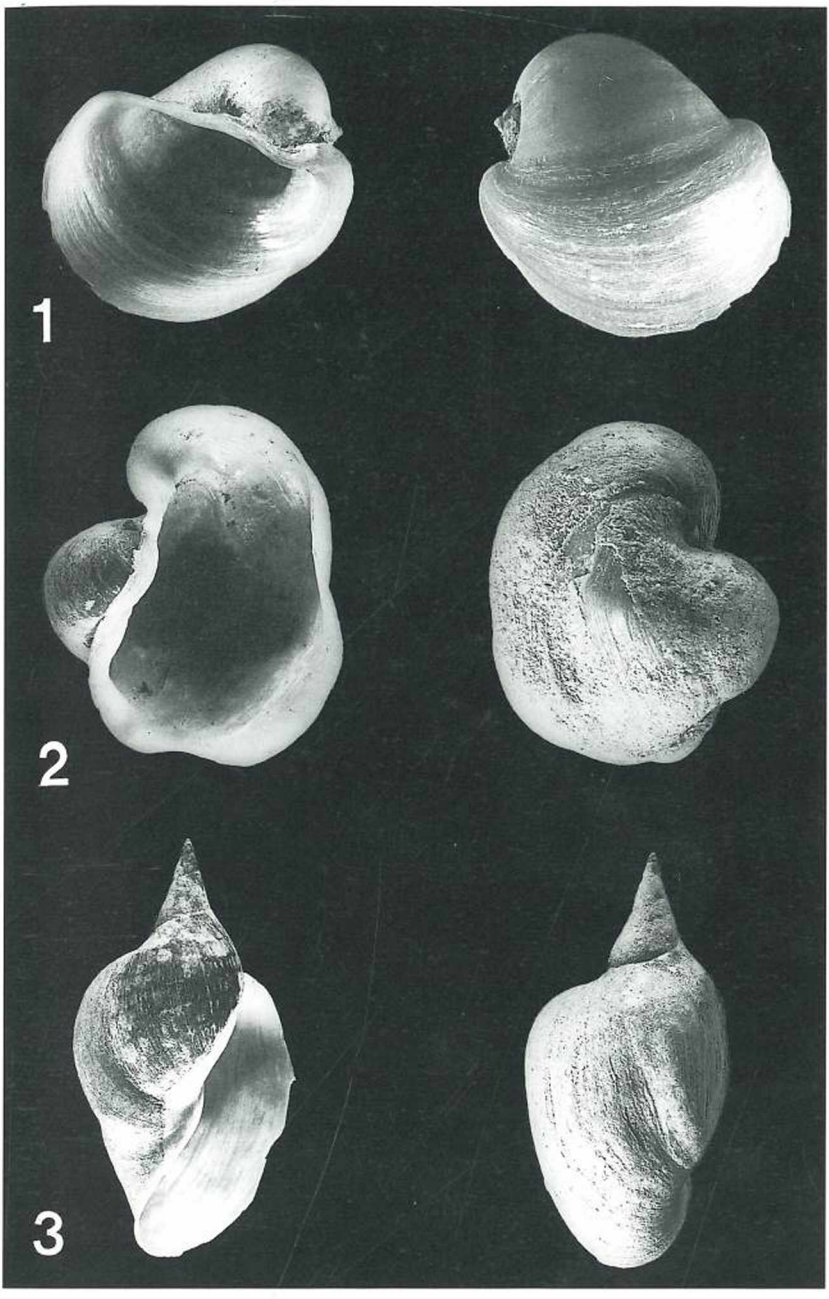
The other shell of *Lymnaea* (*Radix*) *peregra* (O. F. MÜLL.) contains much enlarged last whorl. Its aperture is also very large and irregular in outline, $^1/_3$ of the aperture protrudes over the shell apex (Fig. 2). The external surface of the last whorl is greatly plicate. The atypical structure of this shell has been caused by mechanical damage of which traces are still visible on the surface (Fig. 2).

Different malformations of the last whorl are also visible in three shells of *Lymnaea* (*Lymnaea*) *stagnalis* (L.). One of those shells is characterized by an excessively large elliptically extended aperture. Its aperture height to the spire height ratio is 3 : 1 (Fig. 3). It is usually 1 : 1 in typical specimens. Moreover, at about $^1/_3$ of the last whorl, its wall brings out in relief, like a big pouch running across the whorl (Fig. 3). This pouch as well as the afterward part of the whorl are of a lighter colour than the other whorls. There is no trace giving any evidence that the anomaly has been caused by damage.

