

THE GENUS *Lymnaea* (LAMARCK, 1799) FROM SOUTHERN
MESOPOTAMIA: ARE THE MORPHOLOGICAL AND
ANATOMICAL STUDIES ENOUGH TO SOLVE ITS
COMPLEXITY?

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ABSTRACT

Many different morphs of the subgenus *Radix* sp were morphologically and anatomically studied from different sites of Garmat Ali river, Al-Hammar marshes and some pools near Garmat Ali river. The present study reveals that there is no real *Lymnaea auricularia* in Mesopotamia region, and possibly, *L. cor*, *L. gedrosiana*, *L. canalifera* and *L. euphratica*, represent the molluscs fauna of Mesopotamia. However, the DNA sequences of this cryptic subgenus is required to complete our view about it.

INTRODUCTION

Lymnaeid shells display a wide variability. Almost 1800 Lymnaeid species and forms have been described on the basis of shell morphology. Hubendick (1951) estimates the number of recent world species, that are significantly different in anatomical structures, at about 40 species.

It is currently known that the anatomical structure of the Lymnaeid reproductive organ is of much more taxonomic value than the shell (Jackiewicz, 1998). So, for example, according to the recent study of Jackiewicz (1998), only eleven Lymnaeid species have been found to exist in Europe on the basis of anatomical structure of their reproductive organs. On the other hand, species described in recent years in European parts of the former U.S.S.R. have not taken into consideration, because of the opinions of Russian malacologists on the Lymnaeid taxonomy, as well as on that of other snail and bivalve groups, raised great doubts and are not accepted by all European specialists (Jackiewicz, 1998).

The genus *Lymnaea* is divided into five subgenera: *Galba*, *Radix*, *Myxas*, *Stagnicola*, and *Lymnaea s.str.* (Jackiewicz, 1998).

The previous studies on the genus *Lymnaea* like that of Annandale and Prashad, (1919), and the present study agree together that there may be only the subgenus *Radix* exist in Mesopotamia. However, the other subgenera are exist in Iran, like the subgenera *Galba*, *Stagnicola*, and *Lymnaea s. str.*, three species of these, *L. G. truncatula*, *L. S. palustris* and *L.L. stagnalis*, in addition to the species of the subgenus *Radix*: *L.R. auricularia*, *L.R. gedrosiana* and *L.R. peregr*, were listed by Mansoorian (1994).

R. auricularia, *R. natalensis*, *Galba truncatula* and *Stagnicola palustris*, another species were recorded from the Arabian peninsula (Neubert, 1998). *L. stagnalis*, *S. palustris*, *R. auricularia*, *R. peregra* from Turkey (Geldiay and Bilgin 1969).

Annandale and Prashad (1919) described five species of the subgenus *Radix* from Mesopotamia, *L. cor*, *L. gedrosiana*, *L. canalifera* and *L. euphratica*. We exclude *R. hordeum*, because we think that this species was only known in what may be a subfossil state, and it had been found on the banks of the lower Euphrates at two places, in Seistan, and in the Afghan desert. Anyway, we ignore this species, because it is no longer used in adjacent countries. So the present study focus and throws light on the described species by Annandale and Prashad (1919), in addition to many different morphs from our region which need more work, especially the DNA sequences of these different populations.

MATERIALS AND METHODS

The snails were collected with a sieve or dredged from Garmat Ali river, Al-Hammar, and some pools near Garmat Ali river. The samples were put into 70% ethanol. Some of the specimens were sent to German laboratories for further phylogenic analysis. The dissections and measurements of the shell and genital organs were carried out using variner caliper and stereomicroscope with an eyepiece-micrometer.

