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**A NEW SPECIES OF LAND MOLLUSCS FROM SOUTHERN ARMENIA *HARMOZICA ZANGEZURICA* SP. NOV. (PULMONATA, HYGROMIIDAE), WITH A KEY TO CAUCASIAN SPECIES *HARMOZICA* LINDHOLM, 1927**

**N.V. GURAL-SVERLOVA<sup>1</sup>, A.L. AMIRYAN<sup>2</sup>, R.I. GURAL<sup>1</sup>**

<sup>1</sup>State Museum of Natural History, National Academy of Sciences of Ukraine, Lviv, Ukraine  
sverlova@pip-mollusca.org

<sup>2</sup>Biogeotech LLC, Qouchak str. 12, Yerevan, 0065, Yerevan, Armenia  
armen.amiryan@gmail.com

One new species of the genus *Harmozica*, similar to the widespread in the Caucasus *Harmozica (Diplobursa) pisiformis*, is described from Southern Armenia (Syunik Region). The shell of *Harmozica zangezurica* sp. nov. different from *H. pisiformis* by slightly higher shape and more reflexed columellar margin of the aperture, which covers at least half of the narrow umbilicus. The clear anatomical difference of the new species from *H. pisiformis* and other species of the genus *Harmozica* is very large vaginal appendages, the length of which is approximately equal to the total length of the penis and epiphallus. A key to the Caucasian species of *Harmozica* is provided.

*Land molluscs – Harmozica – new species – Armenia – Caucasian Region*

Հայաստանի հարավից (Սյունիքի մարզ) հավաքված նյութի հիման վրա նկարագրվում է *Harmozica* ցեղի նոր տեսակ, արտաբնապես նման Կովկասում լայն տարածված *Harmozica (Diplobursa) pisiformis* տեսակին: *Harmozica zangezurica* sp. nov.-ի խեցին տարբերվում է *H. pisiformis*-ից մի փոքր ավելի բարձր և ավելի շրջված կողմնայար եզրային բերանով, որը ոչ պակաս, քան կիսով չափ փակում է նեղ պորտը: Նոր տեսակի հստակ անատոմիական տարբերությունը *H. pisiformis*-ից և *Harmozica* ցեղի այլ ներկայացուցիչներից համարվում են շատ մեծ (խոշոր) հեշտոցային կցորդները, որոնց երկարությունը մոտավորապես հավասար է պենիսի և էպիֆալուսի ընդհանուր (զումարային) երկարությանը: Տրված են որոշիչ բանալիներ Կովկասյան *Harmozica* ցեղի տեսակների համար:

*Ցամաքային փափկամարմններ – Harmozica – նոր տեսակ – Հայաստան (Հայաստանի Հանրապետություն) – Կովկասյան տարածաշրջան*

По материалам с юга Армении (Сюникская область) описан новый вид рода *Harmozica*, внешне похожий на широко распространенный на Кавказе вид *Harmozica (Diplobursa) pisiformis*. Раковина *Harmozica zangezurica* sp. nov. отличается от *H. pisiformis* немного более высокой формой и сильнее отвернутым колумеллярным краем устья, не менее чем наполовину прикрывающим узкий пупок. Четким анатомическим отличием нового вида от *H. pisiformis* и других видов рода *Harmozica* являются очень крупные вагинальные придатки, длина которых приблизительно равняется суммарной длине пениса и эпифаллуса. Дан ключ для определения кавказских видов рода *Harmozica*.

*Наземные моллюски – Harmozica – новый вид – Армения – Кавказский регион*

The genus *Harmozica*, which Eastern European authors often referred to as *Stenomphalia* [7, 8], in the Caucasus region has so far been represented by four recognized species [5, 8], belonging to the subgenus *Harmozica* s. str., *Stenomphalia*, *Diplobursa* and *Batumica*. According to Schileyko [5, 7] the subgenus *Diplobursa* is represented both in the Caucasus and in the world fauna by the single much variable species *Harmozica* (*Diplobursa*) *pisiformis* (L. Pfeiffer, 1846). Other described forms, including the forms at species level [2, 3], were reduced to the synonyms of this species [5, 8].

However, the mentioned large intraspecific variability of *H. pisiformis* concerns mostly conchological characteristics: shape and size of the shell, the granular sculpture on its surface [1, 2, 5]. The anatomical study of different forms didn't show significant differences between them, including the relative size of the vaginal appendages [1, fig. 110]. During the study of the land molluscs of the Southern Armenia (Syunik Region) in May 2016 we have found one previously unknown species of the subgenus *Diplobursa*, conchologically similar to *H. pisiformis*, but having a clear anatomical difference from this species and other species of the genus *Harmozica*, expressed in a relatively large length of the vaginal appendages, not typical of the *Harmozica* [5].

