Faunistic spectrum of terraneous mollusks of Uzbekistan and bordering territories

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Abstract. The article presents a list of species of 11 families, their ecological and geographical characteristics. The features of the distribution of terrestrial mollusks in connection with the vertical geobotanical belt in the conditions of the mountain systems of Uzbekistan and adjacent territories have been studied. The ecological groups of terrestrial molluscs have been determined in relation to the moisture factor and habitats. The faunistic spectrum of terrestrial mollusks was studied based on the materials of our collections, the material for this work was collected in Karzhantau, Ugam, Pskem, Chatkal, Talass, Kuramin, Fergana, Alai, Turkestan, Zarafshan, Gissar, Nurata, Kugitagtangtau in Chirchiko-Akhangaran, Zarafshan, Kashkadarya and Surkhan-Sherabad valleys, as well as extensive collections of the Zoological Institute of the Russian Academy of Sciences, the Zoological Museum of Moscow University

1 Introduction

The malacofauna of Central Asia is very diverse. It is distinguished by its rich endemicity of species and generic rank, which is associated with its southern position and the diversity of the natural ecological environment. Currently, there are approximately more than 200 species of terraneous mollusks known in the fauna of Central Asia, whose systematic position has been studied quite well. At the same time, many aspects of their lives: biology, ecology, distribution, economic significance are investigated fragmentally. It should be noted that this aspect is affected in one way or another in many works devoted to the research of the Central Asian malacofauna. As a result, data on the species composition of terraneous mollusks were significantly replenished due to the inclusion of a number of species, new to the fauna of Central Asia; specified the boundaries of the ranges of a number of species; revision of the taxonomic position of certain forms; identified the identity of malacofaunas of different high-altitude zones. It should be noted that intensive and diverse investigated terraneous mollusks of Uzbekistan have been held mainly for the past 15-20 years, as a result, a large amount of material has been accumulated that has not yet been generalized. Having studied in detail the vertical distribution of terraneous molluscs, since knowledge of the distribution of mollusks in various types of biotopes and their vertical placement can serve as the main basis for the development of measures to

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combat mollusks that are pests of crops and intermediate hosts of helminths, and preventive measures against them.

As we know, a number of terraneous mollusk species are intermediate and reservoir hosts of cattle helminth and pests of agricultural plants, however, the number of species of economic importance is unknown to this day. Therefore, the fourth tasks of the article are to determine the number of species - intermediate hosts of helminths and to revise the composition of intermediate hosts of a number of nematodes of the researched territory and to find out the role of new and little-known species of terraneous mollusks in the life cycles of helminths.

2 Materials and methods

The actual basis of the article is based on the materials of our collecting carried out in the mountain ranges: Karzhantau, Ugham, Pskem, Chatkal, Talas, Kuramin, Ferghana, Alai, Turkestan, Zarafshan, Gissar, Nuratinsky, Kugitangtau, Baysuntau, Babatag and in Ferghana, Babatag and in the Ferghana, Chirchik-Akhangaran, Zarafshan, Kashkadarya and Surkhan-Sherabad valleys, as well as extensive collections of the Zoological Institute of the Academy of Sciences of Russia, the Zoological Museum of Moscow University.

3 Results and Discussion

In addition, the collections of Samarkand University, the Institute of Zoology and Parasitology of the Academy of Sciences of the Republic of Tajikistan were partially used. The researches have shown that the faunal spectrum of terraneous mollusks of Uzbekistan and bordering territories is very diverse (Table 1). The family Cochlicopidae in the research area is represented by one genus (Cochlicopa) and 8 species, which is 4.67% of malacofauna. Representatives of this family are widespread in the Palearctic. The following locations were found in the investigated territories. All species live in interzonal biotopes.

The family Orculidae in the research area is represented by 2 subfamilies: Orculinaei Lauriinae, the range of which covers the Mediterranean countries, the Canary and Azores Islands, Europe, Crimea, the Caucasus, Central Asia. Subfamily Orculinae is represented by one monotypic genus -Sphyradiium (range, as in the family as a whole). S. doliolum was found in our area, living in a large set of biotopes.

Lauriinae also consists of one genus and the species Lauriacylindracea. According to A.A. Shileiko (1984), its range covers the Primorsk regions of Europe from the islands of Bergholm and southern Norway along the Atlantic and Mediterranean coasts to Asia Minor, North Africa, Crimea, Transcaucasia, Dagestan and Kopetdag.