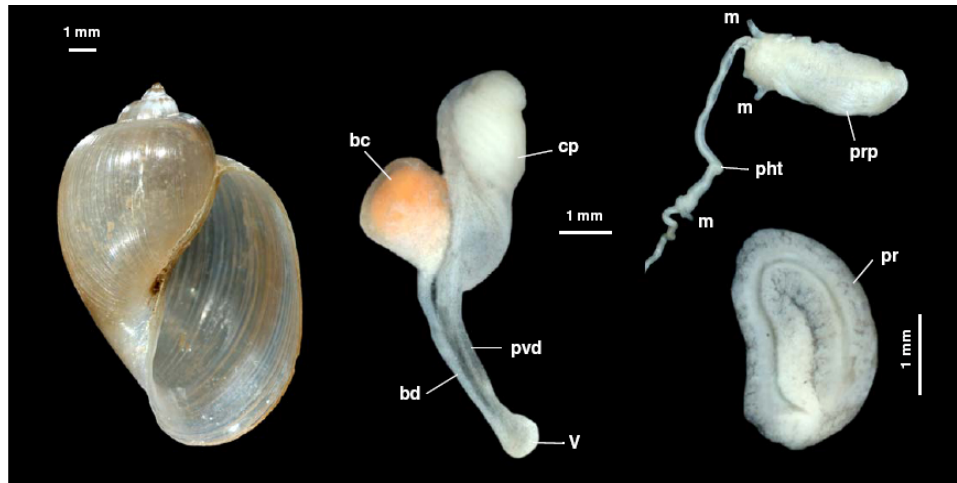
RESULTS AND DISCUSSION

Lymnaea cor Annandale and Prashad (1919) (fig. 1.a,b,c,d)

Limnaea cor, Annandale and Prashad, 1919. Rec. Ind. Mus. XVIII, p.111, pl. XIII, figs. 1-2.

More than fifty living specimens of this species which is widely distributed into our region were collected from Garmat Ali river, Al-Hammar marshes and some pools near Garmat Ali river. The morphs correspond to the drawings given by Annandale and Prashard, 1919: p.111, figs 1-2. The full morphological description was done for this species by Annandale and Prashard (1919), but unfortunately, without anatomical depiction. *L.cor* bears a resemblance, perhaps quite superficial, to certain forms of *L. auricularia* and allied species or races, but the direction of the

spiral, the form of the spire and body-whorl and especially the comparatively narrow, quadrate or subquadrate outline of the mouth are very different on actual comparison. In addition, according to the present study, the seminal vesicle of *L. auricularia* is long compared with *L. cor*. The maximum height of this species is 12 mm with maximum diameter of 9.5 mm. So we think there is no real *L. auricularia* in our region.



bc = bursa copulatrix, bd = bursa duct, cp = corpus pyriforme (uterus), m = muscle, pht = phallotheca, pr = prostata, prp = praeputium, pvd = prvaginal duct, v = vagina.

