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On the systematical position of *Helix duporti* Bavay et Dautzenberg (Gastropoda: Pulmonata: Camaenidae)

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Abstract. Anatomical study has shown that the species described as *Helix duporti* Bavay et Dautzenberg, 1908 belongs to the genus *Trachia* Martens, 1860. A brief discussion of the problems of the taxonomy of snails having helicoid shells in the fauna of Vietnam.

Introduction

Fauna of South-East Asia, and Vietnam in particular, is more or less completely studied. Shell descriptions of numerous species contained in a series of papers by Ancey, Bavay, Crosse, Dautzenberg, Gude, P. Fischer, Mabille, E. Martens, Möllendorff, Morlet, Morelet, L. Pfeiffer, and many others. Compilation of these data and full bibliography were presented by Schileyko [2011]. Unfortunately, anatomical data on Vietnamese stylommatophoran molluscs are very scanty, therefore, systematical position of majority of species (especially those with helicoid shells) remain unclear.

Over the last few decades in the Zoological Museum of Moscow State University accumulated some alcohol material on the land snailû of Vietnam and adjacent countries, and, to the extent of their study, the author intends to publish the relevant information. The following is the first of planned articles.

Abbreviations in figures: *AG* – albumen gland; *At* – genital atrium; *E* – epiphallus, *F* – flagellum, *FO* – free oviduct, *P* – penis, *Pil* – pilasters, *Po* – pore of penial papilla; *PP* – penial papilla; *PR* – retractor of penis, *RS* – reservoir of spermatheca; *SS* – spermathecal stalk, *T* – talon; *Ut* – uterus; *Va* – vagina; *VD* – vas deferens.

Обозначения на рисунках: *AG* – белковая железа; *At* – половой атриум; *E* – эпифаллус, *F* – флагеллум, *FO* – свободный овидукт, *P* – пенис, *Pil* – пилястры, *Po* – пора папиллы пениса; *PP* – папилла пениса; *PR* – ретрактор пениса, *RS* – резервуар семеприемника; *SS* – проток семеприемника; *T* – талон; *Ut* – матка; *Va* – вагина; *VD* – семепровод.

Fam. **Camaenidae** Pilsbry, 1893

Pilsbry, 1893 (1893-1895): XXXII (Helicidae subfam.); Solem, 1992: 5; Schileyko, 2003: 1510.

Shell is highly variable in size, shape, and color, but never auriform or plate-like. The family has no differential conchological diagnosis.

Head wart sometimes present.

Jaw odontognathous.

Reproductive tract, opposite to Bradybaenidae, lacks any additional organs (stylophores and mucus glands) on distal section of vagina. Flagellum often present. Epiphallus usually well developed (rarely absent), sometimes with a short caecum.

Trachia Martens, 1860

Martens in Albers, 1860: 160 (*Helix* subgen.); Gude, 1914: 153 (*Planispira* subgen.); Schileyko, 2003: 1516.

Type species – *Helix asperella* L. Pfeiffer, 1846, by original designation.

Shell helicoid, lacking differential diagnostic features.

Flagellum rather long, tapering. Epiphallus thick, not long. Penis thickened, internally with relief of strong longitudinal folds which are either sinuous, or broken into series of tubercles. Penial retractor attached to penis/epiphallus junction. Free oviduct of various length. Vagina stout. Spermathecal stalk long, somewhat swollen basally, reservoir reaching albumen gland.

Trachia duporti
(Bavay et Dautzenberg, 1908)

Fig. 1

Bavay, Dautzenberg, 1908: 234 [*Helix* (*Camaena*)]; 1909: 176, pl. V, fig. 8, 9 [*Helix* (*Camaena*)]; Schileyko, 2011: 42 (*Camaena*).

Type locality – "Phu-Ly".