**Materials and methods.** The material was collected in May 8, 2016 near Chakaten village (Syunik Region, Armenia), en route from Kapan town to the Shikahogh Nature Reserve. The following species of land molluscs were collected at the same time in the same area: *H. pisiformis*, *Xeropicta derbentina* (Krynicky, 1936), *Helix lucorum* Linnaeus, 1758. The type material is deposited in the State Museum of Natural History of the National Academy of Sciences of Ukraine, Lviv, Ukraine (SMNH NASU).

The fixation and preparation of the holotype, the measurement of the shells were made by the standard methods. The height of the shells, their large and small diameters were measured [5]. The large diameter corresponds to the maximum width of the shell. The whorls number was determined by the scheme in the monograph [6].

**Results and Discussion.** The systematic position of the new species:

Superfamily Hygromiidea Tryon, 1866

Family Hygromiidae Tryon, 1866

Subfamily Monachinae Wenz, 1930

Genus *Harmozica* Lindholm, 1927

Type species: *Helix ravergiensis* A. Férussac, 1835, by original designation

***Harmozica* (*Diplobursa*) *zangezurica* sp. nov.** Fig. 1, 2, 3A

**Type locality.** Vicinities of Chakaten village, Syunik Region, Armenia, 39°06.59'N, 46°28.09'E, 1164 m asl (holotype), 39°10.53'N, 46°26.02'E, 1115 m asl (paratype).

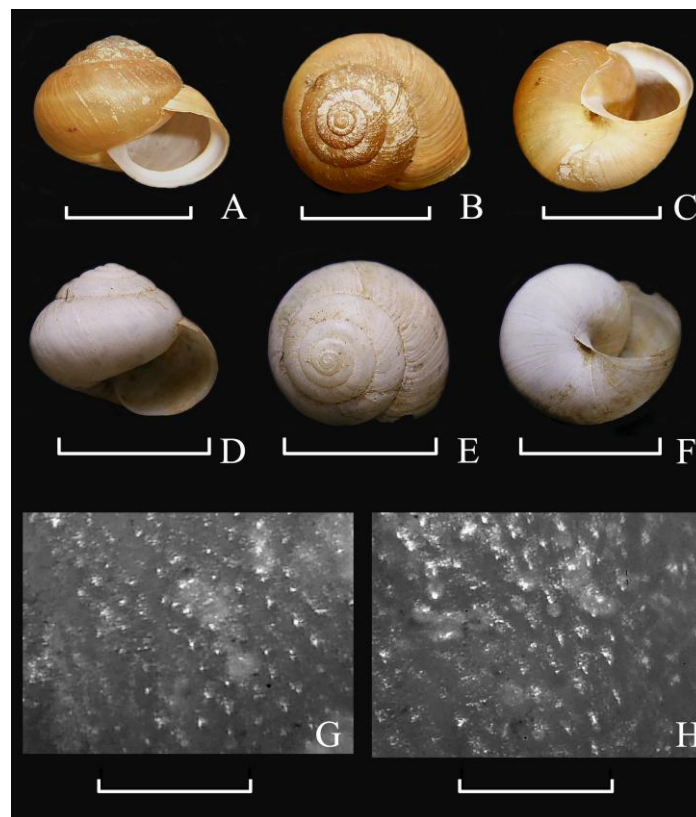
**Type material.** Holotype (SMNH NASU 3908), mature specimen, shell and soft body (dissected) (fig. 1 A-C, 2) and one paratype (SMNH NASU 3909), shell of the immature specimen (fig. 1 D-F) from the type locality, 8 May 2016, coll. N.V. Gural-Sverlova.

**Etymology.** The scientific name is derived from the name of the natural and historical area in the south of Armenia (Zangezur).

**Diagnosis.** New species differs from other species of the genus *Harmozica* by very large vaginal appendages, the length of which is approximately equal to the total length of the penis and epiphallus. Shell spire high, dome-shaped, its height is almost equal to the height of the aperture. Shell surface covered with granular sculpture. Columellar margin of the aperture widely reflexed and covers at least half of the umbilicus.