Fig 1a: Shell and genital organs of *L. cor*



Fig 1,b: *L. auricularia* from Germany

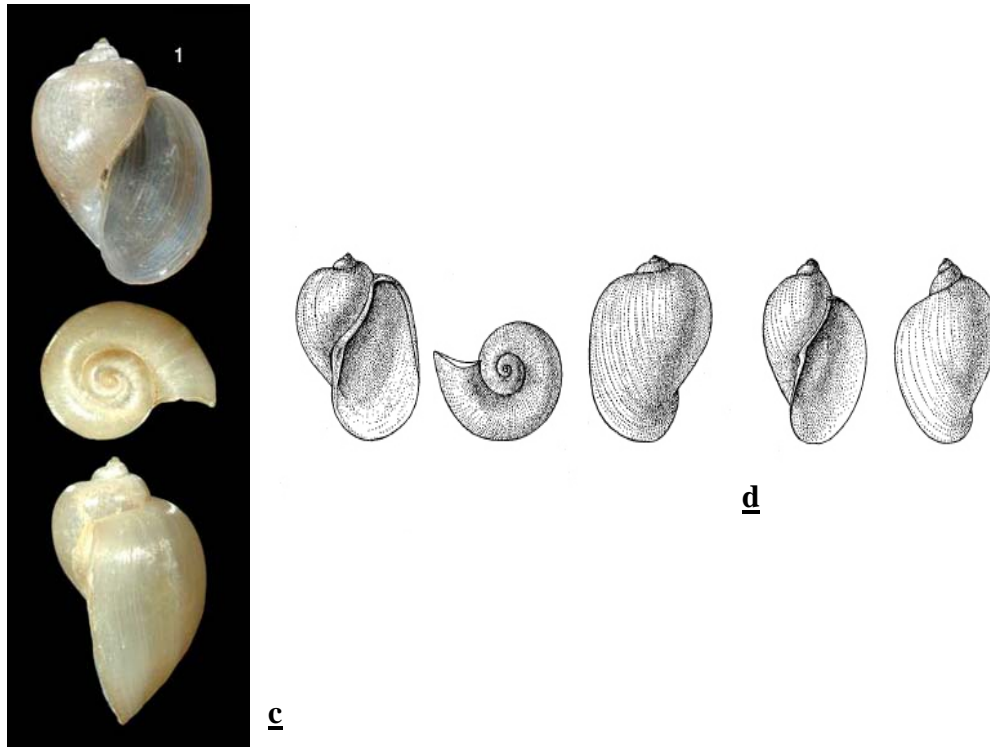


Fig 1, c : *L. cor*, Annandale and Prashad (1919) from North of Samara,
d: *L. cor*, from Al-Hammar marshes

Limnaea gedrosiana Annandale and Prashad (1919) (fig.2.a,b,c)

Limnaea subpersica, Annandale, 1918. Rec. Ind. Mus. XV, p.146, pl.xx, fig.5

Limnaea gedrosiana, Annandale and Prashad, 1919. Rec. Ind. Mus. XVIII, p.48, pl.vii, figs. 2-4.

We studied eleven living specimens of this species, collected from some pools near Garmat Ali- river. The morphs correspond to the drawings given by Annandale and Prashard, 1919: p.48, figs 2-4. The shell is not thicker or less fragile, possess much stronger and longitudinal ridges on the body whorl. There is no spiral sculpture. The mouth of the shell is a little narrow. The largest shell is 10mm high and its maximum diameter is 7mm. The genitalia of the male and female parts are variable in length.



Fig 2,a *L. gedrosiana* collected from some pools of Garmat Ali river

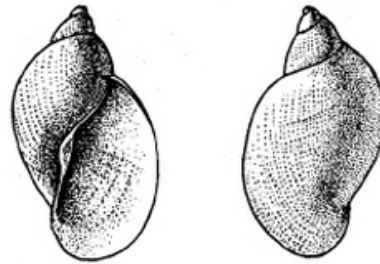


Fig 2, b *L. gedrosiana* (Annadale and Prashad, 1919) From Khandag Creek, Basrah

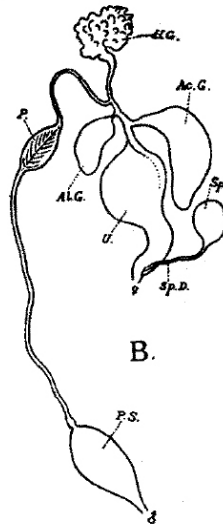


Fig 2, c *L. gedrosiana* Annandale and Prashad (1919) from Al-Khandag creek, Basrah

Limnara peregra canalifera Annandale and Prashad (1919) (fig.3.a,b,c)
Limnaea canalifera, Mousson, 1874. Journ. de Conchyl. XXI, p.41
Limnaea peregriformis, Annandale, 1918. Rec. I nd. Mus. XV, p.165, pl. xx, fig.4.

Limnaea peregra canalifera, Annandale and Prashad, 1919. Rec. Ind. Mus. XVIII, P.108, p l. XIV, figs 1, 2).

Six shells of *L. canalifera* were collected from Al- Hammar Marshes. Unfortunately, living specimens of this species couldn't be collected from our region, so we depend on the shells which correspond to the drawings given by Annandale and Prashad, 1919: p.108, figs 1-2. Supporting with anatomical and morphological figures depicted by Annandale and Prashad (1919), maximum length is 21mm with a diameter of 15 mm.