Shell subglobose, moderately thin-walled, somewhat translucent, of 5-6 slightly convex whorls. Last whorl evenly rounded at periphery, scarcely descending at the very end. Coloration consists of white or yellowish background and a series of dark bands of various widths, that visible inside the aperture. Embryonic whorls smooth. Sculpture of later whorls of weak, irregular radial foldlets and dense spiral striae; on last whorl locally there are malleation. Aperture broad, subcircular, well oblique, with shortly reflexed, sometimes slightly thickened margins. Umbilicus closed. Height of shell 26-34, diam. 36-43 mm; dissected specimen: height 26.5, diam. 36.2 mm.

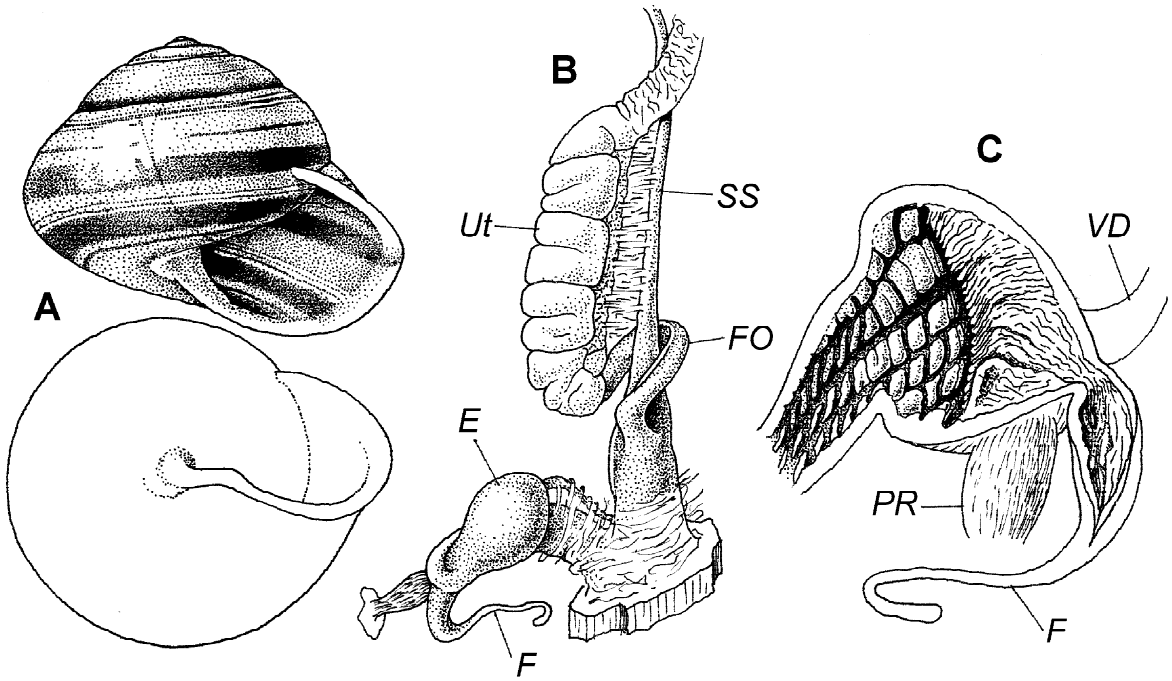

FIG. 1. *Trachia duporti*. Cat Ba Island, Chung Chang, XII.1989. A – shell. B – reproductive tract. C – inner structure of penis, epiphallus, and basal part of flagellum.

РИС. 1. *Trachia duporti*. Остров Кат Ба, Чунг Чанг, XII.1989. A – раковина. B – репродуктивный тракт. C – внутреннее строение пениса, эпифаллуса и базальной части флагеллума.

On the head there is a poorly distinguishable, slit-like wart located between ommatophores.

