Malacologica Bohemoslovaca (2018), 17: 31–34
ISSN 1336-6939

Ordinary offspring of scalariform *Cornu aspersum* (O. F. Müller, 1774) partners

Jiří X. Doležal[1] & Lucie Juřičková[2]

[1]*Journal Reflex, Czech News Centre, Komunardů 42, CZ-17000 Praha 7, Czech Republic, www.reflex.cz, e-mail: jxd@jxd.cz*
[2]*Charles University in Prague, Faculty of Science, Department of Zoology, Viničná 7, CZ-12844 Praha 2, Czech Republic, e-mail: lucie.jurickova@seznam.cz*

Doležal J. X. & Juřičková L., 2018: Ordinary offspring of scalariform *Cornu aspersum* (O. F. Müller, 1774) partners. – Malacologica Bohemoslovaca, 17: 31–34. Online serial at <http://mollusca.sav.sk> 14-Nov-2018.

From a clutch of scalariform specimens of *Cornu aspersum* (O. F. Müller, 1774) 53 ordinary shaped juveniles were hatched. This observation supports the hypothesis about a terratological origin of scalariform shells.

Key words: gastropod shell, scalariform snails, breeding

Introduction

A regular growth of mollusc shells is probably a subject of mechanical effect of "road-holding program" (Hutchinson 1989). The curved areas of shell dictate the path of growth of the subsequent whorl, while keel, keel-like structures or some shell damage can strongly affect this process (Hutchinson 1989, Checa et al. 1998). Scalariform or scalarimorph, in other words corkscrew-like shapes of snail shells used to be considered terratological forms, caused by a damage that disrupt this programme during early development of a juvenile. The injury caused by parasites may also be the cause of scalariformity (Oldham 1931), as well as ecological stress (Zuykov et al. 2011, 2012, Clewing et al. 2015).

Even though scalariformity is usually interpreted as sporadic phenomena within a species regular morphological range (e.g. Geyer 1927, Boettger 1949), some scalarid-like forms of freshwater snails were fixed as endemic species. Such freshwater snails occur especially in ancient lakes like Ohrid (Hauffe et al. 2010), Baikal (Sitnikova et al. 2001), and Titicaca (Kroll et al. 2012), or in some exposed lakes like those of Tibetan Plateau, interpreted as ecophenotypic response to ecological stress (Clewing et al. 2015).

Within land snails, scalariform shells were also rarely observed (e.g. Geyer 1927, Kovanda 1956). Błoszyk et al. (2015) found two scalariform specimens of *Helix pomatia* among 15,000 normal individuals, which clearly characterises the rarity of this phenomenon. The most reports of these abnormalities concentrated among helicids (e.g. Geyer 1927, Schilder & Schilder 1953, Mitov et al. 2003, Horsák et al. 2013, Błoszyk et al. 2015 and many others), probably as a bias of their size.

During the laboratory breeding of freshwater snail *Biomphalaria glabrata*, scalariform individuals arose relatively frequently and the author interpreted it as an effect of both polygeny inheritance and an injury during the development (Richards 1971). This is, as far as we know, the only report about reproduction of these unusual snail forms. That is why we presented here the results of indoor breeding of *Cornu aspersum* (O. F. Müller, 1774) scalariform specimens.

Material and method

We used specimens obtained from several commercial breeding farms in EU. Our breeding was founded from ten scalariform specimens of *Cornu aspersum* during the end of July 2018 (Table 1, Figs 1, 2). Snails were breed in plastic boxes 30×40×25 cm on 6 cm deep moisten Lignocel substrate (shredded coconut fibers). Breeding temperature was 24 °C, humidity around 80%, snails lived in darkness or semi-darkness. Snails were fed on cucumber with addition of calcium carbonate.

Table 1. Sizes (in mm) of scalariform specimens of *Cornu aspersum* (O. F. Müller, 1774) from our breeding group (unsupported private purchase of the first author from commercial snail farms in Ireland and Greek). Whorl space is the distance between the top of the body whorl and the top of subsequent whorl.

Specimen	Height of shell	Width of shell	Whorl space
1	46	33	14
2	34	30	14
3	32	28	15
4	35	26	13
5	36	30	17
6	32	29	15
7	37	26	15
8	31	28	14
9	33	34	16
10	34	28	13

Fig. 1. The typical scalariform specimen of *Cornu aspersum* from our breeding group. All photos by J. X. Doležal.

Results and discussion

The clutch of 61 eggs was laid on the 18th September 2018 – six weeks after the establishment of the breeding group. The first hatchlings were found on the 7th October 2018. All juveniles of the clutch had a normal shaped shell (Figs. 3, 4, 5), 53 of them survived. Our breeding confirms generally accepted opinion that there is no inheritance of scalariform shell deformity in land snails. Our breeding experiment confirms also the ability of scalarid individuals to reproduce.

