

## Taxonomic position of *Helix pernobilis* Féruccac 1821 and notes on the genus *Koratia* (Gastropoda: Pulmonata: Ariophantidae)

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**ABSTRACT.** The study of reproductive tract of the south-east Asian species *Helix pernobilis* Féruccac 1821 has shown that the species belongs to the genus *Koratia* Godwin-Austen 1919. The problem of taxonomic rank of the genus *Koratia* and its comparison with related taxa (*Ariophanta* and *Hemiplecta*) are briefly discussed.

The fauna of land mollusks of Vietnam was studied by many malacologists, predominately French. A catalogue of species known up to date as well as full bibliography had been presented by the author [Schileyko, 2011]. However, anatomically mollusks of Vietnam remain very poorly studied. To establish the generic and familial belonging of a particular species in most cases is possible by only anatomical characters, especially it is true for species with helicoid shells. The description of one of such species is given below.

### *Koratia* Godwin-Austen, 1919

Godwin-Austen, 1919: 202; Zilch, 1960: 317 (*Hemiplecta* subgen.); Schileyko, 2002: 1281.

**Type species** – *Helix distincta* L. Pfeiffer, 1850, by original designation.

Shell is large, depressed-subglobular, moderately thin to rather solid, with evenly rounded to angular periphery. The number of whorls is 5.5-6. Coloration is nearly monotonously yellowish to pale corneous, with a pronounced to varying degree dark band below periphery. Embryonic whorls are smooth. Later whorls look almost smooth, with delicate spiral lines. Aperture is ovate, moderately oblique, with thin margins. Umbilicus is narrow, open. Height up to 25-42, diameter 45-68 mm.

At the boundary between penis and epiphallus there is a rather small lime sac (“flagellum”). Epiphallus is somewhat longer than penis, with a rather small caecum, to which the retractor of penis is attached. Penis has an envelope. Sarcobelum is long, with apical ligament and well-developed thick-

walled papilla, its pore occupies apical position. Spermatheca with very short duct, reservoir has a muscular band (ligament) that connects it with the surface of spermiduct.

**Distribution.** SE Asia.

### *Koratia pernobilis* (Féruccac 1821) (Fig. 1)

Féruccac, 1821: 39, no. 182 (*Helix*); Pfeiffer, 1860 (1854-1879): 177, Taf. XLVIII, Fig. 3, 4 (*Helix*); Crosse, Fischer, 1864: 327 (*Helix*); Fischer, Dautzenberg, 1904: 4 [*Nanina (Rhysota)*]; Pilsbry, 1886: 33, pl. 8, fig. 28 (*Rhysota*); Schileyko, 2011: 30 (*Koratia distincta pernobilis*).

Type locality – “Poulo-Condor” (at the present time – Côn Đảo Island, S Vietnam).

**Material.** 1 specimen from environs of Van Mai village, Xo-Shan-Bin Province, N Vietnam, 28-30.V.1982, leg. I.S. Darevski.

The shell is depressed, moderately thin, of 5-5.5 whorls. The whorls are little flattened below suture. Last whorl with smoothed but quite distinct peripheral angle, is not descending toward the aperture. Color mostly pale-corneous, peripheral angle light (almost white), from below to it a brown band adjoins, its lower margin of which more or less blurred. Embryonic whorls smooth. On later whorls radial sculpture weak (almost absent); spiral sculpture represented by a thin wavy striation. Aperture is broadly ovate, moderately oblique, with thin, straight margins. Umbilicus is rather narrow, subcylindrical. Dimensions of studied specimen: shell height 40.2, diameter 63.2 mm.

Vas deferens thin, moderately long, in its distal part there is a small rounded flagellum (“lime sac” of some authors). On the penis/epiphallus junction there is a rather small caecum, to which penial retractor is attached. Epiphallus rather long, its lower (distal) section is markedly corrugated, separated from the penis by a narrow constriction. Penis not large, its inner surface near the atrium with irregular, smoothed longitudinal folds; nearer to the epiphallus there are series of small rounded tubercles. Most part of the penis is surrounded by

