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The taxonomic status of Schelkovnikov's Pine Vole *Microtus schelkovnikovi* (Rodentia, Mammalia)

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Abstract. A comparison of morphological and karyological traits as well as an analysis of ecological preferences and the distribution pattern support the opinion that *Microtus schelkovnikovi* does not belong to subgenus *Terricola* and is the sole member of its own taxonomic species group. *Hyrcanicola* subgen. nov. comprises a single species *Microtus* (*Hyrcanicola*) *schelkovnikovi*, an endemic and relict form, inhabiting the Hyrcanian broad-leaved forest zone of Azerbaijan and Iran.

Key-words: Systematics, new taxon, voles, Hyrcanian forests.

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I. INTRODUCTION

Schelkovnikov's Pine Vole (*Microtus schelkovnikovi* SATUNIN, 1907) is one of the most enigmatic voles represented in natural history collections by only 45-50 specimens globally. This species was described by K. A. SATUNIN, on the basis of a single male specimen collected by A. B. SHELKOVNIKOV, July 6, 1906 near the village of Dzhi, in Azerbaijan (SATUNIN 1907). Next, 14 specimens from Azerbaijan, were found by KH. M. ALEKPEROV 50 years later in 1956 and 1957 (ALEKPEROV 1959). ELLERMAN (1948) described a new subspecies of Pine Vole *Pitymys subterraneus dorothea*, on the basis of 3 females, collected by G. HEINRICH, in the Khorramabad (=Kuramabad), Pish Kuh, Alborz (=Elburz) Mountains, Mazandaran Province, Iran. These specimens were later synonymised by CORBET (1978) under *Pitymys schelkovinikovi,* as already suggested by ALEKPEROV (1959) and GROMOV and POLYAKOV (1977). KADATSKY (1964), who probably collected more than 60 rodents at several localities in the Talysh Mountains (Azerbaijan), attributed this vole species to *Microtus* (*Pitymys*) *majori*. A further 10 specimens from the northern slopes of the Talysh and the Alborz Mountains in Iran, were collected by H. M. STEINER in 1968, in the Gilan and Mazandaran Provinces (STEINER 1972). A few additional specimens derive from the Lenkorani Lowland and Talysh Mountains, in Azerbaijan, and were caught during the karyological studies undertaken by IVANOV and TEMBOTOV (1972), KULIEV and KULIEV (1978) and AKHVERDYAN et al. (1992).

In the original description SATUNIN (1907) included his new species in genus *Microtus* SCHRANK, 1798. The Schelkovnikov's vole was treated as such by SHIDLOVSKIJ (1919) who had an opportunity to study the holotype, although later the same author lumped this taxon under *Pitymys*

majori (SHIDLOVSKIJ 1941) and was the first to include this species in the genus *Pitymys* MCMURTRIE, 1831. This point of view was also supported by OGNEV (1950). Later ELLERMAN and MORRISON-SCOTT (1951) classified *schelkovnikovi* as subspecies of *Pitymus subterraneus*. The next authors employed either a subgeneric (ALEKPEROV 1959; GROMOV and POLYAKOV 1977; GROMOV and BARANOVA 1981; PAVLINOV and ROSSOLIMO 1987) or a generic level (KRATOCHVIL 1970; STEINER 1972; SHIDLOVSKIJ 1976; CORBET 1978) for "*Pitymys*". CHALINE et al. (1988) proposed the subgeneric distinctiveness of American representatives of *Pitymys* from the European forms and *schelkovnikovi* is at present generally included in *Terricola* FATIO, 1867 (ZAGORODNYUK 1990; AKHVERDYAN et al. 1992; MUSSER and CARLETON 1993, 2005).

Earlier assumptions (ALEKPEROV 1959; SHIDLOVSKIJ 1976) that the vole species described by GOODWIN (1940) as *Microtus hyrcania* in fact belongs to *M. schelkovnikovi* were not confirmed, and are now considered to belong to *Microtus socialis* (KRYŠTUFEK and KEFELIOĞLU 2001).

II. DESCRIPTION

Genus ***Microtus*** SCHRANK, 1798

Subgenus ***Hyrcanicola*** subgen. nov.

E t y m o l o g y. *Hyrcania* – the Latin name of ancient province of Asia, located on the coast of the Caspian Sea; *cola* – from Latin "*incola*" a suffix meaning dweller or inhabitant.

D i a g n o s i s. Medium-sized vole; extensive and thick hair cover; distinctly bicoloured tail, very short, exceeding a maximum of 27% of the head and body length; the presence of eight nipples, two abdominal and two breast pairs; first lower molar (M_1) with seven triangles and a very characteristic wide anterior cap; upper molars (M^1, M^2) with distinct additional lingual loops on their posterior parts; third upper molar (M^3) elonga

ted, often with four buccal re-entrant angles.