They were first discovered by us in Central Asia on the Kugitangtau peninsula. The Valloniidae family is very extensive, known in the Palearctic.

There are 2 subfamilies in the research area: Acanthinulinae (with 1 genus and species) and Valloniinae (with 1 genus and 3 species). Representatives of the genus Vallonia live in sufficiently moistened biotopes.

The subfamily Acanthinulinae. Acanthinulaaculeata in the researched area was first discovered on the Kugitangtau ridge. The natural range of this species includes Europe, North Africa, Crimea, the North Caucasus, Transcaucasia.

The Pupillidae family in the fauna of the territory under consideration is represented by 11 species (which is 6.43% of the malacofauna) belonging to 2 genera. The genus Gibbulinopsis with an area including the Caucasus, Central and Central Asia, the Far East and Japan.

3 species were found in the researched area, 2 of them (Gibbulinopsisgracilis, G. nanosignata) are endemic, known in the north-western part of the Pamir-Alai (Hissar, Turkestan ridges). Representatives of the genera Gibbulinopsis are very drought-resistant, they live in steppe, semi-desert and mountain steppe areas, where they are kept in small-block scree and dead plant remains.

Table 1. Faunal spectrum of terraneous mollusks of Uzbekistan and bordering territories.

Family of molluscs	Quantity		%	Number of types	%
	subfamilies	genus			
Cochlicopidae	-	1	2.22	8	4.65
Orculoidae	2	2	4.44	2	1.16
Valloniidae	2	2	4.44	4	2.32
Pupillidae	1	2	4.44	11	6.39
Vertiginidae	2	3	6.66	7	4.06
Chondrinidae	-	1	2.22	1	0.58
Puramidulidae	-	1	2.22	1	0.58
Buliminidae	1	8	17.77	53	30.81
Vitrindae	-	1	2.22	1	0.58
Bradybaenidae	-	2	4.44	17	9.88
Hygromiidae	5	12	26.66	38	22.09
Agriolimacidae	-	2	4.44	7	4.06
Limacidae	-	1	2.22	4	2.32
Parmacellidae	-	1	2.22	7	4.06
Ariophontidae	-	1	2.22	4	2.32
Gastrodontidae	-	1	2.22	1	0.58
Succinidae	-	4	8.88	6	3.48

The genus Pupillae of the studied territory is represented the fauna by 8 species, of which P. muscorum is Holarctic. The range of P. triplicata, P. bigranata, P. starii covers southern, central-western Europe, the North Caucasus and Transcaucasia, Asia Minor and Near East and mountainous areas of Central Asia. The ranges of P. gallae, P. turcmenica are limited to several mountain ranges. P. anzobica is found only on the Hissar ridge.

The range of the Truncatellinidae subfamily covers all continents except Australia, represented by 9 genera, in Central Asia - 2 genera (Columella, Truncatellina) and 5 species.

The genus Columella is Holarctic, includes 5 species. 3 species were found in the research area: C. columella, C. edentula, characterized by an extensive range, and C. intermedia - endemic to the Tien Shan. It was first discovered by us on the Pskov and Chatkal ridges. The range of the genus Truncatellina includes Europe, the Caucasus, Eastern, Southern Africa, Central Asia, and is represented in the rese region by 2 species living in dry plant remains on open slopes and in woodlands.

The family Chondrinidae in the studied territory is represented by one genus Chondrina, whose natural range includes Southern, Central Europe, North-West Africa, Crimea, the Caucasus, Near Asia, Iran, Kopetdag. It was first discovered by us on the Kugitangtau ridge.

The family Buliminidae in the malacofauna of Uzbekistan and adjacent territories is distinguished by the diversity and richness of species. It is represented here by 8 genus and 52 species of mollusks (30.40% of the malacofauna).

The area of the Pseudonapaeinae subfamily. Its range includes Transcaucasia, Iran, Afghanistan, India, Central and Central Asia. The total number of genus is at least 20, 6 genera, 45 species live in the research area, which is 26.31% of the malacofauna.

The genus Ottarosenia with the only species O. varenzovi is endemic to Kopetdag, first discovered on the Kugitangtau ridge.

