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Short Communication

On Formation of Ephippium in *Wlassicsia Pannonica Daday*, 1904 (*Crustacea, Cladocera*)

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Abstract

During transition to gamogenesis in females of *Wlassicsia pannonica* an outer layer of shell chitin thickens slightly and the inner layer becomes much thicker locally and acquires similarity with honeycomb-like chitin covering outer part of shells of ephippium in *Daphniidae* and *Moinidae*. In interpretation of [1] *Macrothricinae* is a polyphyletic group as the process of ephippium formation in its representatives differs significantly.

Keywords: *Wlassicsia pannonica*; *Crustacea*; *Cladocera*; *Macrothricinae* ephippium

Introduction

Histological studies of cladocerans allow finding details of ephippium formation that are impossible to be uncovered using other methods, specify the idea on species relation degree and enhance the taxonomy of these crustaceans. Initial form of ephippium was shell's leaflets chitin which does not differ from chitin of parthenogenetic females. Such ephippium is still present in *Bosminidae* [2] and in *Ophryoxus gracilis* [3]. Chitin formed by the outer leaf has changed comparing with the initial one in *Daphniidae* [4-6], *Moinidae* and *Bunops serricaudata* [3]. Chitin formed by the inner leaf has changed in *Streblocerus serricaudatus* and *Drepanotrix dentata* (*Macrothricidae*) [3]. Hypoderma of other body parts takes part in ephippium formation in some species. Chitin covering dorsal side of the body became part of the ephippium in *Chydoridae* [7,8], while in *Lathonura rectirostris* ephippium is formed by the chitin of rectum and post abdomen [9,10]. Sticky mucus serving the purpose of attaching ephippium to underwater objects is discharged by the inner leaf of the shell's hypoderma under the chitin inlaying the brood chamber from the inside [11,12] in *Acantholeberis curvirostris*. Aim of the present study was to examine the formation of ephippium in *Wlassicsia pannonica (Macrothricidae)*.

Material and Methods

W. pannonoca were found in the splash zone of Dofinovsky estuary of the Black Sea and bred in the laboratory. They were fed with commercial baker's yeast and Chlorella. Fixation was performed using Bouin's fluid. Paraffin sections (7μ) were stained in haemotoxyline according to Heidenhain.

Results and Discussion

Transversal sections of following types of females are given on figures: parthenogenetic (Figure 1A), in transition from parthenogenesis to gamogenesis (Figure 1B) and two gamogenetic ones (C,D). Eggs are still in the ovaries in one of the gamogenetic females (Figure 1(C5)) and in the brood pouch in the other (Figure 1(D2)). Stages of ephippium formation are shown on (Figures 1(B→C→D)). It is seen that outer chitin has exfoliated (Figure 1(B3, C3, D3)). It is significantly thicker than in the parthenogenetic female (Figure 1A) where it is adjoined to the hypoderm and therefore almost invisible on the section. Chitin covering the shell's leafs from the inside is structured resembling honeycombs in gamogenetic females (Figure 1(B4, C4, D4)). Similar structure is seen in *Daphniidae* [4-6] and *Moinidae* [3] ephippium chitin, however it is not the inner chitin which is structured but the outer one. As the molt approaches inner chitin of *W. pannonica* thickens (Figure 1(B4→C4→D4)). Ephippium has brown color. It usually contains two eggs. Ephippia sink. Unlike *Chydoridae* and some *Macrothricoidea*, *W. pannonica* does not glue them to underwater objects.