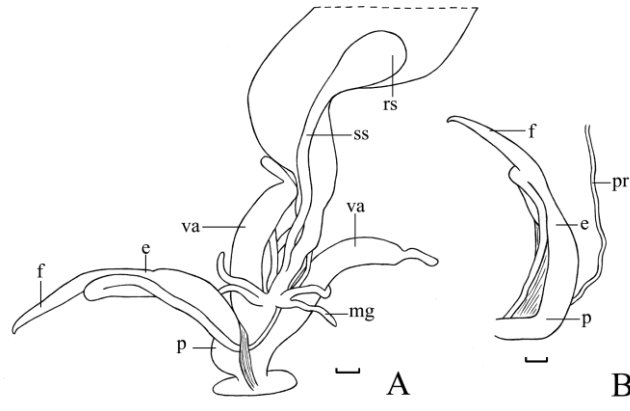
**Dimensions.** Shell of holotype: height 11.1 mm, width (large diameter) 13.9 mm, small diameter 11.6 mm, whorls number 5.6. Shell of paratype: height 9.3 mm, width 11.1 mm, small diameter 9.9 mm, whorls number 5.4.

**Description. Shell (holotype)** (fig. 1 A-C) globular, with the high, dome-shaped spire. The height of the spire is only slightly less the height of the aperture. Whorls relatively convex. The last whorl before the aperture sharply lowered, almost twice as wide as the penultimate whorl. Colouring corneous, almost monochrome, with fuzzy light spiral band on the periphery, visible only in the first half of the last whorl. Shell surface with irregular radial striation and numerous fine round or oval granules (fig. 1G, 1H). Aperture large, nearly round shape. Aperture margins thin, slightly reflexed; columellar margin widely reflexed, at least half covering the narrow umbilicus. Inside the aperture, parallel to its margins, well developed white lip extends.

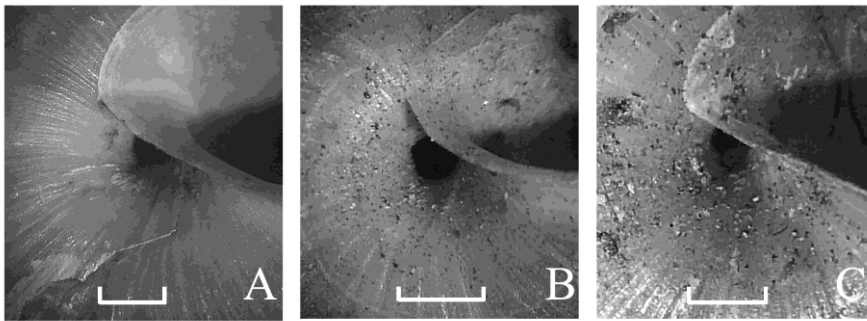


**Fig. 1.** Shells of *Harmozica zangezurica* sp. nov.: A-C – holotype; D-F – paratype; G, H – surface sculpture of the penultimate (G) and the last (H) whorl of the holotype. Scale bars 1 cm for A–F, 0.5 mm for G and H

**Reproductive system (holotype)** (fig. 2). Mucous glands 4, each dichotomous split at the base. Vaginal appendages not approached, very large, their length approximately equal to the total length of the penis and epiphallus. Vaginal appendages clearly separated into swollen long cylindrical trunk, a narrow neck and a terminal thickening. Penis curved, 2 times shorter than the epiphallus. Flagellum 1,5 times shorter than the epiphallus. Penial papilla with numerous longitudinal folds inside, its outlet with corrugated edges. Penial retractor long and thin.



**Fig. 2.** Distal parts of the reproductive system of *Harmozica zangezurica* sp. nov.: e – epiphallus; f – flagellum; mg – mucous glands; p – penis; pa – penial papilla; pr – penial retractor; rs – reservoir of spermatheca; ss – spermathecal stalk; va – vaginal appendages. Scale bars 1 mm.



**Fig. 3.** Reflexed columellar margin of the peristome and umbilicus in various *Harmozica* species, distributed in Armenia: A – *H. zangezurica* sp. nov., holotype; B – *H. pisiformis*, Meghri pass; C – *H. selecta*, Kapan, Norashenik. Scale bars 1 mm.

**Ecology.** It needs further study. The holotype of *H. zangezurica* was collected on the edge of the deciduous forest, the paratype (empty shell) on a steep open slope with sparse herbaceous vegetation, above which were trees and bushes. Perhaps this species inhabits a wide range of biotopes, with different lighting and humidity, like *H. pisiformis* [1, 5]. It is also possible that the spreading of *H. zangezurica* is confined to trees and shrubs, and the empty shell of this species could be brought to the open dry slope with the melt or rain water.

**Distribution.** The new species is known so far only from the type locality. The distribution area of *H. zangezurica* needs to be clarified, since this species could be previously mistaken for conchologically similar species *H. pisiformis*, widespread in Armenia [1] and generally all over the Caucasus region [5]. It is possible, that *H. zangezurica* inhabits a very small area and therefore requires further study and protection.

