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RESEARCH ARTICLE

Racesina, a new generic name for a group of Asian lymnaeid snails (Gastropoda: Hygrophila: Lymnaeidae)

Racesina – новое родовое название для группы азиатских прудовиков (Gastropoda: Hygrophila: Lymnaeidae)

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Abstract. A new generic name *Racesina* **gen. nov.** is proposed to designate a group of Asian lymnaeid snails including *Lymnaea luteola* Lamarck, 1822 and species closest to it. Earlier these molluscs were classified within the (sub-)genus *Cerasina* Kobelt, 1881, however, it is shown by us that this name is a junior synonym of *Radix* Montfort, 1810. The genus *Racesina* embraces three species distributed in Central, Southeast and South Asia: *R. luteola* (type species), *R. oxiana* (O. Boettger, 1889), and *R. siamensis* (Sowerby, 1873).

Резюме. Вводится новое родовое название *Racesina* **gen. nov.** для группы азиатских прудовиков семейства Lymnaeidae, включающей *Lymnaea luteola* Lamarck, 1822 и ближайшие к нему виды. Ранее эти моллюски помещались в состав (под-)рода *Cerasina* Kobelt, 1881, однако нами показано, что это название является младшим синонимом *Radix* Montfort, 1810. Род *Racesina* включает три вида, распространенных в Центральной, Юго-восточной и Южной Азии: *R. luteola* (типовой вид), *R. oxiana* (O. Boettger, 1889) и *R. siamensis* (Sowerby, 1873).

Key words: taxonomy, freshwater pulmonate snails, Lymnaeidae, *Cerasina*, *Racesina*, new genus

Ключевые слова: систематика, пресноводные легочные моллюски, Lymnaeidae, *Cerasina*, *Racesina*, новый род

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Introduction

In 1881, Wilhelm Kobelt established the new subgenus *Cerasina* within the lymnaeid snails genus *Limnaea* Lamarck, 1799, distributed in the East Indies ("Ostindien"). The species *Limnaea bulla* erected by Benson (1836) under unavailable name (see below) was designated subsequently as the type species of the subgenus (Kobelt, 1881: 297). Despite the fact that *Cerasina* was included into some of the most authoritative lists of valid molluscan genera in the last century (Thiele, 1931; Zilch, 1959–1960), there are several taxonomic and nomenclature problems associated

with this name. In the past century, *Cerasina* was not discussed by most authors who dealt with the Lymnaeidae of India and the countries of Southeast Asia (Preston, 1915; Annandale & Rao, 1925; Yen, 1939; Brandt, 1974; Subba Rao, 1989), while Russian malacologists seem to have been especially inclined to accept this taxon as a valid genus (Zhadin, 1952; Vinarski & Kantor, 2016) or subgenus (Kruglov & Starobogatov, 1993; Kruglov, 2005). In the most recent revisions of taxonomic structure of the Lymnaeidae (Ponder & Waterhouse, 1997; Vinarski, 2013; see also Bouchet, 2018), *Cerasina* is treated as *taxon inquirendum*, whose identity is uncertain and requires further investigation.

The main goal of our paper is to resolve the nomenclatorial puzzle of the identity of the generic name *Cerasina*.

Material and methods

We studied numerous specimens of various species of *Cerasina* and *Radix* sampled by us during fieldworks in different countries of Central, Southeast and South Asia (China, Mongolia, Myanmar, and Tajikistan). In addition, we examined vast collections of Asian lymnaeids kept in some large repositories of Russia and Western Europe. Their names and acronyms are as follows:

Natural History Museum, London, UK, formerly British Museum (Natural History) – BMNH;

Natural History Museum of Berlin / Museum für Naturkunde, Germany – ZMB;

National Museum of Natural History, Paris, France – NMNH;

Natural History Museum of Vienna, Austria – NHMW;

Zoological Institute of the Russian Academy of Sciences, Saint-Petersburg, Russia – ZIN;

Laboratory of Macroecology and Biogeography of Invertebrates, Saint-Petersburg State University, Russia – LMBI;

Russian Museum of Biodiversity Hotspots, Federal Center for Integrated Arctic Research of the Russian Academy of Sciences, Arkhangelsk, Russia – RMBH.

In total, nearly 280 specimens of *Cerasina* and related taxa were studied. The material collected by us is deposited in LMBI and RMBH.