Fig.3,a *L. peregra canalifera* from Al-Hammar marshes (1919)

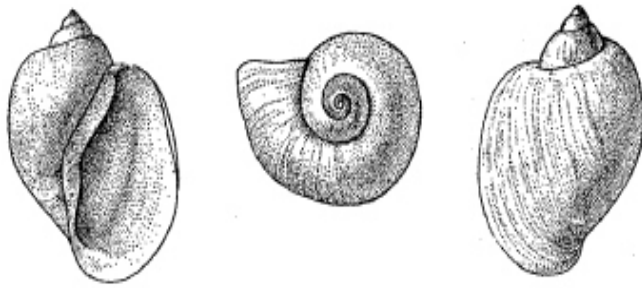


Fig.3,b *L. peregra canalifera* Annandale and Prashad From Al- Khandag creek, Basrah

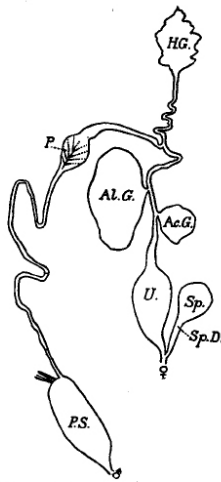


Fig.3,c Anatomy of *L. peregra canalifera* Annandale and Prashad (1919) from Al- khandag creek, Basrah

Lymnaea tenera euphratica Mousson(1874) (fig.4.a,b,c)

Limnaea euphratica, Mousson, 1874. Journ, de Conchyl. XXI, p.40

Limnaea tenera, Annandale, 1918. Rec. Ind. Mus. XVI, p.165, pl.xx, fig.3

Limnaea tenera euphratica, Annandale and Prashad, 1919. Rec. Ind. Mus.XVIII, p.113, pl.XIII, figs. 3-5

Unfortunately, we couldn't be able to collect this species from all sites, so we depend on a photo given by Ahmed (1975). At the first sight the shell looks like a connecting link between *L. peregra canalifera* and *L. cor*, but many differences from both appear on a close inspection. The maximum height is 13 mm and is 8 mm in diameter.



a



b

Fig. 4. *Lymnaea tenera euphratica*, a and b from Ahmed (1975), a, ventral view b, dorsal view

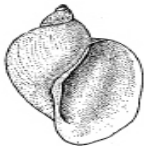


Fig. 4, c: ventral and dorsal view of *L. tenera euphratica* after Annandale and prashad (1919)

c

REMARKS

There are many other forms that still make a confusion in identification of this group. Therefore, we sent some of them to German laboratories for the DNA sequencing analysis. All these species form regular population as distinct species and other are aberrant species (plates 1,2,3). Nor the difference in shell morphology or in mantle pigmentation are enough to put a sense about this cryptic subgenus. Izzatulaev *et al.* (1983) and Kruglov and Starobogatov (1989), presented a key for the former U.S.S.R. from Central Asia, from Siberia and the Far East of the U.S.S.R, respectively. They depended on relatively slight quantitative differences in the praeputium, penis sheath lengths and considered them to be enough, in some cases, to regard two forms as distinct species. On the other hand, it is not wholly clear, if such slight differences are enough for the estimation of a species rank. However, nobody can tell definitely, what degree of differences is enough to distinguish among different species. It is a general problem that exist both in Russian and traditional European taxonomy. The most recent study on European genus *Lymnaea* was conducted by Barges *et al.* (2001), the phylogenic analysis of this study revealed many new species added to the European fauna. We think that we still in need of such studies on our poorly studied *Radix* group in the future in order to complete our view about this subgenus.