Vas deferens goes from prostate and directed toward the atrium in close contact with surface of free oviduct and vagina. Near the atrium, vas deferens forms a sharp bend and directed along the penis upward; the diameter of its distal part is markedly increased. Flagellum is moderately long, with thickened basal section. Internally this section supplied with short, numerous, irregular axial foldlets. Epiphallus short, markedly swollen, entering penis through a rather wide opening. Penis short, almost cylindrical, internally with longitudinal pilasters, which are more or less distinctly broken into series of high tubercles; in subadult specimens the pilasters are not broken, winding. These pilasters start in epiphallus, and become thinner toward the genital atrium. Penial papilla is absent. Penis sheath missing, but distalmost parts of the reproductive tract (penis, vagina, and atrium) surrounded by numerous connective tissue fibers. Penial retractor strongly developed, attached to epiphallus. Free oviduct rather long, about two times longer than vagina. Vagina wide. Spermathecal stalk is swollen basally.

Distribution. N Vietnam (Phu-Lý, Ha Nam province, 20°32’27 N, 105°54’50 E); Cat Ba Island.

Discussion

To establish the taxonomic position of *Helix duporti* we should compare this species with *Camaena cicatricosa* (Müller, 1774) (which is a type species of the genus *Camaena*), since initially *Helix duporti* has been assigned to the subgenus *Camaena* (of the genus *Helix*). Indeed, shell of the species *duporti* is similar to those of *C. cicatricosa* (Figs. 1 A and 2 A).

However, from anatomical point of view the species *duporti* and *cicatricosa* obviously belong to different genera: in *C. cicatricosa* there is a well-developed penial papilla (verge), and very long, convoluted, subcylindrical epiphallus. The species *duporti* has no penial papilla, and its epiphallus is short and much swollen.

The structure of reproductive tract of *Helix duporti* is very similar to those of *Trachia vittata* (Müller, 1774) (Fig. 3 B, C): penial papilla is absent, epiphallus short and thick. Godwin-Austen [1906: 48, pl. IV] gave the description and fragmentary illustrated the reproductive tract of *T. vittata*, and his data coincide with those which presented here. Unfortunately, anatomy of the type species of the genus *Trachia* still unknown, but conchologically *T. vittata* is similar to *Helix asperella*. Besides, it should be paid attention to the structure of the inner surface of the penis: in both species (*vittata* and *duporti*) there are strong longitudinal pilasters. In *vittata* they are located at distal part of penis, whereas proximal part occupied with irregular elongated tubercles. In *duporti* the pilasters run over all inner surface of penis, and they are presented by rows of tubercles (in adult specimens). These differences are probably species-specific and, in my opinion,