Results and discussion

One point contributing to the taxonomic uncertainty described above is the doubtful status of the type species of *Cerasina*. From the point of view of zoological nomenclature, the name *Limnaea bulla* Benson, 1836 is not available since Benson (1836: 744) introduced it without a description or diagnosis and illustration of the shell. This author only characterised the shell as "fine", and this is too brief to be a sufficient description or diagnosis. Therefore, Küster (1862), who gave a description of *L. bulla* along with a picture of its shell, made this species name available. Kobelt (1881: 297), who has often been cited as the author of this species (Kruglov & Starobogatov, 1993; Ponder & Waterhouse, 1997; Vinarski, 2013), used Küster's description of *L. bulla*; and an illustration of the shell given in Kobelt's book depicts a specimen very similar, if not identical, to Küster's one. Despite the fact that the two German authors provided the morphological diagnosis and shell pictures of *L. bulla*, the taxonomic identity of this taxon was the subject of debates and remains unresolved. Thiele (1931) and Zilch (1959–1960) thought that *L. bulla* is a junior synonym of *Lymnaea luteola* Lamarck, 1822, and their opinion was accepted by Zhadin (1952) and Kruglov & Starobogatov (1993). On the other hand, Hubendick (1951: 183) assumed that Kobelt's illustration depicts the shell of either *Lymnaea* (*Austropeplea*) *lessoni* (Deshayes, 1830), or *Lymnaea* (*Radix*) *rubiginosa* (Michelin, 1831). The close relationships between the (sub-)genera *Cerasina* and *Radix* Montfort, 1810 were mentioned by many authors, who considered *Cerasina* as a junior synonym of the latter (see, for example, Burch & LoVerde, 1973; Brandt, 1974).

Due to the absence of both shell diagnosis and illustration in Benson's work (1836), it is impossible to decide which species he named as *L. bulla*. The Benson's own samples were scattered among several scientific institutions in England, Germany, and India; and much of Benson's types were lost (Naggs, 1997). According to Naggs (1997: 42), Benson was reluctant to undertake illustrations and "he sent specimens to Louis Pfeiffer and Heinrich Küster to figure in their iconographical compilations". Therefore, Küster's concept of *L. bulla* more or less corresponded to that of Ben-

son. Unfortunately, Küster's collection was most likely destroyed during the Second World War, at least its current whereabouts are unknown (Nagss, 1997). Therefore, the content of Küster's book (1862) remains the only source of information about the taxonomic identity of *L. bulla*.

We examined large series of shells of all lymnaeid species mentioned above as probable senior synonyms of *L. bulla* (*Austropeplea lessoni*, *Cerasina luteola* and *Radix rubiginosa*) as well as several specimens of *Radix swinhoei* (Adams, 1866), another Oriental lymnaeid, which may be identical to *L. bulla*. All these four species are conchologically very variable (Hubendick, 1951), and we managed to find individuals, within large series of specimens, whose shell habitus and proportions are similar to those illustrated by Küster (Fig. 1). For example, *R. rubiginosa* snails typically have more or less oblong shell with weakly inflated body whorl and high spire and do not resemble Küster's picture, however, there are forms, among varieties of this species, with more or less inflated body whorl, whose habitus is similar to *L. bulla* (see, for example, Figs. 1, B, D, E, H).

Indeed, it is sometimes impossible to differentiate sympatric species of East Asian lymnaeids on the basis of their shell shape. As Brandt (1974: 232) stressed, "it is not easy to distinguish this species [*L. luteola*] from certain forms of *L. auricularia rubiginosa* by shell characters alone". We think that the shell of *L. bulla* depicted by Küster (1862) may have belonged to any of the four candidate species listed above.

However, there is at least one morphological trait allowing us to ascertain its true identity. Hubendick (1951: 161), in his description of *C. luteola*, mentions as its diagnostic feature that "the outlines of the shell, from the apex to the middle of the body whorl, form nearly a straight line". We examined several tens of shells of this species, including the syntypes (see Fig. 2 E) and several distinct varieties (see Fig. 2, D, F–I), and found that the tangential line of all specimens is either straight or scarcely convex. This trait seems to be more or less stable and our observations confirm Hubendick's statement. On the other hand, in the shells of *Radix*, including the type species of this genus, *Radix auricularia* (Linnaeus, 1758), the body whorl is greatly inflated that generates a strongly concave tangential line and a characteristic "shoulder", or sutural shelf, visible on the upper surface of the body whorl (see Fig. 2). The upper whorls forming the shell spire are relatively narrow in many specimens of *Radix*, but the spire is always wide in *C. luteola*. A specimen of *L. bulla* illustrated by Küster (1862) has a relatively narrow spire and a prominent sutural shelf which is absent in all varieties of *C. luteola*. We may thus conclude that the specimen illustrated in Küster (1862) belongs, most probably, to a species of the genus *Radix* (*R.* cf. *rubiginosa*).

