CLASSIFICATION OF TERRESTRIAL MOLLUSKS BY ECOLOGICAL GROUPS

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Abstract. *The ecological characteristics of terrestrial mollusks play a crucial role in understanding their biological traits and habitat preferences. This study reviews the ecological classification of terrestrial mollusks, highlighting hygrobionts, xerobionts, and xerohygrobionts based on proximity to water bodies and biotope conditions. The influence of abiotic factors such as temperature, humidity, and wind, alongside biotic factors including plants, fungi, and microorganisms, is considered. Food sources, particularly plants, significantly determine the distribution of mollusks across ecological groups. The study also considers feeding strategies, with Pulmonata representatives classified into eight groups: detritophages, micromycophages, macromycophages, lichenophages, phytophages, oligoxylophages, malacophages, and polyphages. Examples from families Pupillina, Pyramidulidae, Buliminidae, Hygromiidae, and Succineida demonstrate the relationship between diet, habitat preference, and ecological grouping.*

Keywords: *Terrestrial mollusks, ecological classification, hygrobionts, xerobionts, xerohygrobionts, Pulmonata, feeding strategies, biotic and abiotic factors.*

Аннотация. *Экологические особенности наземных моллюсков имеют ключевое значение для понимания их биологических характеристик и предпочтений местообитаний. В исследовании рассматривается экологическая классификация наземных моллюсков, выделяются гигробионты, ксеробионты и ксерогигробионты в зависимости от близости к водоемам и условий биотопа. Учитывается влияние абиотических факторов, таких как температура, влажность и ветер, а также биотических факторов, включая растения, грибы и микроорганизмы. Источники питания, особенно растения, существенно определяют распределение моллюсков по экологическим группам. Рассматриваются стратегии питания представителей Pulmonata, которые делятся на восемь групп: детритофаги, микромикофаги, макромикофаги, лишайникофаги, фитофаги, олигоксилофаги, малакофаги и полифаги. Примеры из семейств Pupillina, Pyramidulidae, Buliminidae, Hygromiidae и Succineida демонстрируют связь между рационом, предпочтениями местообитания и экологической классификацией.*

Ключевые слова: *Наземные моллюски, экологическая классификация, гигробионты, ксеробионты, ксерогигробионты, Pulmonata, стратегии питания, биотические и абиотические факторы.*

Studying the ecological characteristics of terrestrial mollusks is of particular importance, as it helps reveal many aspects of their biological traits. The ecology of terrestrial mollusks in Uzbekistan has been investigated by P.P. Arkhangelskiy [1], I.M. Likharev and E.S. Rammelmeyer [2], A.A. Schileyko [3, 4], I.M. Likharev and A.Y. Viktor [5], Z.I. Izzatullaev [6], A. Pazilov and D.A. Azimov [7], as well as A. Pazilov and other researchers.

Despite the extensive study of the ecological characteristics of terrestrial mollusks, the use of certain ecological terms remains a matter of debate to this day. Many malacologists consider it appropriate to apply terms such as xerophilous, mesophilous, psychrophilous, and

xeromesophilous to terrestrial mollusks. A. Schileyko [3], viewing hygrophily as a primary trait for all representatives of the superfamily Helicoidea, also regards the use of the above-mentioned terms as justified. K.K. Uvalieva [8] considers the use of the term *xerophilous* for mollusks inhabiting arid biotopes to be conditional. She includes so-called xerophiles within the mesophilous group. According to her, although these mollusks live in dry environments, their main vital processes occur during periods of precipitation. A. Pazilov and D.A. Azimov [8], taking into account the moisture-loving nature inherent to all terrestrial mollusks, regard the terms *xerobiont*, *mesobiont*, and *psychrobiont* as more appropriate for classification.

These terms were first applied to terrestrial mollusks by E.V. Shikov and A.A. Baydashnikov. Taking into account the considerations outlined above, we classified all terrestrial mollusks into a single major ecological group – **hygrophiles**. This approach is supported by the viewpoint of A. Schileyko [3] mentioned earlier. The subsequent subdivision of terrestrial mollusks into more specific ecological groups should therefore begin with this fundamental term.

In subdividing mollusks into more specific ecological groups, the approach used by E.V. Shikov – based on the biotopic distribution of terrestrial mollusks relative to water bodies – was taken as a reference. However, according to our classification, the species distribution does not correspond to Shikov's scheme. This discrepancy can be attributed to significant differences in the climates and landscape diversity between Uzbekistan and Russia.

Accordingly, we propose the following ecological classification for terrestrial mollusks:

1.**Hygrobionts** – this ecological group includes all mollusks inhabiting areas near water bodies.

