



NEW RECORD OF DESMOULIN'S WHORL SNAIL *VERTIGO MOULINSIANA* DUPUY, 1849 (GASTRAPODA, VERTIGINIDAE) FROM CENTRAL ARMENIA

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Vertigo moulinsiana Dupuy 1849, Desmoulin's Whorl Snail is known as Vulnerable IUCN Red Listed species from Eurasia. In Armenia this species was recorded in the northern and southern parts of the country. In order to understand the current distribution and status of the species field works and sampling was conducted from 2018 to 2022 during spring and autumn seasons in different locations of Armenia. New location was recorded for the species close to the Lake Sevan.

Snail distribution – diversity – molluscs conservation

Vertigo moulinsiana Dupuy 1849 տեսակը գրանցված է Բնության պահպանության միջազգային միության (IUCN) Կարմիր ցուցակում՝ որպես «խոցելի»: Տեսակը տարածված է հիմնականում Եվրասիայում: Հայաստանում տեսակը նախկինում գրանցվել է հյուսիսային և հարավային շրջաններից: Տեսակի ներկայիս տարածվածությունն ու կարգավիճակը հասկանալու համար 2018-ից 2022 թվականներին զարնակային և աշնանային սեզոններին Հայաստանի տարբեր շրջաններում իրականացվել են դաշտային աշխատանքներ և նմուշառումներ: Սևանա լճի մերձակայքում նշվել է տեսակի համար նոր տարածման կետ:

Խխուղների տարածում – կենսաբազմազանություն – փափկամարմինների տեսակների պահպանումը

Vertigo moulinsiana Dupuy 1849, зарегистрированный в Международном Красном Списке (МСОР) как уязвимый вид. *Vertigo moulinsiana* в основном встречается в Евразии. В Армении вид встречается в северных и южных областях. Для того, чтобы понять текущее распространение и состояние вида, с 2018 по 2022 гг. в течение весеннего и осеннего сезонов в разных местах Армении проводились полевые работы и отбор проб. Для вида отмечено новое местонахождение вблизи озера Севан.

Распространение улиток – биоразнообразие – защита моллюсков

Armenia is situated in the Caucasus “hotspot”, recognized by both WWF and Conservation International as one of the most important places for biodiversity in the world, and is home to numerous endangered species [2, 7]. Molluscs diversity in

Armenia is presented with more than 160 species [3, 10]. Most of the molluscs distribution is known for Armenia, however, research related to the status of the populations was not conducted for an extended period of time. Genus *Vertigo* is presented with 6 species: *Vertigo angustior* (Draparnaud, 1801), *V. pygmaea* (Draparnaud, 1801), *V. pusilla* O. F. Müller, 1774, *V. nitidula* (Mousson, 1876), *V. moulinsiana* (Dupuy, 1849), and *V. antivertigo* (Draparnaud, 1801). Two species are included in the IUCN Red List: *V. moulinsiana* as Vulnerable species [5] and *V. angustior* as Near Threatened [6].

V. moulinsiana, is considered an Atlantic-Mediterranean species. However, in the southern regions species distribution is not well known [9]. *V. moulinsiana* prefers humid landscapes close to rivers, and lakes or occurs in the marshlands (Killeen, 2003). Species are included in Annex II of the European Union Habitats and Species Directive [2] and the IUCN Red List [6]. In Armenia species were known only from two locations in the south and the north parts of the country over 50 years ago [10].

As there is limited information on the *V. moulinsiana* species distribution in Armenia, the research aimed to evaluate the species distribution range and understand the conservation status of species in Armenia.

Materials and methods. Sampling was conducted from spring to autumn seasons, starting from May till October of 2018 and 2022 in Armenia. Sampling areas were selected according to the known data and possible areas where species could occur. One of the main criteria for sampling was vegetation around water bodies with the presence of the *Carex* genus. Sampling locations' sizes were between 4x4 m² to 7x7 m². Leaves of the plants were investigated for living individuals and upper layers of soil were sampled as well. Samples soil was examined in the laboratory of Zoology Department. Sampling sites were checked at least two times per year in the spring and autumn seasons. Only areas around Sevan Lake were checked four times per year. Information about sampling sites is provided in tab. 1.