Microtus (***Hyrcanicola*** subgen. nov.) ***schelkovnikovi*** SATUNIN, 1907

S y n o n y m y:

1907 *Microtus schelkovnikovi* spec. nova. – SATUNIN: 242-244, 1 Fig.
1919 *Microtus schelkovnikovi* SAT. – SHIDLOVSKIJ: 23-14.
1941 *Pitymys* (*Arbusticola*) *majori schelkovnikovi* SAT. – SHIDLOVSKIJ: 42.
1948 *Pitymys subterraneus dorothea* subsp. n. – ELLERMAN: 784-785.
1950 *Microtus* (*Pitymys*) *majori* THOM. (*partim*) – OGNEV: 406-407, 409, 421.
1951 *Pitymys subterraneus schelkovnikovi* SATUNIN, 1907 – ELLERMAN and MORRISON-SCOTT: 685.
1959 *Microtus* (*Pitymys*) *schelkovnikovi* SAT. – ALEKPEROV: 97-101.
1964 *Microtus* (*Pitymys*) *majori* – KADATSKY: 1696, 1704, Fig. 5, Table 3.
1970 *Pitymys schelkovnikovi* (SATUNIN, 1907) – KRATOCHVIL: 34-58.
1972 *Pitymys schelkovnikovi* (SATUNIN 1907) – STEINER: 144-150.
1976 *Pitymys schelcovnikovi* (sic!) SATUNIN, 1907 – SHIDLOVSKIJ: 166-167.
1977 *Microtus* (*Pitymys*) *schelkovnikovi* SATUNIN, 1907 – GROMOV and POLYAKOV: 272-273, Fig. 44
1978 *Pitymys schelkovnikovi* – CORBET: 109.
1981 *Microtus* (*Pitymys*) *schelkovnikovi* SATUNIN, 1907 – GROMOV and BARANOVA: 204.
1987 *Microtus* (*Pitymys*) *schelkovnikovi* SATUNIN, 1907 – PAVLINOV and ROSSOLIMO: 192.
1990 *Terricola schelkovnikovi* – ZAGORODNYUK: 27, 30, 33.
1992 *Terricola schelkovnikovi* – AKHVERDYAN et al.: 98-100, 104-106.
1993 *Microtus schelkovnikovi* (SATUNIN, 1907) – MUSSER and CARLETON: 529.
2005 *Microtus schelkovnikovi* (SATUNIN, 1907) – MUSSER and CARLETON: 1015.

General characters. This small or medium-sized vole has extensive thick and long pelage (ALEKPEROV 1959). The upper parts in summer are reddish-gray or red-brown, in winter they are dark-gray, the underparts are light gray with a distinct addition of a rufous tinge (ALEKPEROV 1959; STEINER 1972). The ears are almost invisible in the fur. The very short tail is distinctly bicoloured. They have eight nipples, two abdominal and two breast pairs (KRATOCHVIL 1970). The external and cranial measurements (in mm) are as follows (ELLERMAN 1948; ALEKPEROV 1959; STEINER 1972): total length of head and body 88-111; length of tail 18-25 (30); length of hindfeet 14-18; length of ears 7.5-10.0; condylobasal length 23.8-25.3. Adult body masses range from 17.5 to 28.5 g.

Indentification. *M.* (*Hyrcanicola*) *schelkovnikovi* differs from voles belonging to subgenus *Terricola* by its larger size. Its condylobasal length is never below 23.5 mm. The tail is very short, shorter than in all species included in *Terricola* (GROMOV and POLYAKOV 1977), and constitute from 19% to 27% (average 23%) of the head and body length (ALEKPEROV 1959; STEINER 1972), except in one specimen from Pish Kuh, which exceeds 30% (ELLERMAN 1948). The braincase of the skull is wider and in the crown part higher than in other species of *Terricola* from the Caucasus and Transcaucasia (ALEKPEROV 1959; KRATOCHVIL 1970). In comparison with species belonging to the subgenus *Terricola* the *ossa nasalia* are also distinctly shorter (KRATOCHVIL 1970). In general the Iranian specimens are slightly larger (although they belong to sub-adult specimens) than ones from Azerbaijan (STEINER 1972). The first lower molar (M_1) is easily distinguishable from the M_1's of other species belonging to *Terricola* (STEINER 1972; GROMOV and POLYAKOV 1977; AKHVERDYAN et al. 1992) by the complicated shape of the anteroconid complex, the anterior cap of which is very wide. Also, all upper molars are distinctly different from all the respective teeth of *Terricola* species. The first and the second upper molars (M^1 and M^2) are characterized by the presence of distinct additional loops on the lingual parts of posterior triangles, also known in the literature as "*exul*" (M^1) and "*agrestis*" (M^2) loops. The third upper molar is more complex than most M^3's of *Terricola* species and is characterized by the frequent presence of four distinct buccal re-entrant angles (Fig. 1).