The genus Pseudonapaeus in the malacofauna of Uzbekistan and neighboring territories is distinguished by the variety and richness of species. It is represented by 31 species of mollusks, which is 18.12% of malacofauna. Among them there are endemics with a narrow range, confined to certain mountain ranges. This is Ps. shahristanicus, characteristic of Turkestan, Ps. zaravshanicus - for Zarafshan, Ps. kasnakovi, Ps. otostomus - for Gissars, Ps.chodschendicus - for Kuraminsk, Ps. naukaticus - for Alai, Ps. goldfussi, Ps. arislanbobica - to the Ferghana ranges. The wider range is distinguished by Ps. sogdiana, Ps. eremita, common in Iran, Afghanistan, India, Kopetdag, on the Alai and Turkestan ranges. The range of the Turanena genus includes Transcaucasia, Northern Iran, Kopetdag, Himalayas, Pamiro Alai, Tien Shan, Western China. Ten species, accounting for 5.84% of the malacofauna, are found in the studied area. T. scalaris and T. herzi, which are widespread in Northwestern Iran, Armenia, and Mount Elbrus, have a wider range. In the studied area (Babatag, Baysuntau) were found for the first time. Narrow-areal endemics include T. cognata, T. stschukini, distributed only in the Western Tien Shan. There are species confined to certain mountain ranges. This is T. meshkovi, characteristic of the Pskem Range.

The genus Subzebrinus, with a single species S. labiellus, occurs only in the Tarbagatai, Zailisk and Dzungarian ranges. We first discovered it in the Western Tien Shan (in the Ugam and Pskem Ranges). Mastoides is an autochthonous genus. Two species (M. orloffensis, M. albocostatus), which are narrow-areal endemics of the Fergana Range, are represented in the studied area.

The genus Laevozebrinus in the fauna of the studied area is represented by 2 species. Both species are endemics: L. ujfalvyanus (Chatkal and Fergana Ranges) and L. lenis (Karzhantau Ridge).

The subfamily Chondrulopsininae is represented by two genera - Chondrulopsina (its areal covers mountainous areas of Central Asia, northern Afghanistan, western China) and Siraphoroides (known only on the Fergana Ridge).

The family Vitrindae in the studied territory is represented by a single genus and species Phenacolimaxannularis, whose range covers Europe, North Asia, Central Asia, is widely distributed in the mountain ranges of Karzhantau, Ugam, Pskov, Hissar, Baysuntau.

Family Bradybaenidae. The greatest diversity is observed in South-east Asia, in addition, the range of this family covers the Philippine Islands, Japan, some species penetrate into Europe. Two genus are represented in the Bradybaenidae in the studied territory: Bradybaena (younger), Ponsadenia (older). Genus Ponsadenia. Its range covers the Tien Shan, the Dzungarian, Tarbagatai and Western China ranges. On the investigated territory there are 2 species: P. duplocincta and P. semenovi. Of these, P. semenovi is distributed outside the studied territory - in Western China. Both species differ in their ecological characteristics. P. durliosinsta is a hygrophilous species, found in mountainous areas, inhabiting forested areas. P. semenovi can be found in all landscape-geographical zones. The range of the genus Bradybaena covers Central Asia, all of East Asia, north to Kamchatka, the Philippines and Japan. Two species inhabit Europe. There are 14 species in the studied area, which can be called endemics of the Tien Shan. Br.lantzi, Br. almaatini, Br. cavimargocavimargo have a wider areal: covers the mountain systems of Tien Shan, Pamir-Alai. The remaining species are confined to certain mountain ranges. These are Br. dichrozona, Br. saturata - Chatkal and Kuramin ranges. All species of this genus differ in their ecological features: Br. phaeozona, Br. almaatini, Br. dichrozona, Br. saturata inhabit among shrubs, on rubbly areas, Br.reglucens, Br. stoliczkana, Br. fedtschenkoi - under stones, are also confined to rocky talus. The Hygromiidae family in the malacofauna of Uzbekistan and adjacent territories is distinguished by the diversity and richness of species

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The Trichiinae subfamily covers Europe, the Mediterranean, the Caucasus and Central Asia, is represented by 5 genera, of which 3 genera (18 species) are endemic in Central Asia.