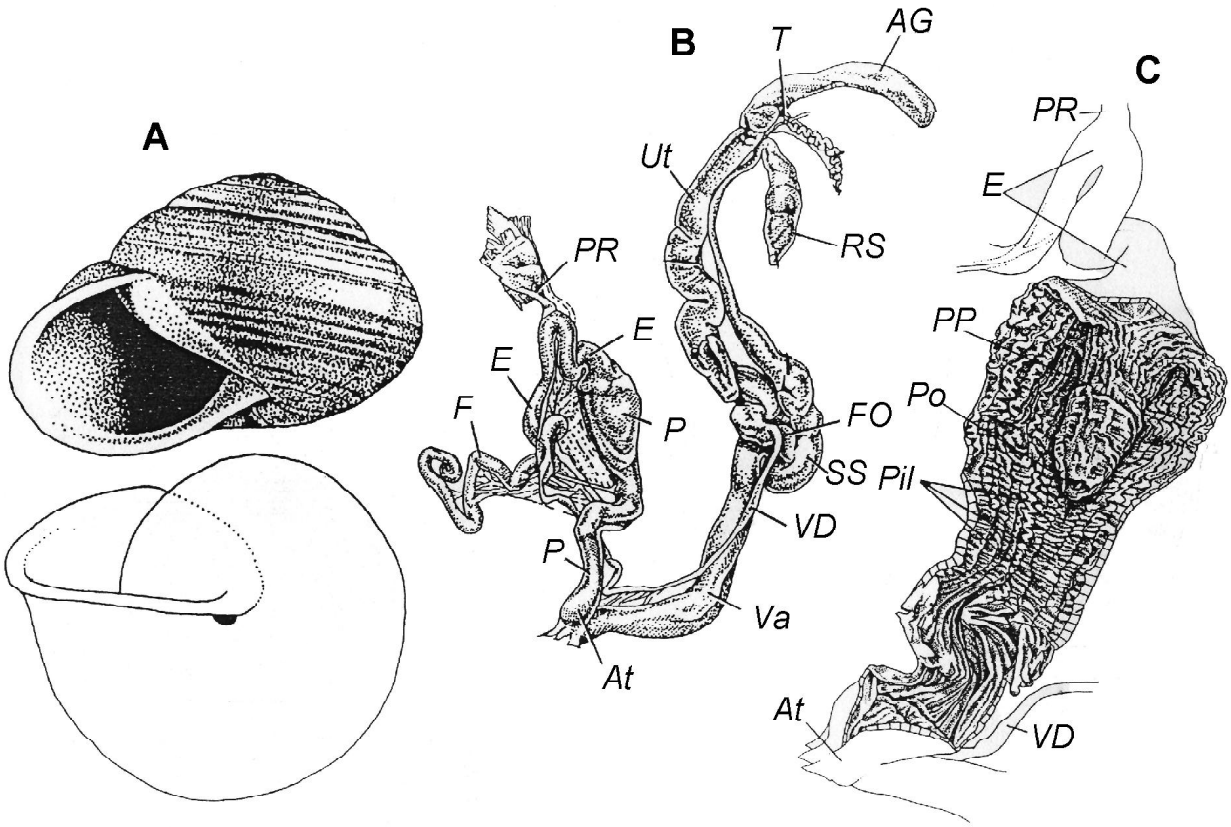

FIG. 2. *Camaena cicatricosa*. A – shell: S China. After Schileyko, 2003. B – reproductive tract. C – interior of penis. After Solem, 1992.

РИС. 2. *Camaena cicatricosa*. A – раковина: Южный Китай. По Schileyko, 2003. B – репродуктивный тракт. C – внутреннее строение пениса. По Solem, 1992.

do not prevent the attribution of these two species in the same genus.

There is, however, one essential difference between *Trachia vittata* and *T. duporti*: the first has head wart (scarcely visible!) whereas in the second the wart is absent. To estimate the taxonomic weight of this character we must know more data about the absence/presence of head wart in various species with helicoid shells. Now we can only say that this organ may be present in Camaenidae as well as in Bradybaenidae [Solem, 1992].

It should be added that in the Vietnamese fauna there are species whose shell is similar to *T. duporti*, namely *Helix gabriellae* Dautzenberg et d'Hamonville, 1887, *Helix longsonensis* Morlet, 1891, *Camaena mansuyi* Dautzenberg et Fischer, 1905 and some others. In all probability, these species also belong to the genus *Trachia*. Unfortunately, shells of many species of Vietnamese fauna have never been illustrated.

General remarks

Of 477 species and subspecies of land pulmonate molluscs that live on the territory of Vietnam [Schileyko, 2011], 137 belong to two families (Bradybaenidae and Camaenidae) for which helicoid shells are characteristic, although in these families there are some genera with enoid or bulimuloid shells (*Giardia*, *Amphidromus*). On the other hand, snails with helicoid shells one can find among Ariophantidae (*Ariophanta*, *Hemiplecta*, *Koratia*). All told, in the fauna of Vietnam there are at least 115 species with the shells of such an appearance.