The above stated contradicts with [1] thoughts who united *Drepanothrix*, *Streblocerus*, *Wlassicsia* and *Bunops* genera into *Macrothricinae* group. Cellular chitin is on the inside in *W. pannonica* while in *B. serricaudata* it is one the outside [3]. In *D. dentata* and *S. serricaudatus* the inner chitin is also thickened like in *W. pannonica* but it is unstructured, adhesive and serves the purpose of gluing the ephippium to underwater objects [3]. Differences in ephippium structure in *W. pannonica, B. serricaudata, D. dentata*

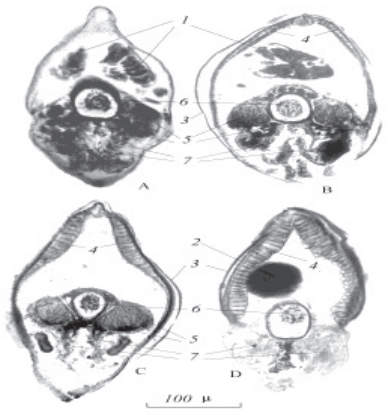

Figure 1: Transverse sections of *Wlassicsia pannonica*, demonstrating formation of ephippium in this species. A-parthenogenetic female, B-female turning from parthenogenesis to gamogenesis, C, D-gamogenetic females; 1- parthenogenetic embryos in a brood pouch, 2-latent egg in a brood pouch, 3-amorphic outer chitin exfoliated from the hypoderma, 4-structured chitin lining an inside part of a brood pouch, 5-ovaries, 6-gut, 7-legs.

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and S. serricaudatus are as big as they are between *Daphniidae and Chydoridae*, for instance. *Macrothricinae* as it is thought of by Dumont and Silva-Briano include representatives of at least three long diverged phylogenetic lines: first-*Wlassicsia*, second-*Streblocerus* and *Drepanotrix*, third-*Bunops*. The ephippium is similar in *Streblocerus* and *Drepanotrix* [3]. The system of *Macrothricinae* by [1] is based upon the results of studies of parthenogenetic females. However, gamogenetic females possess features important from the taxonomic point of view, absent in parthenogenetic females and they should be considered.

References

1. Dumont HJ, Silva-Briano M. A reclassification of the anomopod families *Macrothricidae* and *Chydoridae*, with the creation of a new suborder, the *Radopoda (Crustacea: Branchiopoda)*. Hydrobiologia. 1998; 384: 119-149.
2. Makrushin AV. Resistance to drying of latent eggs of *Bosmina obtusirostris (Cladocera, Crustacea)* and their reactivation. Zoologichesky Zhurnal. 1989; 68: 132-134.
3. Makrushin AV, Markevich GI. On formation of ephippium in some *Cladocera (Crustacea)*. Zoologichesky Zhurnal. 1982; 61: 1425-1428.
4. Wolff M. Studies on cuticular genesis and structure and their relationship to the physiology of the matrix. Biol Centralbl Bd. 1904; 24: S644-650, 697-722, 761-767.
5. Zwack A. The finer construction and formation of the Ephippium of *Daphnia hyalina Lyidig*. Z wiss Zool. 1905; 79: S548-S573.
6. Zwack A. Das Ephippium von *Simocephalus vetulus Schoedler*. Z wiss Zool Bd. 1907; 86: S304-S310.
7. Makrushin AV. On structure of ephippium of *Eurycercus lamellatus*. Biologia vnutrennih vod. Informacionny bulleten. 1967; 27-31.
8. Makrushin AV. Changes in the organisms of females of some species of *Cladocera (Crustacea)* under their transition to gamogenesis. Zoologichesky Zhurnal. 1970; 49: 1573-1575.
9. Makrushin AV. Protoephippial glands in *Cladocera (Crustacea)*. Zoologichesky Zhurnal. 1972; 51: 1736-1738.
10. Fryer G. Observations on the ephippia of certain macrothricid cladocerans. Zool J Linn Soc. 1972; 51: 79-96.
11. Makrushin AV. Some patterns of the reproductive system in *Cladocera* (*Crustacea*). Zoologichesky Zhurnal. 1976; 55; 1143-1148.
12. Makrushin AV. The diversity in the structure of ephippium in the *Macrothricidae* (*Crustacea, Cladocera*) and the taxonomic status of this family. Zoologichesky Zhurnal. 1985; 64: 212-216.

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