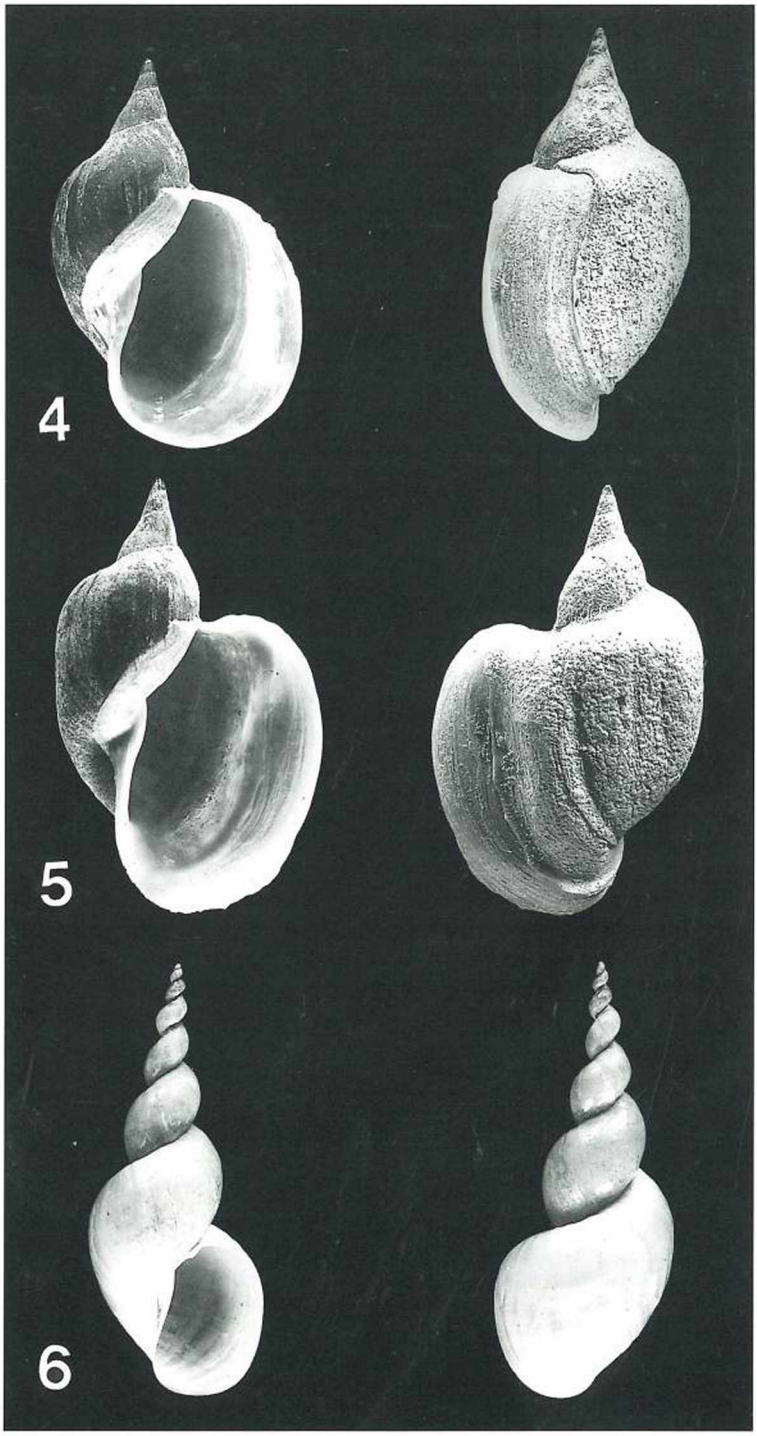
The next shell of the same species also has an overgrown near-apertural part which is greatly turned inside out. This has resulted in a very large wide aperture which is round in outline. The ratio of its height to the spire height is 2 : 1 (Fig. 4). The aperture resembles in its shape shell apertures of some forms of *Lymnaea* (*Radix*) *peregra* (O. F. MÜLL.) and *Lymnaea* (*Radix*) *auricularia* (L.). The greatly turned inside out part of the shell looks like a wide band when is seen from the outside. It is quite different in structure and colours than the rest (Fig. 4). This anomaly probably was not caused by mechanical damage.

The last shell of *Lymnaea* (*Lymnaea*) *stagnalis* (L.) has a greatly extended near-apertural part of the last whorl. The aperture is very big, wide and ovate. The ratio of its height to the spire height is 2 : 1 (Fig. 5). Moreover, there are some folds on the outside surface of the last whorl, running transversely that is parallel with the aperture margin. The nearest fold to the aperture margin is the longest and widest one (Fig. 5).