References

Błoszyk J., Kalinowski T., Książkiewicz Z. & Szybiak K., 2015: New data on sinistral and scalariform shells among roman snail *Helix pomatia* Linnaeus, 1758 in Poland. – Folia Malacologica, 23: 47–50.

Boettger C. R., 1949: Über das Auftreten einer erheblichen Schalenabweichung bei einer Posthornschnecke [About the occurrence of a significant shell deviation in *Planorbarius corneus*]. – Abhandlungen der Braunschwierger Wissenschaftliche Gesselschaft, 1:1–7. (in German).

Clewing C., Riedel F., Wilke T. & Albrecht Ch., 2015: Ecophenotypic plasticity leads to extraordinary gastropod shells found on the "Roof of the World". – Ecology and Evolution, 5(14): 2966–2979.

Checa A. G., Jiménez-Jiménez A. P. & Rivas P., 1998: Regulation of spiral coiling in the terrestrial gastropod *Sphincterochila*: An experimental test of the road-holding model. – Journal of Morphology, 235(3): 249–257.

Geyer D., 1927: Unsere Land- und Süsswasser-Mollusken [Our land and freshwater molluscs]. – K.G. Lutz Verlag, Stuttgart, 224 pp. (in German).

Hauffe T., Erõss Z., Albrecht C. & Schreiber K., 2010: *Gocea ohridana*. – The IUCN Red List of Threatened Species 2010: e.T155653A4815465. http://dx.doi.org/10.2305/IUCN.UK.2010-4.RLTS.T155653A4815465.en, accessed November 11, 2018.

Horsák M., Juřičková L. & Picka J., 2013: Molluscs of the Czech and Slovak Republics. – Nakladatelství Kabourek, Zlín, 264 pp.

Hutchinson J. M. C., 1989: Control of gastropod shell shape; the role of the preceding whorl. – Journal of Theoretical Biology, 140(4): 431–444.

Kovanda J., 1956: O skalaridních a anomálních formách ulit některých našich plžů [About scalariform and anomalous forms of shells of some of our gastropods]. – Vesmír, 35(4): 139–141. (in Czech).

Kroll O., Hershler R., Albrecht Ch., Terrazas E. M., Apaza R., Fuentealba C., Wolff Ch. & Wilke T., 2012: The endemic gastropod fauna of Lake Titicaca: correlation between molecular evolution and hydrographic history. – Ecology and Evolution, 2: 1517–1530.

Mitov P., Dedov I. & Stoyanov I., 2003: Teratological data on Bulgarian Gastropoda (Mollusca). – Linzer Biologische Beiträge, 35(1): 263–272.

Oldham C., 1931: Some scalariform examples of *Arianta arbustorum* infested by parasitic mites. – Proceedings of the Malacological Society, 19(5): 240–242.

Richards Ch. S., 1971: *Biomohalaria glabrata* genetics: Spire formation as a subletal character. – Journal of Invertebrate Pathology, 17(1): 53–58.

Sitnikova P., Röpstorf P. & Riedel F., 2001: Reproduction, duration of embryogenesis, egg capsules and protoconchs of the family Baicaliidae (Caenogastropoda) endemic to Lake Baikal. – Malacologia, 43: 59–85.

Schilder F. A. & Schilder M., 1953: Die Bänderschnecken. Eine Studie zur Evolution der Tiere [*Cepaea* snails. A study on evolution of animals]. – Fischer Verlag, Jena. 206 pp. (in German).

Zuykov M., Vinarski M., Pelletier E., Demers S. & Harper D. A. T., 2012: Shell malformations in seven species of pond snail (Gastropoda, Lymnaeidae): analysis of large museum collections. – Zoosystematics and Evolution, 88(2): 365–368.

Zuykov M., Gudkov D., Vinarski M., Pelletier E., Harper D. A. T. & Demers S., 2011: Does radioactive contamination affect the shell morphology of the pond snail *Lymnaea stagnalis* in the exclusion zone of the Chernobyl NPP (Ukraine)? – Environmentalist, 31: 369–375.

Fig. 2. Scalariform specimens of *Cornu aspersum* from our breeding group in the breeding box.

Fig. 3. The normal shaped offspring of scalariform *Cornu aspersum* two days after hatching.

Fig. 4. The normal shaped offspring of scalariform *Cornu aspersum* with a parent specimen six weeks afterhatching.

Fig. 5. The normal shaped offspring of scalariform *Cornu aspersum* nine weeks after hatching.