ACKNOWLEDGMENTS

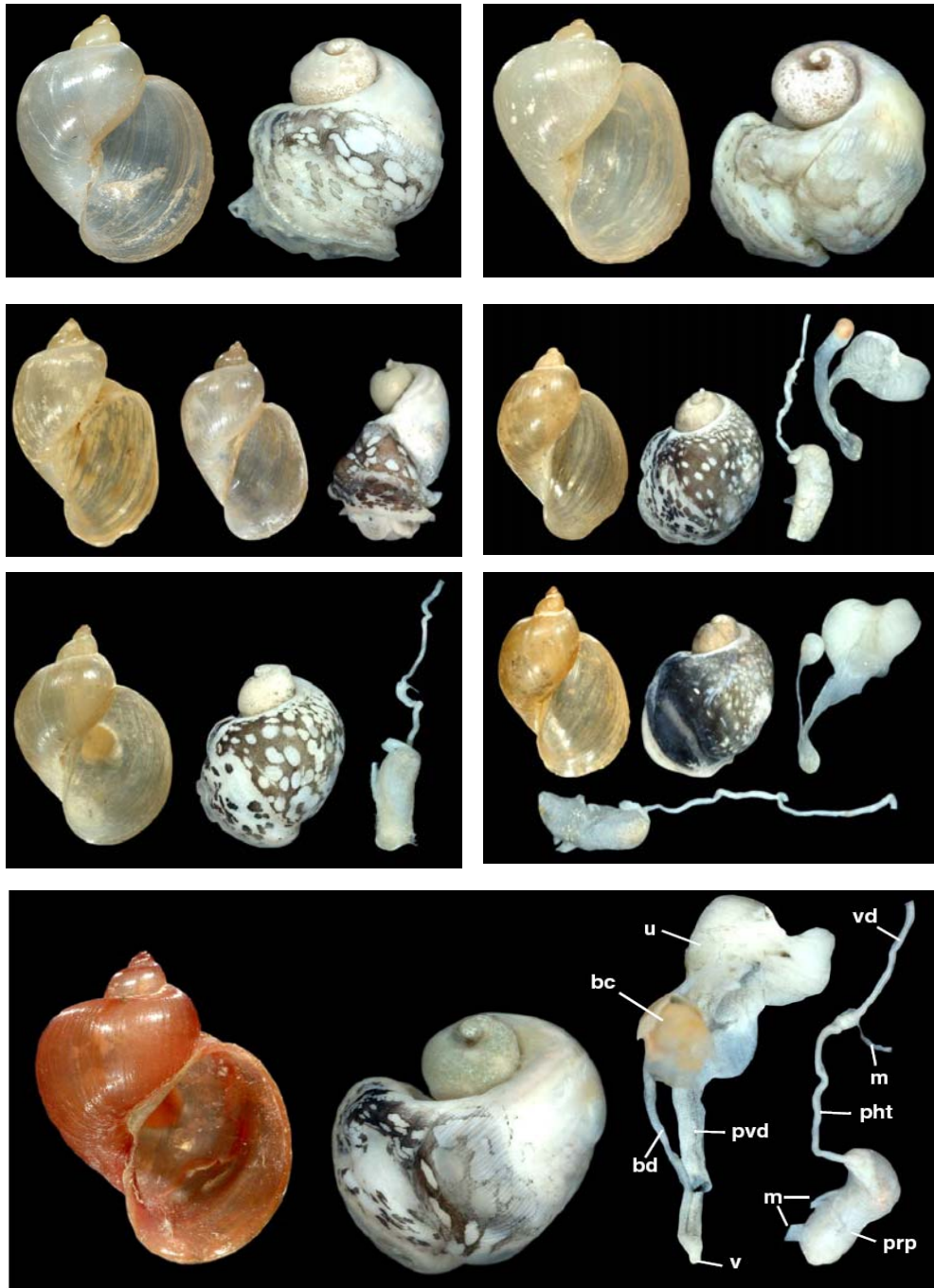
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Plate1 : different morphs of *Radix* sp. from Al-Hammar marshes



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bc = bursa copulatrix, bd = bursa duct, m = muscle, pht = phallotheca, prp = praeputium, pvd = provaginal duct, u = uterus, v = vagina