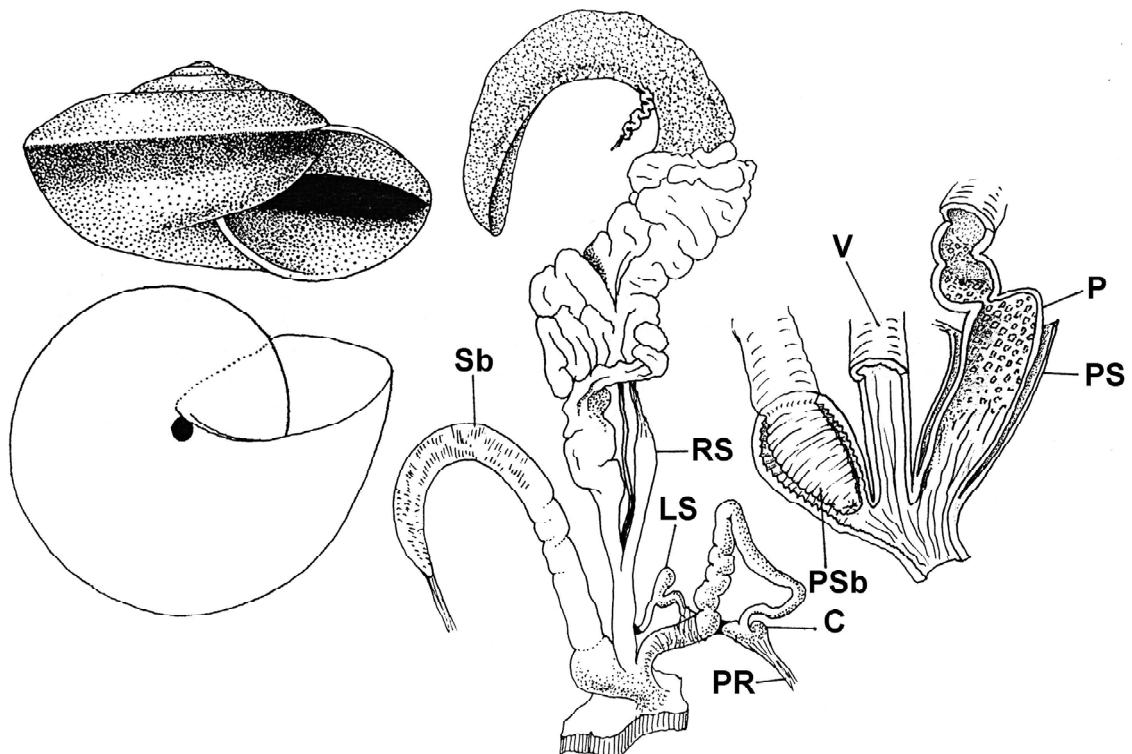


FIG. 1. *Koratia pernobilis*. Shell, reproductive tract and inner structure of its distal section. Abbreviations: C – caecum; LS – lime sac; P – penis; PR – penial retractor; PS – penis sheath; PSb – papilla of sarcobelum; RS – reservoir of spermatheca; Sb – sarcobelum; V – vagina.

РИС. 1. *Koratia pernobilis*. Раковина, половая система и внутреннее строение ее дистального отдела. Обозначения: С – цекум; LS – “флагеллум” (лайм сак, известковый мешок); Р – пенис; PR – ретрактор пениса; PS – чехол пениса; PSb – папилла саркобелума; RS – резервуар семеприемника; Sb – саркобелум; V – вагина.

well-developed sheath, upper edge of which is drawn by connective-tissue fibers to the *vas deferens*. Oviduct somewhat longer than vagina, inner surface of which bears irregular, smoothed longitudinal folds. Sarcobelum long, with apical ligament. Lower part of the sarcobelum expanded, contains muscular conic papilla. Spermatheca is short, with indistinctly expressed reservoir and apical ligament which attached to the spermiduct.

**Remark.** In the studied specimen of *K. pernobilis* the spermatophore is not found, but there is information [Wanvipa Kumprataung *et al.*, 1989] that in *Koratia distincta* spermatophore is present; description of its structure is not given.