The family of Camaenidae together with Bradybaenidae includes the majority of species with helicoid shells in the Vietnamese fauna. These two families have not conchological differential characters, but they clearly differ anatomically. Bradybaenidae initially have a stylophore (often with smaller additional sac) and mucus glands whereas Camaenidae have no any additional organs on reproductive tract except for flagellum. However, the problem is that sometimes the representatives of Bradybaenidae may secondarily lose stylophores and mucus glands, and in such cases definite taxonomic difficulties arise. For example, Japanese genera *Mandarina*, *Neochloritis*, *Lepidopisum*, *Satsuma*, *Yakuchloritis*, *Nipponochloritis*, as well as Taiwanese *Pancala*, and Thai *Thaitropis* lack the mentioned accessory organs, and it is impossible to decide – is it initial or secondary condition. In the

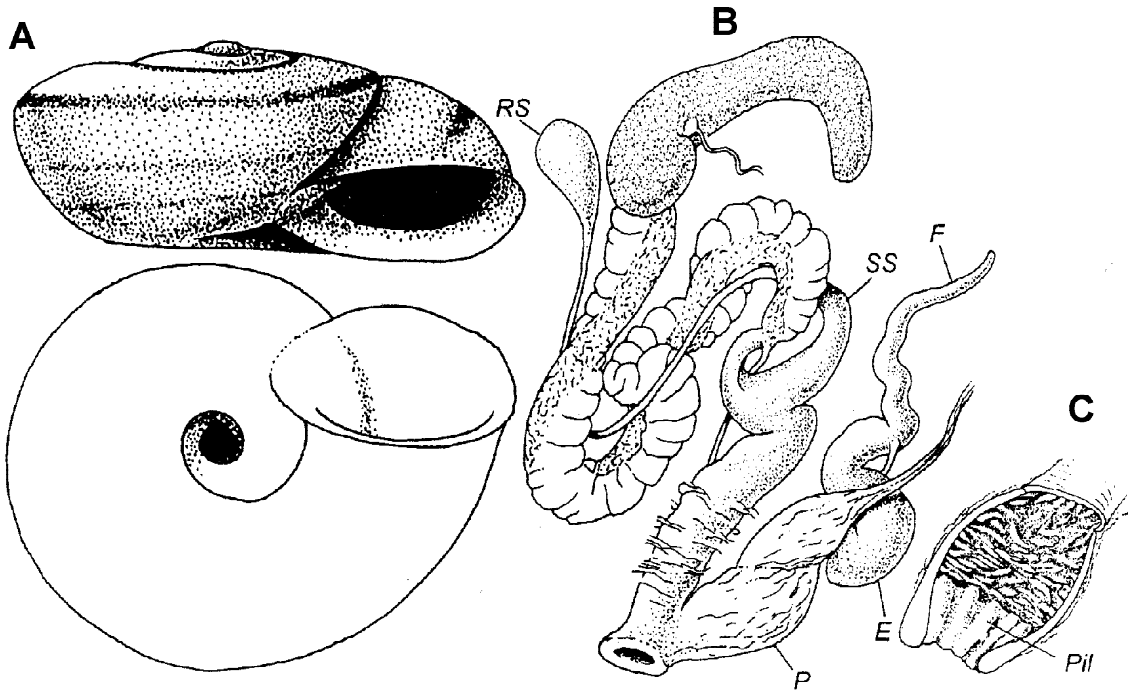

FIG. 3. Species of *Trachia*. A – *Trachia asperella*. Shell: Ceylon. B, C – *Trachia vittata*. B – reproductive tract. C – interior of penis. After Schileyko, 2003.

РИС. 3. Виды рода *Trachia*. A – *Trachia asperella*. Раковина: Цейлон. B, C – *Trachia vittata*. B – репродуктивный тракт. C – внутреннее строение пениса. По Schileyko, 2003.

first case they (or part of them) should be assigned to Camaenidae, in the second – to Bradybaenidae.

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О систематическом положении *Helix duporti* Bavay et Dautzenberg (Gastropoda: Pulmonata: Camaenidae)

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РЕЗЮМЕ. Анатомическое исследование показало, что вид, описанный как *Helix duporti* Bavay et Dautzenberg, 1908, относится к роду *Trachia* Martens, 1860. Краткое обсуждение проблем таксономии моллюсков с хеликоидной раковиной фауны Вьетнама.