Plate 2: different morphs of *Radix* sp. from Garmat-Ali river

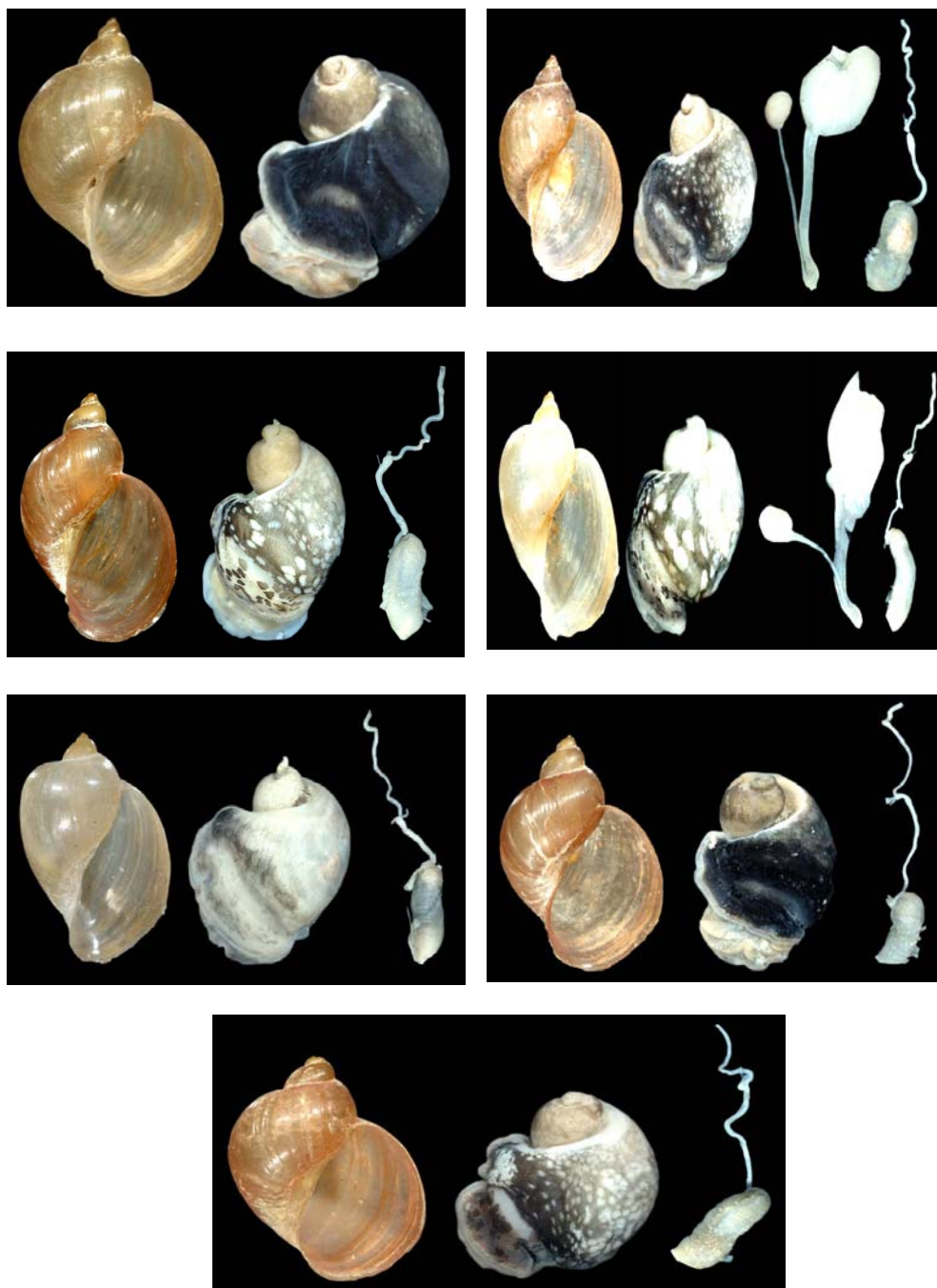


Plate 3: different morphs of *Radix* sp. From some pools near Garmat-Ali river

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