2.**Xerobionts** – this group comprises mollusks living in various biotopes far from water bodies.

3.**Xerohygrobionts** – this group consists of mollusks that inhabit both areas near water bodies and more distant locations across diverse biotopes.

Certainly, the ecological classification outlined above cannot uniformly encompass all terrestrial mollusks. Mollusks included in the **hygrobiont** group exhibit varying degrees of hygrophily, just as those in the **xerobiont** group display different levels of xerophily. Similar patterns are observed among **xerohygrobionts**: some individuals exhibit more pronounced xerobiont traits, while others display stronger hygrobiont characteristics. Therefore, we consider that further scientific research is needed in this area.

Abiotic factors (such as temperature, humidity, and wind) and biotic factors (including plants, animals, and microorganisms) play a significant role in the formation of different ecological groups of terrestrial mollusks and in their distribution across diverse biotopes.

Throughout their life cycle, mollusks are influenced by the complex interaction of these factors. While all terrestrial mollusks are generally hygrophilous with respect to abiotic conditions, they may be photophobic or partially photophobic and eolophobic. Among biotic factors, plants – which serve as the primary food source for terrestrial mollusks – also occupy a leading role in their life processes.

According to Ya.I. Starobogatov [4], plants are not only a food source for representatives of the genus *Geophila*, but also one of the main factors determining the historical development of mollusks. According to Starobogatov [4], all representatives of the order Pulmonata are classified into eight groups based on their feeding habits: **detritophages, micromycophages, macromycophages, lichenophages, phytophages, oligoxylophages, malacophages,** and **polyphages**.

As noted above, food – specifically plants – plays a significant role in the distribution of mollusks across different ecological groups. For instance, many representatives of the subgenus *Pupillina* are micro- and macophagous, which allows them to inhabit both shaded areas and biotopes located farther from shade. *Pyramidula rupestris*, a member of the family Pyramidulidae, is a lichenophage and calcibiont, and therefore is found on rock surfaces and among rock crevices.

Representatives of the family Buliminidae are herbivorous polyphages, feeding on dead, dry, and decaying plant matter, as well as fungi and lichens. Consequently, among buliminids there are species that inhabit shaded areas, arid environments, and even rock crevices (e.g., *Turanena*).

The majority of buliminid representatives, however, primarily inhabit dry environments.

Members of the family Hygromiidae are also herbivorous polyphages. Like buliminids, hygromiids mainly inhabit dry biotopes, although species of the genus *Xeropicta* can also be found in shaded areas. All mollusks of the order Succineida live exclusively in moist biotopes along shaded and marshy areas. This characteristic is also linked to their diet, as they feed on unicellular aquatic plants.

The proposed ecological classification highlights the importance of moisture and biotope conditions in structuring terrestrial mollusk communities. While all mollusks exhibit varying degrees of hygrophily or xerophily, their distribution is influenced by both abiotic and biotic factors. Plant-based food sources play a central role in shaping habitat preferences and ecological grouping, as demonstrated by diverse feeding strategies among mollusk families. Further research is required to refine ecological classifications and understand species-specific adaptations in varied biotopes.

References

1. Иззатуллаев З.И. Два новых вида брюхоногих моллюсков сем. *Pomatiopaidae (Moll., Discopoda)* из Таджикистана // Докл. АН ТаджССР- 1979 в.-Т. 22, №10- С. 629-631.
2. Boettger O. Die Binnenmolusken Transkaspiens und Chorassans// Zoll.Jahrb. Abt. Sust.-1889.-Bd-4.-S. 925-927
3. Kobelt W. Die Familie Buliminidae. In: Martini, Chemnitz. Systemaitisches Conchylien-Cabinet, 1902, II Theil. S.397 – 401.
4. Старобогатов Я.И. Некоторые особенности распространения моллюсков в подземных вод Кавказа и Средней Азии// Тр. Зоол.ин-та АН СССР. Т.51.-М,-Л.: Старобогатов Я.И. Наука,1972.- С.165-172
5. Старобогатов Я.И. Система и филогения *Lymnaeidae (Gastropoda, Pulmonta, Basommatophora)* // Пробдеми зоол.-Л.: Наука, 1976.-С. 79-81.
6. Rosen O.B. Contribution a la faune malacologique terrestre du Turhestan (description de deux especes nouvelles // Feuille Jeunes Natur. 1897. – 170 s).
7. Lindholm W.A. Eun Beitrag zur kenntnis der Molluskenfauna der Krim // Arch. Moll, 1926. Bd. 58. S. 161 – 177
8. Kobelt W. Eine Stenogyra aus Turkestan // Nachrichtbl. dtsch. malak. Ges.,1904.Bd.36. H.2, S.87 – 90