**Distribution.** S Vietnam (Còn Đảo Island), N Vietnam (Xo-Shan-Bin Prov.), Cambodia, Thailand.

## Discussion

System of the Ariophantidae family cannot be considered completely established. In particular, various authors attributed the type species of the genus *Koratia* to different genera and subgenera (not counting the genus *Helix*): to *Nanina* [Martens, 1860; Smith, 1896]; to *Nanina* (*Rhyssota*)

[Martens, 1867; Fischer, Dautzenberg, 1904; Dautzenberg, Fischer, 1905]; to *Hemiplecta* [Morlet, 1889, Wanvipa Kumprataung *et al.*, 1989]; to *Ariophanta* (*Hemiplecta*) [Morlet, 1891]. It is essential that all the named authors, except Wanvipa Kumprataung *et al.* [1989], had based their conclusions only on conchological characters, whereas the majority of ariophantid genera are diagnosed mainly by anatomical features. If to leave the names *Nanina* Gray 1834 (preoccupied by Risso, 1826) and *Rhyssota* Albers, 1850 (the genus distributed only in the Philippine Islands), there remains the question of the relationship of the genus *Koratia* with genera *Ariophanta* Des Moulins, 1829 and *Hemiplecta* Albers, 1850.

Differential diagnoses of three closely related genera following:

*Hemiplecta* – penial papilla is present, caecum long, epiphallus is folded across and both its knees are connected by a ligament.

*Koratia* – penial papilla is absent, caecum short, epiphallus is not folded across.

*Ariophanta* – penial papilla is absent, caecum long, epiphallus is folded across, and both its knees are connected by connective-tissue fibers.

Thus, if in *Hemiplecta* there is one unique (diagnostic) character (presence of penial papilla), in *Koratia* there are two such characters (short caecum and straight epiphallus). *Ariophanta* has no unique features and the taxon is characterized by a combination of characters. At the same time, should be taken into consideration the fact that these diagnoses are based on the type species, and as more species of the family will be studied it may appear that the features that characterize the type species of these three taxa will overlap.

No less complex situation is with *Helix pernobilis* Féruccac 1821. This taxon was assigned (as a separate species or subspecies of *Helix distincta*) to *Nanina* (*Rhysota*) [Fischer, Dautzenberg, 1904], or to *Koratia* [Schileyko, 2011].

At the same time the genus *Koratia* some authors [Godwin-Austen, 1919; Schileyko, 2002] considered as a separate genus, others [Solem, 1966; Wanvipa Kumprataung *et al.*, 1989] – as a subgenus of the genus *Hemiplecta* (description and illustration of the reproductive tract of the type species of *Hemiplecta* – *Helix humphreysiana* Lea, 1841 – see Benthem Jutting, 1950, p. 126, Fig. 1, and of closely related species “*Helix*” *ceylanica* L. Pfeiffer, 1850 – Schileyko, 2002, p. 1282-1283, Fig. 1686). Generic status of *Koratia* and its distinctions from the genus *Hemiplecta* has been shown by the author [Schileyko, 2002]. The structure of the reproductive tract of *Helix pernobilis* indicates the belonging of this species to the genus *Koratia*; anatomy of the type species of the genus is given by Goodwin-Austen [1919, p. 201, Fig. 2], Wanvipa Kumprataung *et al.* [1989, p. 79-81, Fig. 9-14] and Schileyko [2002, p. 1282, Fig. 1685], and no significant differences in the structure of the reproductive tract between these two species were observed.

Two questions remain open: the rank of the taxon (whether it is a separate species or subspecies of *Koratia distincta*), and distribution area of *K. pernobilis*.

With regard to the first question, perhaps the only difference of *Koratia pernobilis* from *K. distincta* is that in the first species there is a peripheral angle, whereas in the second one the periphery of the last whorl is evenly rounded. However, the degree of angularity of the last whorl in many species of mollusks varies considerably and to confirm confidently the species status of *K. pernobilis* will only be possible when/if both forms are found in the same place.

The question of the distribution of *K. pernobilis* requires clarification. The species was described from southern Vietnam, the material that I have, is collected in the northern part of the country. Besides, some findings were made in Cambodia and Thailand. There are two possibilities: either *K. per-*

*nobilis* is distributed broadly but sporadically, or *K. distincta* locally forms angular shells. In the latter case *K. pernobilis* might be just an intraspecific form of *K. distincta*.

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Таксономическое положение *Helix pernobilis* Féruccac 1821 и заметки о роде *Koratia* (Gastropoda: Pulmonata: Ariophantidae)

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**РЕЗЮМЕ.** Исследование репродуктивного тракта юго-восточноазиатского вида *Helix pernobilis* Féruccac 1821 показало, что вид принадлежит роду *Koratia* Godwin-Austen 1919. Кратко обсуждается вопрос о таксономическом ранге рода *Koratia* и его взаимоотношениях с родственными таксонами (*Ariophanta* and *Hemiplecta*).

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