Our own work on the phylogeny and classification of Oriental lymnaeid snails (Aksenova et al., 2018) has shown that the species *Cerasina luteola* with some other closest species belong to a genus-rank taxon that is phylogenetically distinct from the genus *Radix*. Apart from molecular data (Aksenova et al., 2018), there are some morphological characters that allow separating *Cerasina* from *Radix*. *C. luteola* and its relatives have a multi-folded prostate, whereas all representatives of *Radix* Montfort, 1810 have the prostate with a single fold inside (Hubendick, 1951; Kruglov, 2005). In addition, all shells of *Cerasina*, examined by us are smooth and devoid a sculpture, whereas those of *Radix* are always sculptured (Aksenova et al., 2018).

Based on the above, we place *Cerasina* in synonymy with *Radix* and below we erect a new lymnaeid genus to include *Lymnaea luteola* Lamarck, 1822 and its relatives.

Taxonomy

Class **Gastropoda**

Subclass **Heterobranchia**

Order **Hygrophila**

Family **Lymnaeidae**

Subfamily **Amphipepleinae**

Genus ***Radix*** Montfort, 1810

Cerasina Kobelt, 1881, **syn. nov.**

Type species of *Radix*: *R. auriculatus* Montfort, 1810 [= *Helix auricularia* Linnaeus, 1758] (by original designation); type species of *Cerasi-*