The genus Nanaja - endemic to Western Tien Shan - is represented by 2 species: N. cumulata, N. illuminata. Both species are narrowly localized until discovered in the Pskem Range. They live mainly in large-fragmented sedentary showers, not far from streams. Both species are narrowly localized, so far found in the Pskem Range. They inhabit mostly in coarse-clastic low-mobile screes, not far from streams.

The genus Odontoterma is an endemic of the Chatkal and Fergana Ranges and is represented by two species: O. diplodon and O. monodon. Both species occur in mountain areas at an altitude of 2,500-2,800 m above sea level. They live among shrubs and deciduous forests; they prefer wetter deciduous forests.

The genus Leucozonella is endemic to Central Asia; 14 species are currently known in the study area. The most widespread are Leucozonellacarauodes, L. rubens, L. mesoleuca, and L. rufispira, which inhabit Pamir-Alai and Tien Shan. The remaining species are endemics with a limited range: L. ferghanica, L. crassicosta, L.hypophaea, L. angulata - Western Tien Shan; L. schileykoi- only the basin of the Ak-suu River in the Turkestan Range, and L. globulifopmus - in the Alai Range. All species of this genus differ in their ecological features: L. ferghanica, L. angulata prefer wetter biotopes, not far from spring waters; L. mesoleuca, L. caria inhabit among bushes, in open areas; L. rufispira, L. retteri- are confined to coarse clastic rocky screes; L. hypophaea, L. schileykoi - to dry open rocky slopes.

The range of the genus Helicopsis includes Middle and Southern Europe, Crimea, Transcaucasia, Asia Minor, North Africa, Central Asia (Kopetdag, Kugitangtau). The only species in the studied area is H. likharivi, which inhabits open rocky slopes and was first discovered on the Kugitantau Ridge.

The range of the genus Xceropicta covers the Caucasus, Crimea, in some places along the northern shore of the Black Sea, the Balkan Peninsula, North-East Africa, Central Asia. Two species are known in the studied area: X.candaharica - with a wide area and X. kupiskii - distributed in places in the Chatkal, Alai, and Nurata Ranges. Both species are xerophilous.

Endemic subfamily. Archaicinae includes 4 genera. Its area of distribution is limited to mountainous areas of Central Asia. The range of the genus Archaica includes the Western, Southern Tien Shan and Alai ridge.

6 species were found in the investigated territory. The wide range is distinguished by A. heptapotamica - from the northwestern part of the Ferghana and the central part of the Talas ranges to the west to the westernmost spurs of the Tien Shan, the western part of the Kyrgyz range. The remaining species are endemic with a narrow range. A. apollinsis was found on the Ferghana and Alai, A.papanica – Alai, A. karjantauca – Karzhantau, A. eleorina – on the Zarafshan ridges. In ecological terms, representatives of this genus do not differ. In ecological terms, representatives of this genus do not differ. They live mainly in large - fragmented showers with high herbage.

The genus Hissarica (monotypic) with a single species H. incltatus is known only on the Zarafshan ridge. Leucarchaica is also a monotypic genus, represented by a single species L. rudimentifera, known only on the Fergana Ridge. The Euomphaliinae subfamily in the

research area includes the only (imported) genus Monacha and the species M. carthusiana, found on the northern slopes of the Turkestan ridge.

The range of the Paedhoplitinae subfamily is limited to the mountainous regions of Central Asia, its representatives originated locally from some Trichiinae, regardless of the European-Caucasian Hygromiinae and Euomphaliinae. It is represented by 2 genera - Angomphalia and Paedhoplita.

The genus Angiomphalia includes 5 species. Of these, A. regeliana is widely distributed across the Tien Shan and the northern spurs of the Pamirs. It lives in various biotopes, in flat zones - among thickets of grasses, near spring waters; in mountainous areas - among shrubs, prefers the northern slopes of hills.

The ranges of other species are narrow and narrowly localized. A. copisa is found only on the Chatkal ridge, A.exasperata, A. calestoimontana, A. seductilis - on the Central and Northern Tien Shan. It was first discovered by us in the northeastern part of the Ferghana Ridge.

The genus Paedhoplita in the research area is represented by 2 species: P. lentina - on the Ferghana and Chatkal ridges; P.buamica - in the eastern part of the Kyrgyz and northwestern part of the Ferghana ridges.