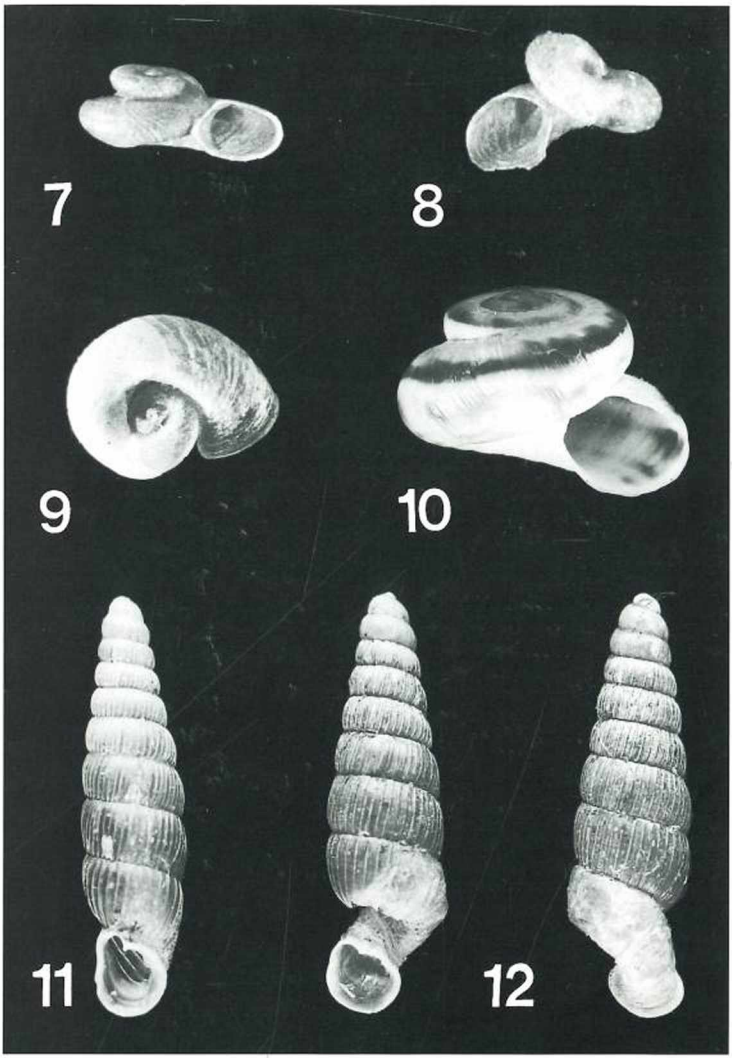
A very attractive, severely uncoiled shell of *Lymnaea* (*Lymnaea*) *stagnalis* (L.) is worthy of special notice among atypically developed lymnaeid shells. This shell is relatively narrow and very slender. It is built of seven whorls. Each of them is exceptionally convex. They are very loosely coiled. Therefore the suture separating particular whorls is very deep. In com-




Figs 1–3: Atypical shell structure: 1, 2 – *Lymnaea (Radix) peregra* (O. F. MÜLL.); 3 – *Lymnaea* (*Lymnaea*) *stagnalis* (L.).




Figs 4–6: Atypical shell structure of *Lymnaea* (*Lymnaea*) *stagnalis* (L.).