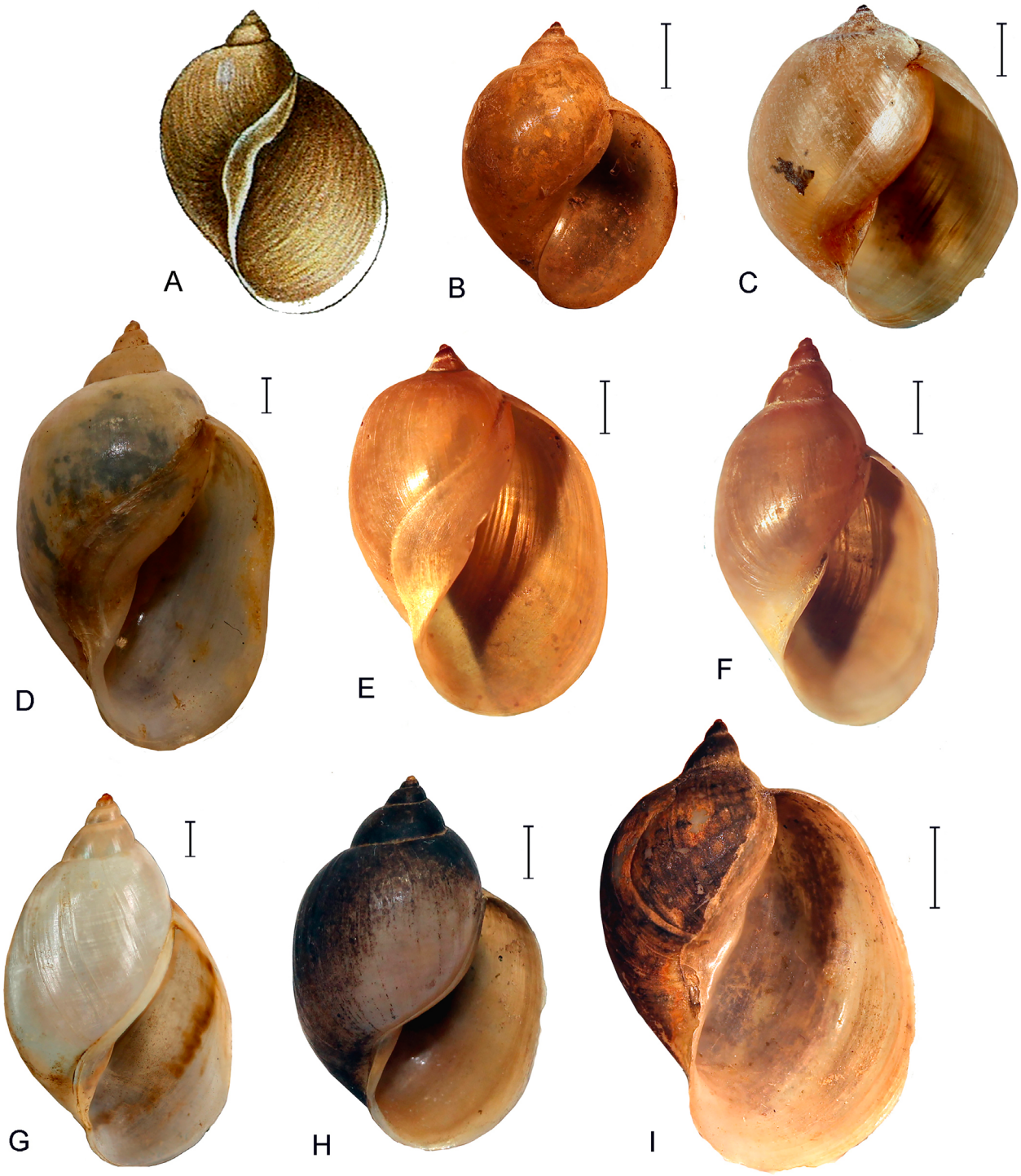

Fig. 1. Lymnaeidae, shells. **A,** *Limnaea bulla* (after Küster, 1862, Taf. 7, Fig. 1); **B,** *Austropeplea lessoni*, New Guinea, central part, Nayabui, leg. H. Godwin-Austen (BMNH); **C,** *Amphipeplea strangei* L. Pfeiffer, 1854 (= *Austropeplea lessoni*), Australia, south Queensland, Granite Creek near Gin-Gin, 1958, leg. L. Price (NHMW); **D**, *Limnaea coarctata* Dunker, in litt. (= *Radix rubiginosa*), Indonesia, Sumatra, syntype (?) (ZMB); **E, F,** *Radix rubiginosa*, Indonesia, Lombok, leg. A. Everett (BMNH); **G,** *Lymnaea luteola*, India, Pondichery, syntype (NMNH); **H,** *Limnaeus nucleus* Troschel, 1837 (= *Racesina. luteola*), India, Ganges Riv., leg. Lamarc-Piquot, syntype (ZMB); **I,** *Radix swinhoei*, Vietnam, Tonkin (BMNH). Scale bars: 2 mm (except of A because it is absent in the original source).

