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PECULIARITIES OF THE *HELIX ALBESCENS* (GASTRPODA, PULMONATA) REPRODUCTIVE SYSTEM

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Peculiarities of the Reproductive System of *Helix albescens* (Gastropoda, Pulmonata). Leonov S. V. — The data on *Helix albescens* Rossmassler, 1839 reproductive system are provided. The presence of glands of the auxiliary copulatory organ, that gathered in two tufts and one massive stylophore (dart-sac) are noted. The diverticulum in Crimean specimens is shown to be permanently absent, and the flagellum is 1/2–2/3 times as long as penis. The penis has two papillae and the distinct penial knob. These characters can be used for identification of *H. albescens*.

Key words: *Helix albescens*, Helicidae, reproductive system, Crimea.

Особенности строения половой системы *Helix albescens* (Gastropoda, Pulmonata). Леонов С. В. — В статье приведены данные о строении половой системы *Helix albescens* Rossmassler, 1839. На рисунке и в тексте отмечается наличие слизистых желез, собранных в 2 пучка; одного массивного стилофора. Указано, что у крымских особей всегда отсутствует дивертикул семяприемника, длина бича составляет 1/2–2/3 длины пениса. Пенис имеет 2 папиллы, а также хорошо выраженный пениальный бугорок. Перечисленные признаки могут быть использованы для идентификации вида.

Ключевые слова: *Helix albescens*, Helicidae, половая система, Крым.

Introduction

Peculiarities of the Helicidae reproductive system and the parts of it such as flagellum, diverticulum of bursa copulatrix, epiphallus, female adnexa etc. are very important in species identification. On the other hand, its are very closely linked with the peculiarities of reproduction, and ensure reproductive isolation, reflecting, thus, much evolutionary important traits of species organization. Investigating the *Helix albescens* Rossmassler, 1839 reproductive system we have found that our data are appreciably differ from information presented in A. A. Shileyko's (1978) monograph and in S. G. Damyantov and I. M. Likharev review (1979). So it necessitate us investigate and examine this question.

Material and methods

We investigate the *H. albescens* reproductive system on materials from the different regions of Crimea to allow for geographical variability. Altogether we examine 43 specimens from: Simferopol (14), Bakhchisaray (8), Kerch (5), Yalta (5), Pribreznoe (5), Sevastopol (2), Gvardeyskoe (2), Tarkhankut (2). Cuttings were made by the standard methods (Likharev, Rammelmeyer, 1952; Akramovsky, 1976; Shileyko, 1978).

Results and discussion

H. albescens reproductive system presented in figure 1. All reproductive organs are situated compactly, and tightened by the bands of connective tissue. Spermoviduct include female part (oviductal gland) (fig. 1: 9) and prostatic gland (fig. 1: 10), which surround allospermiduct. Further spermoviduct subdivided into the narrow vas deferens (fig. 1: 11), that opens to the epiphallus (fig. 1: 13); and the distinctly curved free