The range of the Agriolimacidae family. Its range covers almost the entire Holarctic, but most genera and species are characteristic of Mediterranean and coastal countries. In general, the family is represented by 6 genera. 2 - Deroceras, Lutopelte were found in the research area.

The range of the genus Deroceras includes most of the northern hemisphere.

Most species live in the Mediterranean subdistrict. There are 6 species in the research area. Inhabitants of very moist biotopes are often found along the shores of reservoirs.

The genus Lutopelte with a single species L. maculata in the research area was found on the southwestern slopes of the Fergana Ridge, in the valley of the Zarafshan River. It lives among plants, under rocks, as well as among shrubs, along mountain rivers.

The range of the Limacidae family. Its range covers Europe, the Mediterranean region of North Africa, the Caucasus, Near and Central Asia. It is represented by a total of 10 genera. Representatives of the endemic genus Turcolimax with 4 species are common in the research area. The wider range is distinguished by T. natalianus, common in Northern Tien Shan, Dzungaria, Tarbagatai and Western China. The range of T. turkestanus covers the Northern and Central Tien Shan. T. ferghanus is characterized by a narrow range – only the Chatkal ridge.

The range of the Parmacellidae family, according to I.M. Likharev and A.I. Victor (1980), consists of two parts isolated from each other: a) North Africa (from Alexandria to Morocco) together with Portugal and southern Spain; b) eastern Transcaucasia, Northern Iran, Kopetdag, Central Asia, Afghanistan. It is represented by 2 genera: Parmacella and Candacharia. Representatives of the genus Candacharia are distributed in the research area, whose range covers the mountain systems of the Tien Shan, Pamir-Alai, mountainous regions of Afghanistan and North-eastern Iran.

The genus Candacharia is represented by 7 species, 2 of which - C. izzatullai, C. langarika - are endemic with narrow ranges confined to certain mountain ranges (Zarafshan).

The family Ariophantidae. Most of its species, according to K. K. Uvalieva (1990), live in the tropics.

In Central Asia, it is represented by a single genus - Macrochlamys. There are 4 species in the research area. Among them, the most widely developed. schmidti – in all mountain systems of Central Asia. M. turanica, M. sogdiana are common in the Tien Shan and Pamir-Alai mountain systems. M. kasnakovi does not go beyond the Pamir-Alai.

The Gastrodontidae family. The main part of its species lives in the Western Palearctic. In the research area, the genus Zonitoides is represented by the only species, Z. nitidus, found in very moist biotopes.

The family Succineidae. The main number of its species also lives in the western part of the Palearctic, 4 genera are represented in the fauna of Central Asia.

The range of the genus Novisuccinea covers Central and Eastern Asia to the north – Kamchatka, the Philippines. 2 species were found in the research area: Novisuccineaevoluta, N.martensiana, widely distributed in Tien Shan, Altai, Transbaikalia, Tibet. The most characteristic habitats for these species are wet rocks near mountain rivers and streams, waterfalls, as well as alpine meadows, where they adhere to scree and rock outcrops.

The genus Pamirsuccinea is represented by a single species, P. eximia, distributed in Pamir-Alai. It lives near water in humid biotopes.The area of genus Oxyloma covers Europe, Caucasus and Central Asia. Two species of this genus inhabit the area of researches. *O. elegans* in the study area is found locally in the Turkestan, Alay, Fergana, Chatkal, and Alay Ranges in damp places near water, often among coastal vegetation. O. sarsi is widespread in Transcaucasia, Western Siberia, and Central Asia and inhabits the most humid biotopes.

The range of the genus Succinea includes Europe, the Caucasus, Altai, Siberia, and Central Asia. In general, the genus is represented by 3 species. Succineaputris inhabits in area of researches, in humid habitats, but excessive moisture is avoided, inhabits also flooded high grass meadows.

4 Conclusion

Having studied the faunistic spectrum of terrestrial mollusks in Uzbekistan and adjacent territories, the ecological groups of terrestrial mollusks in relation to the moisture factor and habitats have been determined. As a result, the data on the species composition of terrestrial molluscs have been significantly replenished by including a number of species new to the fauna of Central Asia; the boundaries of the ranges of a number of species have been clarified; revised taxonomic position of some forms; the originality of the malacofaunas of different altitudinal belts was revealed.

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