

## History of discovery and some taxonomic problems in the alpine shrew (*Sorex alpinus*) and pygmy field mouse (*Apodemus microps*) in Slovakia

História objavenia a niektoré taxonomické otázky u piskora vrchovského (*Sorex alpinus*) a ryšavky myšovitej (*Apodemus microps*) na Slovensku

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**Abstract.** The occurrence of alpine shrew, *Sorex alpinus* Schinz, 1837, in Slovakia has been known since the second half of the 19<sup>th</sup> century, yet detailed taxonomic studies have been published only as late as by the end of the 1940s. In 1952, KRATOCHVÍL and ROSICKÝ studied a material of 44 specimens collected throughout the former Czechoslovakia and found individuals that had a longer body and a shorter tail when compared to other subspecies, and described them as a new subspecies, *Sorex alpinus tatricus* Kratochvíl et Rosický, 1952. They considered the High Tatras to be the terra typica of this new subspecies. The question of this, but also of other alpine shrew subspecies, has been a matter of polemics and discussions for a long time, and recently the validity of this subspecies could not be confirmed. Again in 1952, another new species, the pygmy field mouse, *Apodemus microps* Kratochvíl et Rosický, 1952, was described from Slovakia. Later on, this species originally considered to occur in lowlands was found also in alpine valleys. The situation in Slovakia is complicated by the findings of small individuals of the pygmy field mouse from the timberline zone in the Western Tatras which MOŠANSKÝ (1963, 1994) classified as a separate taxon. Besides that, some studies have been published recently in which *A. microps* is considered to be synonymous with *A. uralensis* (Pallas, 1811).

The occurrence of the alpine shrew, *Sorex alpinus* Schinz, 1837, in Slovakia has not been mentioned in the monographs either by KORNHUBER (1857) or by JEITTELES (1862). Only somewhat later KORNHUBER (1863) completed his “*Synopsis der Säugethiere mit besonderer Beziehung auf deren Vorkommen in Ungarn*” [= *Synopsis of Mammals of Hungary*] and, among other species, he pointed out that the alpine shrew had been probably repeatedly observed by J. G. REINER in the Tatra Mountains. He mentioned two specimens that he saw in the museum in Budapest that had been designated to come from the Central Carpathians. According to a researcher of the Hungarian National Museum in Budapest, Dr. GÁBOR CSORBA (in litt.), the museum possesses the two oldest specimens of *S. alpinus* from Slovakia (a male and a female, skins and skulls) collected by István ROKOSZ on June 6, 1847 in the forests near Harmanec, Zvolen District. Moreover, in the National Museum in Budapest, in the list of REINER’s preparations deposited here in 1847, there are 3 shrew specimens classified originally as *S. alpinus*, in the legend

however they were renamed to *S. tetragonurus* Hermann, 1780, i. e. *Sorex araneus* Linnaeus, 1758. There is also a note that one of the specimens is missing. However, according to Dr. CSORBA, at present these specimens are no more on the record lists of the National Museum. Interestingly enough, NOWICKI (1866) did not mention this species from Galicia, where the Polish side of the Tatras belonged, he only underlined that this species was known from the Alps from the altitudes of the montane zone up to the dwarf pine zone and stressed the necessity to search for it in this region of Poland.

Neither KOCYAN mentioned it in his study published in 1867 and the first data concerning the alpine shrew in his unpublished preparation journal is of 31 October 1878. Altogether, he registered over 20 specimens of this species till April 1899. As localities of its occurrence he mentioned e.g. Pily, Magura, or "near the house", i.e. the surroundings of his home in Oravice and Zuberec in Slovakia. In another study published in 1888 he already listed this species and mentioned it was more common than *Sorex minutus* Linnaeus, 1758. Later on, some data from this publication were cited also by MOJSISOVICS (1897). KOCYAN also mentioned one specimen of the alpine shrew in his list of preparations of birds and mammals that he had sent to the Carpathian Museum in Poprad. The same specimen was mentioned also by DANHAUSER (1889), the custodian of the museum, who labelled it by the date 1881 and gave Oravice as the locality of occurrence (however, at present this specimen cannot be found in the Podtatranské Museum in Poprad, MLYNARČIKOVÁ in litt.). One specimen of the alpine shrew with the label that it came from KOCYAN (nevertheless without any indication of date and locality) is deposited in the Oravské Museum in Oravský Podzámok (KARASKA in lit). Beside that, there are 6 specimens of alpine shrew caught in Oravice and Zuberec by KOCYAN that are deposited in the National Museum in Budapest (CSORBA in litt.). These are however the places where he lived and the localities may include sites in the broader surroundings of this part of the Orava region. In the State Museum of Natural History in Lvov there are two adult alpine shrews caught by KOCYAN in 1867 with Zakopane being given as the locality of origin (DZYUBENKO in litt.). The first findings of this species in Poland also came from KOCYAN. WALECKI (1881) mentioned two specimens of alpine shrew (adult and juvenile) from KOCYAN who is reported to have caught them in 1880 and added that until then this species had been known only from the Swiss Alps. In his preparation journal, KOCYAN mentioned two specimens of alpine shrew in that year, namely of 28 September 1880, with the locality of Pily (Oravice, Slovakia).