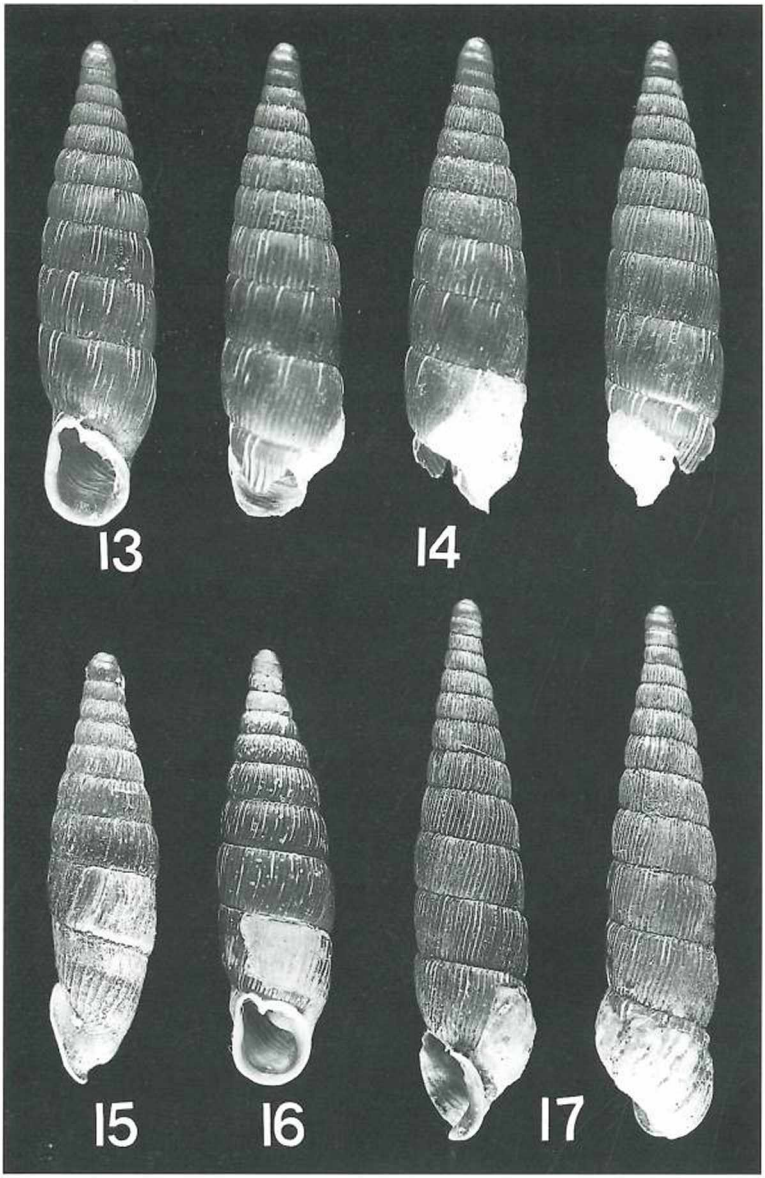



Figs 7–12: Atypical shell structure: 7–9 – *Armiger crista* f. *nautileus* (L.); 10 – *Helicella obvia* (MENKE); 12 – *Ruthenica filograna* (ROSSM.) (11 – a typically built shell of this species, found at the same locality, is shown for comparison).

parison with typical shells, its aperture height is much lower than the half of the shell height (Fig. 6).

Our attention was also called to three specimens of *Armiger crista* f. *nautileus* (L.), each with more or less uncoiled spire. The shell of one from them (Fig. 7) is not, as it usually is, coiled in one plane. Therefore its whorls lie one above the other, so they are arranged in steps.

First two whorls of the second shell (Fig. 8) are coiled in a right way. However, the third whorl, in the middle, loses its contact with previous whorls. It runs independently down to




Figs 13–17: Atypical shell structure: 14 – *Alinda biplicata* (MONT.) (13 – a specimen of a typical shell, found at the same locality, is shown for comparison); 15 – *Macrogastra plicatula* (DRAP.); 16 – *Macrogastra badia* (C. PFR.); 17 - *Laciniaria plicata* (DRAP.).

the bottom of the shell. Moreover, in comparison with the typical specimens, this shell is turned left.

The third whorl of the last planorbid shell (Fig. 9) is raised up over the previous whorls. A narrow slit has been created between them. The final part of this whorl adheres to the shell again.

Anomalies of a shell structure of snails from the family Clausiliidae are relatively frequent and have already been analysed in details (ROTARIDES & SCHLESCH 1951, JACKIEWICZ 1965). These authors selected 6 types of clausiliid shell anomalies. The anomalies presented below may be attributed to two from the above types.

The shell of *Ruthenica filograna* (ROSSM.) with an uncoiled terminal part is the most interesting one (Fig. 12). It is a rarer anomaly among those found in clausiliids (JACKIEWICZ 1965) and has been not described in this species up to now. The shell is of 8 typically coiled whorls. An injury occurred within the eight whorl and it comprised a shell columella, as well. The snail built further this whorl, however, completely uncoiled and with a smaller diameter. The whorl is finished with an atypical aperture missing all lamellae. The surface of the whorl is without regular ribs, usually visible on typical shells (Fig. 11) and is lighter in colour than the rest of the shell.

The other atypical clausiliid shells may be attributed to the malformation type created by a regeneration of damaged whorls and aperture (JACKIEWICZ 1965).

Tenth and eleventh whorl were damaged in the shell of *Alinda biplicata* (MONT.). An atypical aperture, without lamellae, has been created during the regeneration. It is partially surrounded with a weakly developed labrum. The other part of the aperture is formed by the remains of the eleventh whorl. The regenerated shell surface is without any ribs and is white in colour (Fig. 14). It is much different than the surface of the previous whorls, which are similar to the typical shell (Fig. 13).