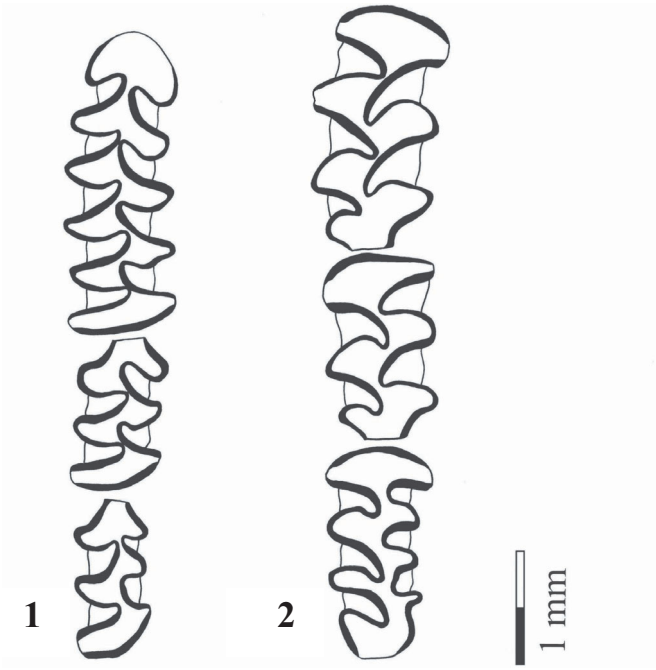

Fig. 1. *Microtus* (*Hyrcanicola*) *schelkovnikovi*, specimen no. 52427, male, 23 km along the road Lenkorani – Lerik, Lerickij Raion, Azerbaijan, collection of Zoological Institute, Russian Academy of Sciences, coll. Kh. ALEKPEROV. 1 – dental pattern of right lower tooth-row (M_1-M_3); 2 – dental pattern of left upper tooth-row (M^1-M^3).

K a r y o l o g y. The karyotypes of the Schelkovnikov's vole have been paid unusually high attention. The diploid and fundamental numbers of chromosomes were described by IVANOV and TEMBOTOV (1972). The diploid number 2n=54 and the fundamental number FN=62 were later confirmed by KULIEV and KULIEV (1978) and AKHVERDYAN et al. (1992) and differ from the species of *Terricola* in several ways. In the karyotype there are four pairs of large and medium-sized submeta- and metacentrics and another 22 pairs are acrocentic. Sex chromosomes are acrocentric, and differ from all species of *Terricola*; they are characterized by meta-submetacentrics (AKHVERDYAN et al. 1992). G-banding showed that the evolution of the karyotype had resulted in pericentric inversions in four pairs of autosomes leading to the loss of heterochromatin blocks (AKHVERDYAN et al. 1992).

D i s t r i b u t i o n (Fig. 2): **Azerbaijan**: Dzhi (1 male), Talysh Mountains, coll. A. B. SHELKOVNIKOV; Lenkorani, 19-23 km from the town along to road to Lerik and Isti-Su (Yarbymlinskij Raion) (9 females and 5 males, including 2 specimens no. 52426, 52427, at present in collection of Zoological Institute, Russian Academy of Sciences, St. Petersburg), Talysh Mountains, coll. Kh. M. ALEKPEROV; Lenkorani 16, 18, 20 and 23 km W of the town; Shuvi, 6 km N-E of the village; Siov, 5 km N of the village; Alasha, Tanherud, 4 km W of the village; Gavzova, 3 km W of the village; Azerbaijan, 2 km S-W of the village; Byardzhan, 2 km N-E of the village, Unuz (together more than 60 specimens, collected at altitudes of 150 m to 1000 m above see level), Talysh Mountains, coll. N. G. KADATSKY; Lerik (3 females, 2 males), Lerickij Raion, Talysh Mountains, coll. V. G. IVANOV and A. K. TEMBOTOV; Lenkorani (2 females, 3 males), 17 km from the town, Talysh Mountains, coll. G. K. KULIEV and G. N. KULIEV; Shovi (4 females), Talysh Mountains, coll. M. R. AKHVERDYAN et al.; Lenkorani (3 specimens), collection of Zoological Museum of Moscow State University, no. 92410, 92412, 136349; **Iran**: Assalem, 1100-1250 m (3 females, 3 males), near Hashtpar, South Talysh Mountains, Gilan Province, coll. H. M. STEINER; Khorramabad (=Kuramabad) (3 males), Pish Kuh, Alborz Mountains, Mazandaran Province, coll. G. HEINRICH; Weyser, 1200 m, (2 males), south of Nowshar, Alborz Mountains, Mazandaran Province, coll. H. M. STEINER; Dasht Lateh, 1400 m, (2 males), near Pol-e-Sefid, Alborz Mountains, Mazandaran Province,