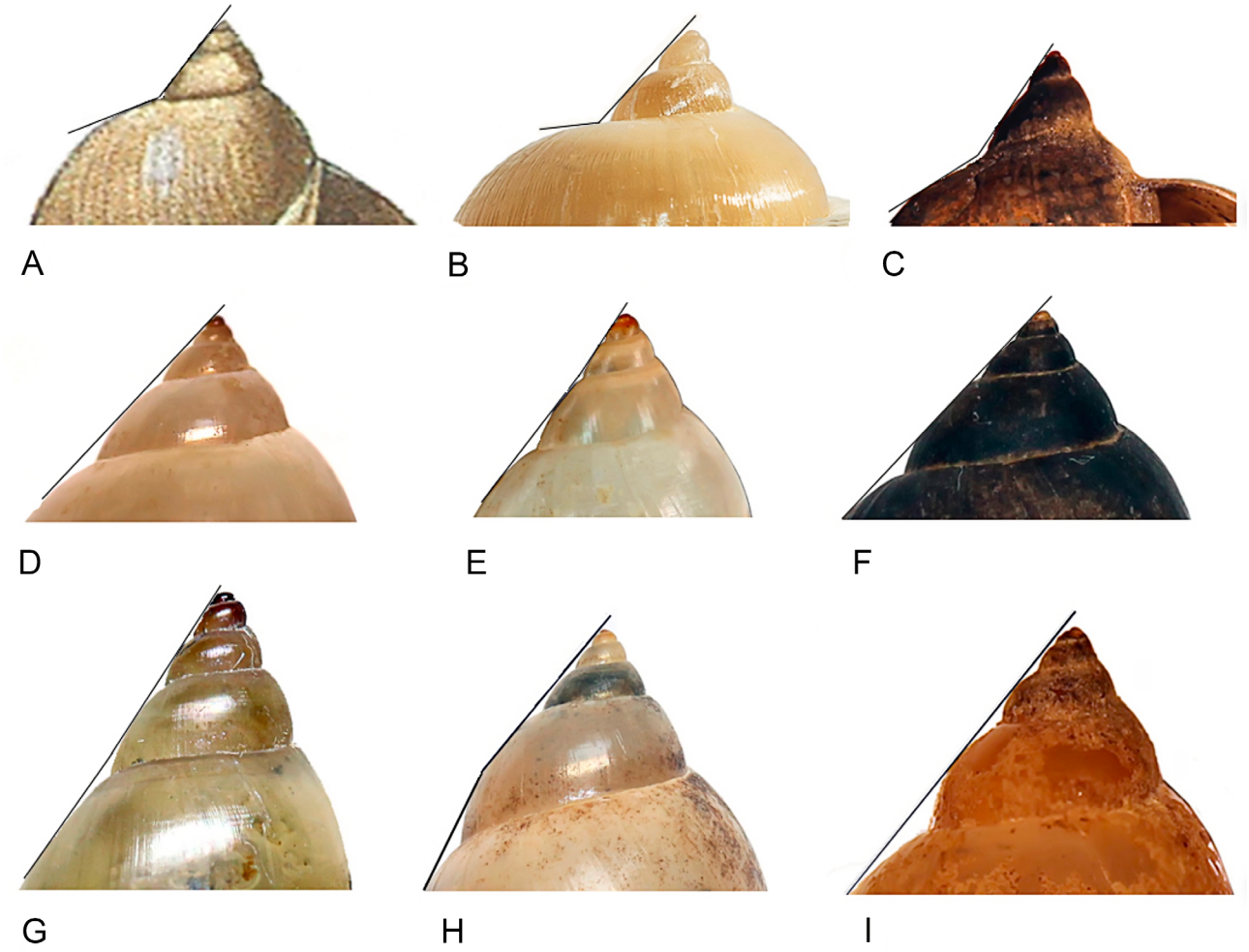

Fig. 2. Lymnaeidae, tangential lines of spire whorls. **A.** *Limnaea bulla* (after Küster, 1862). **B,** *Radix auricularia* (Linnaeus, 1758), Tajikistan, Pamir, leg. D.M. Palatov (LMBI); **C,** *Radix swinhoei*, Vietnam, Tonkin (BMNH); **D,** *Limnaeus prunum* Troschel, 1837 (= *Racesina luteola*), India, Ganges Riv., leg. Lamarc-Piquot, syntype (ZMB); **E,** *Lymnaea luteola*, India, Pondichery, syntype (MNNH); **F,** *Limnaeus nucleus* Troschel, 1837 (= *R. luteola*), India, Ganges Riv., leg. Lamarc-Piquot, syntype (ZMB); **G,** *Racesina oxiana* (O. Boettger, 1889), Tajikistan, ditch near Kurban-Shakhid Vill., 04.07.2016, leg. M. Vinarski (LMBI); **H,** *Racesina luteola* (f. *impura*), India, Ganges Riv., leg. Lamarc-Piquot (ZMB); **I,** *Racesina luteola* (f. *ovalis*), Myanmar, Irravadi Riv. near Jehangyoung, leg. Nöthing (BMNH).

na: *Limnaea bulla* Küster, 1862 [= *Radix* cf. *rubiginosa* (Michelin, 1831)] (by original designation).

Genus ***Racesina*** **gen. nov.**

Type species: *Lymnaea luteola* Lamarck, 1822

Diagnosis. Lymnaeids of moderate size (shell height is usually 20–22 mm), with ovate-conical or ovoid to almost globose shells. Shell surface glossy. Spire wide, tangential line almost straight or weakly convex, body whorl weakly inflated, sutural shelf virtually absent. Prostate with several (3–8) inner folds.

Etymology. The genus name represents an anagram of the name *Cerasina*; the linguistic gender is feminine.

Taxonomic content and distribution. Except for the type species, the genus includes at least two members: *R. oxiana* (O. Boettger, 1889), **comb. nov.** and *R. siamensis* (Sowerby, 1873), **comb. nov.** The range of the genus encompasses several countries of Central, Southeast and South Asia, from Turkmenistan in the northwest to Thailand in the southeast (Brandt, 1974; Subba Rao, 1989; Kruglov & Starobogatov, 1993; Aksenova et al., 2018).

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