

ALPINE SNAILS OF TURKEY

YILDIRIM Mehmet Zeki, KEBAPÇI Ümit

Abstract. The alpine land snails recorded from Turkey are evaluated and brief explanations about the taxa and their distributional records are given. Accordingly 59, 2 aquatic and 57 terrestrial, species and subspecies are enlisted according to literature data and field findings from the alpine areas in Turkey.

Keywords: high altitude, alpine land snails, endemism, Turkey.

Rezumat. Melci din regiuni alpine din Turcia. Sunt evaluați melcii regiunile alpine din Turcia și sunt date scurte explicații despre taxonii respectivi și distribuția lor. În consecință, sunt listate 59 specii și subspecii (2 acvatice și 57 terestre), conform datelor din literatură și constatările de teren din ariile alpine din Turcia.

Cuvinte cheie: altitudine mare, melci de teren alpin, endemisme, Turcia.

INTRODUCTION

The term alpine refers to mountainous areas above the tree line. Although changeable in its flora and abiotic factors like geological structure, the alpine zone is characterized by its vegetation lacking large trees and the presence of snow cover during the cold season; therefore, it is a harsh environment for many life forms. In higher altitudes, the diversity of the land snails decreases, while the endemism level is generally high (LICHAREV & RAMMELMEIER, 1952). Naturally, surveys in alpine regions are not very frequent. Except some studies, which concentrated on rather mountain areas, as in the case of STURANY (1905), in general, higher zones of mountains form only part of broader surveys. Accordingly, the knowledge about high altitude and alpine snails of Turkey is very scattered and based on outdated taxonomy. The present paper includes a preliminary list and a brief evaluation of the alpine land and freshwater snail fauna of Turkey.

MATERIAL AND METHODS

Using available literature and field observations, alpine land snails of Turkey are evaluated and a list of the determined taxa was compiled. Abbreviations for provinces: AG-Ağrı, AN-Antalya, AR-Artvin, BA-Bayburt, BU-Bursa, ER-Erzurum, DE-Denizli, GU-Gümüşhane, IS-Isparta, KA-Kars, KO-Konya, KS-Kastamonu, KY-Kayseri, ME-Mersin, MU,-Muğla, NI-Niğde, RI-Rize, TR-Trabzon.

RESULTS AND DISCUSSIONS

A total of 59 species and subspecies are compiled according to literature data and field findings from alpine habitats in various parts of Turkey (Tables 1 and 2); 2 of these are aquatic and the remaining 57 species consist of terrestrial species. In the tables (Tables 1 and 2), each family to which the listed species belong is given a separate line and within a line shading is used to clarify sequential separation between different sources.

Table 1. The high altitude aquatic snails of Turkey (for abbreviations see Material and Methods, [E]: endemic).

	Species	Province	Source
1	<i>Radix labiata</i> (MÜLLER, 1774)	KY	STURANY, 1905
2	<i>Planorbis carinatus</i> (MÜLLER, 1774)	AN	YILDIZ et al., 2005

The aquatic species that have been found in high altitudes are *Radix labiata*, which was found in Tekir Yaylası at 1850 and 2100 m (STURANY, 1905) and *Planorbis carinatus*, which was found in Eğrigöl at 2000 m (YILDIZ et al., 2005). In lower altitudes, however, species richness increases.

Land snail species are more numerous in comparison to aquatic snails due to their ability to withstand cold periods by hiding into crevices and dry periods by dormancy. Similar to the lowland dry areas, the species richness in the families Enidae, Hygromiidae and Helicidae is high (see Table 2). The members of these families are mainly thick shelled and dry adapted. However, high species numbers of the mesic groups Oxychilidae, Limacidae, and Clausiliidae is interesting. As it can be seen in Table 2, alpine Clausiliidae species (with exception of one species) are confined to Taurus mountains and the members of Oxychilidae and Limacidae all having Caucasian affinity are found in northeastern Anatolia. *Gallandia* (= *Oligolimax* auct.) species are characterized by their preference towards higher altitudes; however, in Turkey they can frequently be encountered also in altitudes lower than 1000 m as well as up to heights over 2500 m.