Last two whorls were damaged in the shell of *Macrogastra plicatula* (DRAP.) (Fig. 15). They have been rebuilt and finished with a typical aperture. The regenerated part is of a lighter colour and is weaker ribbed than the rest of the shell.

The last whorl of the *Macrogastra badia* (C. PFR.) shell was damaged (Fig. 16). The initial part of the reconstructed shell is of light shade and has no ribs. However, the further part and the aperture have been built as in typical specimens.

A partially damaged last shell whorl of *Laciniaria plicata* (DRAP.) preserved some parts lying close to the previous whorl as well as some parts of the aperture with its labrum and lamellae. The snail have rebuilt the missing part of the shell, however, the aperture has not been completely regenerated (Fig. 17). The regenerated part of the whorl is of a lighter colour and is without ribs.

The shell of *Helicella obvia* (MENKE) is also worthy of notice. Its first four whorls are coiled typically. Moreover, the fifth whorl is initially coiled correctly. Suddenly, it is shifted down, moving aside from the previous whorl. A stepping fault is created between them in this way (Fig. 10).

Lymnaeid shells with completely uncoiled spire occur relatively seldom. Malformations of the last whorl as well as atypical depositions of growth bands on the adapertural shell part, with lighter colours than the rest of the shell, are more frequent anomalies. The presented shells of *Lymnaea* (*R.*) *peregra* and *Lymnaea* (*L.*) *stagnalis* contain such atypical endings of their last whorls.

There were 3 specimens with an uncoiled last whorl among 730 collected specimens of *Armiger crista* f. *nautileus*. This is quite a frequent phenomenon for this species (PIECHOCKI 1979). Shell anomalies also very frequently occur among other species of the family Planorbidae (DROZDOWSKI 1962).

Atypically built shells, specially those regenerated after mechanical damages, can be more often found in clausiliids than in other snails. It is probably connected with habitat of their life. Rocks, screes, stones may favour damages of their subtle, slim shells.

The presented shell anomaly of the *Helicella obvia* recalls the uncoiled shell forms of *Armiger crista* f. *nautileus* and other planorbid species (DROZDOWSKI 1962). Abnormal shell structures have not been often noted for the family Helicidae.

## References

BOETTGER, C. (1944): Basommatophora. In: GRIMPE, G. & E. WAGLER (Hrsg.), Die Tierwelt der Nord- und Ostsee, **5**. Leipzig.

DROZDOWSKI, A. (1962): Anomalie w budowie muszli u niektórych wodnych ślimaków płucodysznych. – Przegl. zool., Wrocław **6**: 240–241.

JACKIEWICZ, M. (1965): Regeneracja i anormalności skorupek świdrzyków (Mollusca, Clausiliidae). – Pr. Kom. biol. Pozn. TPN, Poznań **31**: 1–31.

JACKIEWICZ, M. (1972): Anormalności w budowie skorupki niektórych mięczaków wodnych. – Przegl. zool. Wrocław **16**: 95–98.

KORALEWSKA-BATURA, E. (1997): Sinistrally coiled specimen of *Helix lutescens* Rossmässler, 1837 (Gastropoda: Stylommatophora: Helicidae). – Malak. Abh. Mus. Tierkd. Dresden **18**: 233–237.

KOVANDA, J. (1956): O skalaridnich a anomálnich formách ulit některých našich plžů – Vesmir, Praha **35**: 139–141.

MEISENHEIMER, J. (1912): Die Weinbergschnecke *Helix pomatia* L. – Monographien einheimischer Tiere, Leipzig **6**: 1–140.

PIECHOCKI, A. (1979): Mięczaki (Mollusca). – Fauna słodkowodna Polski. Pt. 7. PWN, Warszawa.

ROTARIDES, M., SCHLESCH, H. (1951): Regeneration of the shell and related phenomena in the family Clausiliidae. – Acta Biol. Acad. Sci. Hung. **2**: 55–117.

URBAŃSKI, J. (1963): Ślimak winniczek *Helix pomatia* L. – jego systematyka, biologia, znaczenie gospodarcze i ochrona. – Ochr. Przyr. **29**: 215–254.

URBAŃSKI, J. (1985): Mollusca – mięczaki. In: Zoologia, bezkręgowce (GRABDA, E., ed.), vol. I, part 3, pp. 621–921. PWN, Warszawa.

WŁOSIK. E. & MUSIAŁ, J. (1983): Lewoskrętna i wieżyczkowate muszle u ślimaka winniczka (*Helix pomatia* L.). – Pr. Kom. biol. Pozn. TPN, Poznań **46**: 53–57.

(Received on April 6, 1998)