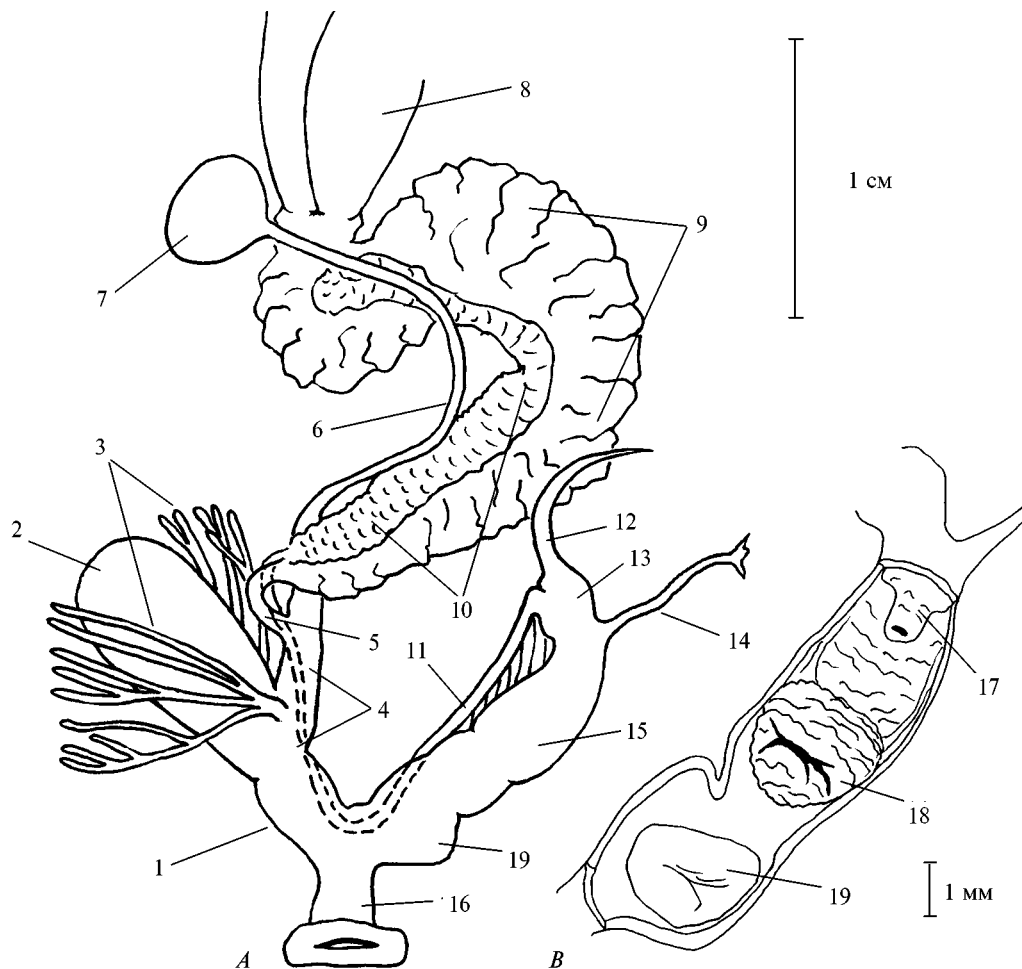


Fig. 1. Reproductive system of the *H. albescens* from Simferopol: *A* – general view; *B* – penis: 1 – lower part of vagina; 2 – dart-sac, or stylophore; 3 – glands of auxillary copulatory organ; 4 – upper part of vagina; 5 – free oviduct; 6 – pedunculus of bursa copulatrix; 7 – bursa copulatrix; 8 – albumen gland; 9 – oviductal gland; 10 – prostatic gland; 11 – vas deferens; 12 – flagellum; 13 – epiphallus; 14 – penis retractor muscle; 15 – penis; 16 – atrium; 17 – proximal penis' papilla; 18 – distal penis' papilla; 19 – penial knob.

Рис. 1. Половая система *H. albescens* из Симферополя: *A* – общий вид; *B* – пенис: 1 – нижний отдел вагины; 2 – стилофор; 3 – слизистые железы; 4 – верхний отдел вагины; 5 – яйцевод; 6 – проток семяприемника; 7 – семяприемник; 8 – белковая железа; 9 – матка; 10 – простата; 11 – семяпровод; 12 – бич; 13 – эпифаллус; 14 – ретрактор пениса; 15 – пенис; 16 – половая клоака; 17 – проксимальная папилла пениса; 18 – дистальная папилла пениса; 19 – пениальный бугорок.

oviduct (fig. 1: 5), that go further into the upper part of the vagina (fig. 1: 4) – between the place of pedunculus of bursa copulatrix beginnings, and female part adnexa. The pedunculus of bursa copulatrix (fig. 1: 6) in *H. albescens* are not distinctly curved. Free oviduct (fig. 1: 5) and vagina (fig. 1: 1, 4) have a thick muscular walls.

To the female adnexa belongs: the glands of the auxillary copulatory organ (fig. 1: 3), that gathered in two tufts and temperately branch out, general number of the final branches in each tuft are 8–15; and the dart-sac (fig. 1: 2). The section that is situated beneath the auxillary copulatory organ is the lower part of vagina (fig. 1: 1). It opens to the atrium (fig. 1: 16). The vas deferens (fig. 1: 11) is the narrow duct, that is surrounded with the circular muscular fibres, that contribute to the movements of the seminal fluids and expulsion of it (Runham, 1988). The spermoviduct tightened to the penis (fig. 1: 15) by the bands of connective tissue. The epiphallus of *H. albescens* is short

and very thin (fig. 1: 15), its ultrastructure is similar to the one of the vas deferens, but it have a larger lumen and more developed musculature. Flagellum (fig. 1: 15) is relatively short too, bulged at the basis; its length amount to 1/2–2/3 of the penis' length. The penis is the tube of the thick circular musculature with outer longitudinal muscular fibres (fig. 1: 15). There are two penis' papillas (fig. 1: 17, 18). Also we have found the distinct pennial knob (fig. 1: 19).

The sperm of the reproductive partner arrive to bursa copulatrix (fig. 1: 7) through the pedunculus (fig. 1: 6). A. A. Shileyko (1978) had show, that there is correlation between flagellum's and diverticulum's lengths, namely the longer flagellum the longer diverticulum.

H. Lind had (1973) demonstrate on *H. pomatia* that spermatophore body is developed in the epiphallus, and its tail end – in the flagellum. So, the smaller are the ones the smaller is spermatophore. As the long spermatophore arrive, its fore-part penetrate into the diverticulum, and the tail end is turned up to the bursa copulatrix. There is no necessity of diverticulum in the species in which the spermatophore is bring up into the partner's genital tracts in the form of the compact clot, so the diverticulum is reduce in that case (Shileyko, 1978). We do not find any considerable difference in *H. albescens* reproductive system from different Crimea regions. Always are present relatively very short flagellum, short epiphallus and always is absent diverticulum. It is contrary to A. A. Shileyko's (1978) data. He had gave the picture of *H. albescens* reproductive system from Bulgaria, and had indicate in text that the length of the flagellum, in the Crimean specimens, is amount to combined lengths of the penis and epiphallus; and also had note the presence of well-developed diverticulum. By the other hand, I. M. Likharev and E. S. Rammelmeyer (1952) had indicate, that *H. vulgaris* (= *H. albescens*) have no diverticulum, and the one's flagellum is short ("shorter than the penis or equal to this one", p. 490). In the N. N. Akramovsky's (1976) review of the Armenian molluscs author gave the description and picture of the *H. albescens* reproductive system. He put this species to the other genus – *Physospira* C. Boettger, 1919 (p. 231, figure 114) because of the absence of diverticulum (and exactly this trait is the base, in the author opinion, for the separation of the genus). N. N. Akramovsky shows also, that length of the flagellum is equal approximately 2/3 of the penis' length. It is coincide with our data. We suppose that separation of *H. albescens* in the other genus on the base of diverticulum absence is not well founded, because the typical species of the genus, *H. pomatia* Linnaeus, 1758, can have a very short, rudimentary diverticulum, and, rather can be without it (our data). As well A. A. Shileyko (1978) and I. M. Likharev, E. S. Rammelmeyer (1952) show the possible rudimentary of the diverticulum or the absence of it in *H. pomatia*. Besides the question about the presence or absence of the differences in reproductive system structure of *H. albescens* from the South of the European part of the former USSR and Caucasus at the one side and from Bulgaria at the other calls for further investigations.

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