**Remarks.** *H. zangezurica* clearly differs anatomically from other species of the genus *Harmozica*, in particular from the conchologically similar *H. pisiformis*, by very long vaginal appendages. In general, the genus *Harmozica* is characterized by short

vaginal appendages [5]. In *H. zangezurica* the length of the vaginal appendages is approximately equal to the total length of the penis and epiphallus (fig. 2A). In other known species of the genus *Harmozica* a relative length of the vaginal appendages is 2-3 times less, so that the vaginal appendages are not longer than penis. As long as those in *H. zangezurica*, the vaginal appendages in the genus *Hesseola*, belonging to separate subfamily Hesseolinae [8]. However, in *Hesseola* the vaginal appendages are close together, which is not observed in *H. zangezurica*.

Shells of *H. zangezurica* in shape, color, size and sculpture of the surface are very similar to the shells of the widespread in the Caucasus species *H. pisiformis*, what may cause by the difficulties in differentiation of these species. Shells of *H. zangezurica* have higher spire, more reflexed columellar margin of the aperture, which more covers the umbilicus. In *H. pisiformis* the umbilicus is usually only slightly covered with columellar margin of the aperture (fig. 3B), while in *H. zangezurica* it is covered at least by half (fig. 3A). This difference is clearly seen also in incompletely formed shells (fig. 1F).

In *H. pisiformis* the ratio of the shell height to its width (large diameter) commonly ranges from 0.6 to 0.7. However, in populations of this species sometimes occur specimens with more flattened or higher shells [2]. Highest shells of *H. pisiformis* may resemble the shells of *H. zangezurica*, in which the ratio of height to width of the shell is 0.80 (holotype) – 0,84 (paratype). Therefore, this shell ratio can play only secondary importance in the differentiation between *H. zangezurica* and *H. pisiformis*.

In *Harmozica (Stenomphalia) selecta* (Klika, 1894), also widespread in Armenia, the umbilicus can also be a half covered with the columellar margin of the aperture (fig. 3C). However, the lapel of this margin is not as wide as that of *H. zangezurica* (fig. 3A). In addition, the shells of *H. selecta* have no granular sculpture, which is characteristic of a *H. zangezurica*. The shell surface of *H. selecta* is covered with thin spiral grooves, that are absent from other species of *Harmozica* [1, 5].

**Key to the Caucasian species of the genus *Harmozica***

1. Shell surface with granular sculpture..... 2  
 – Shell surface without granular sculpture..... 5
  
2. Shell usually gray, sometimes light corneous, with a clear light-coloured spiral band on the whorls periphery. Above and below the light band the shell can be painted a much darker background color. Grounds of the vaginal appendages not swollen. Flagellum and epiphallus about the same length.....  
 .....*Harmozica (Harmozica) ravergiensis* (A. Férussac, 1835)  
 – Shell from light corneous to dark chestnut. Light-coloured spiral band is missing or fuzzy. Flagellum 2-3 times shorter the epiphallus or the grounds of the vaginal appendages visibly swollen.....3
  
3. Aperture margins, with the exception of the columellar, only slightly turned outwards. Shell colouring from a light corneous to dark brown. Grounds of the vaginal appendages visibly swollen ..... 4  
 – Not only the columellar but also the palatal margin of the aperture is strongly turned outwards. Shell coloration is very dark, chestnut or brown. Vaginal appendages almost cylindrical, in shape and size not differing much from the mucous glands.....*Harmozica (Batumica) maiiae* (Hudec & Lezhawa, 1969)
  
4. Umbilicus is only slightly covered with reflexed columellar margin of the aperture. Vaginal appendages short, their length does not exceed the length of the penis..... *Harmozica (Diplobursa) pisiformis* (L. Pfeiffer, 1846)

– Umbilicus at least half covered with reflexed columellar margin of the aperture. Vaginal appendages 2-3 times longer, their length is approximately equal to the total length of the penis and epiphallus..... *Harmozica (Diplobursa) zangezurica sp. nov.*

5. Shell surface is covered with thin spiral grooves. Umbilicus is usually covered by half with reflexed columellar margin of the aperture. Grounds of the vaginal appendages moderately expanded, so that the appendages shaped like bowling pins.....*Harmozica (Stenomphalia) selecta* (Klika, 1894)

– Shell surface without spiral sculpture. The umbilicus open or slightly covered with reflexed columellar margin of the aperture. Vaginal appendages very swollen at the base .....*Harmozica (Diplobursa) pisiformis* (L. Pfeiffer, 1846), atypical form of this species, known as .....*Harmozica (Diplobursa) assadovi* (Likharev & Rammelmeyer, 1952) [3]

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