Table 1. Sampling points for *V. moulinsiana*.

N	Sampling Locations	Coordinates	Notes
1	Megri	38.9011, 46.2437	Previously recorded location
2	Vandzor	40.8040, 44.4925	Previously recorded location
3	Tsovak	40.1817, 45.6166	New distribution point
4	Stepanavan	41.0092, 44.3846	Previously recorded location
5	Azat Reservoir	40.0716, 44.6055	New sampling point
6	Vanadzor village	40.1974, 45.2343	New sampling point
7	Spandaryan Reservoir	39.6794, 45.7885	New sampling point
8	Getik	39.7049, 45.5455	New sampling point
9	Kechut Reservoir	39.8233, 45.6628	New sampling point
10	Sevan Lake	40.4328, 45.1066	New sampling point
11	Sevan	40.5448, 44.9816	New sampling point
12	Aparan Reservoir	40.5054, 44.4385	New sampling point
13	Gosh Lake	40.7195, 45.0155	New sampling point
14	Parz Lake	40.7512, 44.9611	New sampling point
15	Arpi Lake	41.0469, 43.6467	New sampling point
16	Shvanidzor	38.9325, 46.3710	New sampling point
17	Tsav waterfall	39.0515, 46.4158	New sampling point

Results and Discussion. Out of investigated 17 sampling locations placed all over Armenia one individual of *V. moulinsiana* was recorded from area close to the south part of Sevan Lake, close to the Tsovak village during sampling in 2019 autumn season. This is a new distribution record for the species. However, during field trips in spring seasons from 2020 to 2022 *V. moulinsiana* was not recorded from the same location.

V. moulinsiana was not found from the previously registered 2 locations. Areas around city Megri where species was sampled previously was dried and were not inhabitable for species anymore. In the north part of the country close to the Stepanavan city despite habitat compliance individuals of the species were not recorded. Anthropogenic impact of local communities and presence of grass harvesting and grazing was recorded around possible species distribution sites.

Species was not recorded also from the rest of the sampling areas due to different reasons: inhabitable surroundings of water bodies, dry climate, and most of the time proper vegetation absence.

V. moulinsiana usually has small and geographically restricted distribution [1, 9]. The species appears to have limited microhabitats with strictly defined conditions to live. Some populations occupy small areas with rich fen, and the chosen places are sometimes waterlogged. However, the species was detected in surrounding areas of Sevan Lake with open grasslands. It shows that the distribution range of the species is larger than previously determined for the country. Still, the areas where species was detected for the first time have some ecological issue with different type of anthropogen press. They are used for grazing for domestic animals and this is creating conservation issues for the species as adult form of species prefer to rest on the grass surrounded by water bodies.

Conservation notes. *V. moulinsiana* is a small animal with low mobility so it's important to develop conservation actions for the species with low mobility and high environmental dependence. The first and foremost important step will be to include the species in the Red Book of Armenia with "Vulnerable" status. The species is highly conservation dependent and is susceptible to many pressures present in the lowland wetlands where it resides. Thus, the lack of other conservation interest in its habitat and the vulnerable nature of that habitat mean that future prospects suggest the further decline is anticipated, especially given the need for active conservation management. The ongoing losses of sites also make the remaining suite of populations more isolated and vulnerable [4]. In Armenia the species was found in 2 sites: Lori province in the north and south part of Armenia province Syunik, near Megri city, but now species does not occur there according to our investigations. However, species occurs in central part of the country with non typical habitat type which can result to a conclusion that new methods should be applied to this species distribution research.

Conclusion

New distribution site close to Tsovak Village was recorded for *Vertigo moulinsiana* species.

According to our result we can conclude that anthropogenic influence on the water bodies can be one of the factors impacting the distribution of *V. moulinsiana*.

V. moulinsiana is recommended to be included in the next revision of Red Book of Armenia as Vulnerable species as it has narrow distribution range and small population density.

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