Fig. 2. Distribution of *Microtus* (*Hyrcanicola*) *schelkovnikovi*. 1 – Lenkorani Lowland and North Talysh Mountains, Azerbaijan (together about 20 localities); 2 – Assalem, near Hashtpar, South Talysh Mountains, Iran; 3 – Khorramabad, Pish Kuh, Alborz Mountains, Iran; 4 – Weyser, south of Nowshar, Alborz Mountains, Iran; 5 – Dasht Lateh, near Pol-e-Sefid, Alborz Mountains, Iran.

coll. H. M. STEINER. The Schelkovnikov's Pine Vole probably inhabits most of lowland and mid-mountain zones (between ca. 100 m and 1500 m above sea level) overgrown by Hyrcanian broad-leafed forests from the Lenkorani Lowland (Azerbaijan) in the west to northern slopes of Alborz Mountains near Gorgan (Iran) in the east.

E c o l o g y. The ecology and habitat preferences of Schelkovnikov's Pine Vole is poorly known. However, all authors indicate that *M.* (*Hyrcanicola*) *schelkovnikovi* occupies the lowland and mid-mountain forests in Talysh and Alborz Mountains. ALEKPEROV (1959) and KADATSKY (1964) emphasise the preference for shady and moist parts of the so-called Hyrcanian forests, between 150 m and 1000 m above the see level, especially the places rich in Ironwood (*Parrotia persica*), Chestnut-leaved Oak (*Quercus castaneifolia*) and Hornbeam (*Carpinus betulus*). STEINER (1972) has collected *M.* (*Hyrcanicola*) *schelkovnikovi* at higher altitudes (between 1100 m and 1400 m above the sea level) in moist forests without undergrowth or in thickets along a small stream. The most characteristic feature of the Hyrcanian vegetational zone is the broad-leaved deciduous forest stretching over the northern slopes of Alborz and Talysh mountain ranges covering the southern coasts of the Caspian Sea in Azerbaijan and Iran. This forest, rich in hardwood species, ranges in altitude from sea-level to 2800 m above sea-level, and encompasses about 80 species of trees and shrubs, many of which are relict and endemic ones (BROWICZ 1989). The zone is well distinguished from other areas by high annual precipitation (600-2000 mm), a considerable part of which falls in summer. The high air humidity and the higher winter temperatures at lower altitudes probably make the greater part of this area a most favorable habitat for *M.* (*Hyrcanicola*) *schelkovnikovi.* According to KADATSKY (1964) the Schelkovnikov's voles build their nests mainly in the upper part of soil cover, at depths of up to 25 cm, under fallen leaves in forests. They consist of a complex net of corridors, ranging in length from 2 to 10 m. The voles probably feed mainly on plant roots and seeds.

III. CONCLUSIONS

Most of the authors who studied original specimens of Schelkovnikov's vole stress the morphological distinctness of this species from all other vole species in the *Terricola* group. This distinctness is manifested by such external features as the high pelage density and the very short tail (ALEKPEROV 1959; STEINER 1972), which is supposed to arise from the subterranean mode of life in specific moist and shady habitats (KADATSKY 1964), as well as by the presence of eight nipples (in other *Terricola* species there are only 6 or even 4 nipples – SHIDLOVSKIJ 1941; KRATOCHVIL 1970). The size and shape of the skull (ALEKPEROV 1959; KRATOCHVIL 1970; STEINER 1972) and dental traits (KRATOCHVIL 1970; STEINER 1972, AKHVERDYAN et al. 1992) are very important distinguishing features. The chromosome set of this vole also differs from all other species of *Terricola* being the most primitive (IVANOV and TEMBOTOV 1972; KULIEV and KULIEV 1978; AKHVERDYAN et al. 1992). All abovementioned differences, as well as the relict distribution justify the isolation of this species and support a distinct taxonomic status compared to all species of *Terricola*, at least at the subgeneric level. Further genetic studies should answer the question of taxonomic rank and distance between *Hyrcanicola* subgen. nov. and other taxa of voles.

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