Table 2. The alpine land snails of Turkey (for abbreviations see Material and Methods, [E]: endemic, [A]: alpine only).

	Species	Province	Source
1	<i>Pyramidula rupestris</i> DRAPARNAUD, 1801	IS, NI	Original data; STURANY, 1905
2	<i>Pupilla inops</i> REINHARDT, 1877 [A]	KA	SCHÜTT, 2005
3	<i>Gibbulinopsis (Gibbulinopsis) interrupta</i> (REINHARDT, 1876) [A]	KA, ER	
4	<i>Columella columella</i> (MARTENS, 1830) [A]	AR, BU	SCHÜTT, 2005
5	<i>Schileykula scypus cilicica</i> HAUSDORF, 1996 [E]	NI	STURANY, 1905; HAUSDORF, 1996
6	<i>Sphyradium doliolum</i> (BRUGUIERE, 1792)	KY	
7	<i>Pseudochondrula blanda hedjinensis</i> (KOBELT, 1907) [A] [E]	ME	Original data
8	<i>P. madeni</i> SCHÜTT, 2005 [A] [E]	BA	SCHÜTT, 2005
9	<i>P. seductilis scapa</i> (PFEIFFER, 1853) [E]	KY, NI	STURANY, 1905
10	<i>P. tetradon</i> (MORTILLET, 1854)	AG,KA, ER	SCHÜTT, 2005
11	<i>Jaminia loewii loewii</i> (PHILIPPI, 1844) [E]	NI	STURANY, 1905, FORCART, 1940
12	<i>Chondrus zebrula tantalus</i> OLIVIER, 1801	NI	
13	<i>Paramastus oligogyrus</i> BOETTGER, 1898 [E]	KO, NI	
14	<i>Chondrula lycaonica</i> (STURANY, 1904) [E]	AN	Original data
15	<i>Andronakia catenulata</i> (LINDHOLM, 1913)	RI	
16	<i>Multidentula ovularis</i> (OLIVIER, 1801)	NI	STURANY, 1905
17	<i>M.squalina eudoxinus</i> (NAEGELE, 1894)	IS, NI	Original data, STURANY, 1905
18	<i>Discus (Discus) ruderatus ruderatus</i> (HARTMANN, 1821)	ER	SCHÜTT, 2005
19	<i>Vitrea ernesti</i> RIEDEL & SUBAI, 2004 [E]	IS	Original data
20	<i>Vitrea neglecta</i> DAMJANOV & PINTER, 1969	BU	SCHÜTT, 2005
21	<i>Vitrea hattiana</i> (RIEDEL, 1970) [E]	ER	
22	<i>Oxychilus (Ortizius) emmae</i> (AKRAMOWSKI, 1955) [A]	AR, ER, GU	SCHÜTT, 2005
23	<i>O. (Forcartiella) discrepans</i> (RETOWSKI, 1889) [A]	AR, RI	
24	<i>O. (Retowskiella) sumelensis</i> RIEDEL, 1989 [E]	RI	
25	<i>O. (R.) zilchi</i> RIEDEL, 1984 [A] [E]	TR	
26	<i>Daudebardia (Libania) naegelei</i> BOETTGER, 1905 [E]	NI	STURANY, 1905
27	<i>Turcozonites megistus</i> (ROLLE, 1894)	IS	Original data
28	<i>Gallandia annularis</i> (STUDER, 1820)	DE	Original data
29	<i>Gallandia olympica</i> HAUSDORF, 1995 [E]	BU, KS	HAUSDORF, 1995
30	<i>Gigantomilax (Vitrinoides) daghestanicus</i> (SIMROTH, 1898) [A]	AR, KA	SCHÜTT, 2005
31	<i>G.(V.) koenigi</i> (SIMROTH, 1812) [A]	KA	
32	<i>G.(V.) monticola armeniacus</i> (SIMROTH, 1886) [A]	ER, TR	
33	<i>Eumilax brandti</i> (MARTENS, 1880)	AR, RI, TR	
34	<i>Limacus flavus</i> LINNAEUS, 1758	IS, KY	Original data; BABOR, 1905
35	<i>Toxolimax hoplites</i> (SIMROTH, 1899) [E]	BU	SCHÜTT, 2005
36	<i>Mesolimax escherichi</i> SIMROTH, 1899 [E]	AN, IS	Original data
37	<i>Deroceras (Deroceras) berytensis</i> (BOURGUIGNAT, 1852)	KY	BABOR, 1905
38	<i>Strumosa strumosa rupestris</i> (ROSSMÄSSLER, 1856) [E]	BU	SCHÜTT, 2005
39	<i>Phrygica raehlei raehlei</i> NORDSIECK, 1994 [A] [E]	ANT	Original data
40	<i>Sprattia aksoylari</i> YILDIRIM, 1997 [E]	IS	
41	<i>S. beycola beycola</i> NORDSIECK, 1994 [A] [E]	ANT	NORDSIECK, 1994
42	<i>S.blissi blissi</i> (BOETTGER, 1899) [E]	IS	Original data
43	<i>S. pseudophrygica</i> NORDSIECK, 2004 [A] [E]	KO	NORDSIECK, 2004
44	<i>Elia (Caucasica) ossetica</i> (MOUSSON, 1863)	KA	SCHÜTT, 2005
45	<i>Mentissoidea rupicola rupicola</i> (MORTILLET, 1854)	AR, ER	

Table 2 (continued). The alpine land snails of Turkey (for abbreviations see Material and Methods, [E]: endemic, [A]: alpine only).

	Species	Province	Source
46	<i>Hesseola pratensis</i> (PFEIFFER, 1845)	BA, ER	SCHÜTT, 2005
47	<i>H. solidior</i> (MOUSSON, 1873)	KA	
48	<i>Monacha (Monacha) ignorata</i> (BOETTGER, 1905) [E]	ME	Original data
49	<i>M. (Paratheba) pusilla</i> HAUSDORF, 2000 [A] [E]	TR	HAUSDORF, 2000
50	<i>Helicopsis striata</i> (MÜLLER, 1774)	NI	STURANY, 1905
51	<i>Pseudotrichia memmonis</i> (STURANY, 1904) [E]	KO, NI	
52	<i>Metafruticicola dedegoelensis</i> HAUSDORF, GÜMÜŞ & YILDIRIM, 2004 [E]	IS	Original data
53	<i>Caucasocressa callosa</i> HAUSDORF & FALKNER, 2001 [A] [E]	AR	HAUSDORF & FALKNER, 2001
54	<i>C. planospira</i> HAUSDORF & FALKNER, 2001 [A] [E]		
55	<i>C. schmalzi</i> HAUSDORF & FALKNER, 2001 [A] [E]		
56	<i>Isaurica callirhoe</i> (ROLLE, 1894) [A] [E]	MU	Original data
57	<i>Helix (Helix) buchii</i> PFEIFFER, 1853	RI	

The widespread Pupilloidean species *Pyramidula rupestris* (Pyramidulidae) and *Sphyradium doliolum* (Orculidae), also does not show altitudinal difference, i.e. they can be found in a variety of altitudes. However, glacial relict *C. columella* (Vertiginidae) and pupillids *Gibbulinopsis interrupta* and *Pupilla inops* are found in higher altitudes in Turkey. Two different modes of altitudinal distribution can be seen in also mainly xerophilous groups Enidae, Hygromiidae and Helicidae species, as well as in the mesic groups Oxtychilidae, Limacidae, Clausiliidae.

Endemism level is relatively high (44%) among alpine land snails. On the other hand, the species richness is higher in northeastern and southwestern Turkey. This may reflect partly research bias as mainly the previous malacological surveys concentrated on these two regions, thus new discoveries from other regions are possible in the future.

CONCLUSIONS

A total of 59 land and freshwater snail species have been recorded from the alpine areas of Turkey. With new species discoveries and determination of new occurrences, considering the number of alpine heights not surveyed so far, the number may increase in the future.

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Yildirim Mehmet Zeki

Mehmet Akif Ersoy University, Education Faculty, Burdur, Turkey
E.mail: mzyildirim@mehmetakif.edu.tr

Kebapçi Ümit

Mehmet Akif Ersoy University,
Science and Arts Faculty, Burdur, Turkey
E-mail: kebacpi@mehmetakif.edu.tr

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