Besides these two specimens, in another study WALECKI (1884) mentioned other two specimens caught also by KOCYAN in 1881. In his above mentioned preparation journal KOCYAN recorded only one specimen with the date of 26 March 1881. KOCYAN gave all specimens to professor WRZEŚNIEWSKI and they have been deposited in the Cabinet of Zoology of the Warsaw University.

In a detailed investigation of animal taxa including their zoogeographic distribution within the Carpathians, HOLDHAUS & DEUBEL (1910), while mentioning *S. alpinus*, referred only to KOCYAN'S data from his publication that appeared in 1888 and to the unpublished confirmation by MEHELY that this shrew lived in the High Tatras. According to the above-mentioned authors, the alpine shrew was known also from the Krkonoše, Alps, Harz, Jura and the Pyrenees. We can also refer to the study dating back to those times by NIEZABITOWSKI (1901) who, without giving any locality, mentioned it as occurring in limited populations in the forests of former Galicia.

The rather low number of specimens and localities known till that time was documented also in the fundamental monograph by PASZLAWSZKY (1918) who listed only Oravice, Zuberec and Hátzeg (the former two localities being KOCYAN'S) for the whole former historical Hungary.

Later on, JIRSÍK (1924) erroneously wrote that the alpine shrew “was not recorded in literature” and mentioned that he had only several, however uncertain, reports on its occurrence near Vitanová and Ružomberok. In these years this species was reported from the Orava region by MELICHAR (1928), from the High Tatras by ŠTORKÁŇ (1929), KOMÁREK (1931) and BABOR (1943). These authors did not classify Slovak alpine shrews into subspecies except for SCHAEFER (1935) who classified the Carpathian population as belonging to *S. a. alpinus* Schinz, 1837 and he stressed that the specimen which he had found on 18 August 1931, at the altitude of 1,000 m a.s.l. below the Lomnický štít in the High Tatras, had a shorter tail in relation to its body. Likewise, also FERIANC (1946) was of the opinion that the Slovak Carpathian population of this species belonged to the nominate subspecies. On the other hand, NIEZABITOWSKI (1933) considered the specimens from the Tatras to belong probably to *S. alpinus hercynicus* Miller, 1909, nevertheless he added that this was yet to be confirmed. In his further study (1934) he assigned them to *S. a. hercynicus*.

At the beginning of the second half of the past century, HANZÁK & ROSICKÝ (1947), ROSICKÝ & HANZÁK (1947), as well as KRATOCHVÍL & GRULICH (1950) studied this species in great detail in former Czechoslovakia. The former two authors assigned the specimens caught by them to the subspecies *S. alpinus hercynicus*, they however added that in two specimens from the Tatras the body was longer in relation to the tail than in the specimens from other localities. Similar data were obtained also by KRATOCHVÍL & GRULICH (1950) in a larger material comprising 23 specimens from whole Czechoslovakia who classified the shrews from the Tatras as a separate natio, *S. alpinus hercynicus* n. *tatricus*. Two years later, KRATOCHVÍL & ROSICKÝ (1952a) selected from a group of 44 specimens, collected from the whole territory of Czechoslovakia, those individuals that had a longer body and a shorter tail as compared to the other related subspecies, and described them as a new subspecies, *S. alpinus tatricus* Kratochvíl et Rosický, 1952. They considered the High Tatras as the terra typica of this new subspecies. They assumed that besides the individuals caught in the Tatras, individuals living in other Slovak mountains, first of all in Slovenský kras and Vihorlat, but also in some Bohemian and Moravian regions, namely Šumava, Jeseníky and Beskydy, belonged to this subspecies too. They stressed that in the individuals caught in eastern Slovakia, mainly the Eastern Carpathians, they observed certain deviations from the newly described subspecies (the specimens had a longer tail) and suggested that these might be individuals related rather to another, Transylvanian population. These deviations in the eastern Slovakian specimens were also registered by MOŠANSKÝ (1957). This author (MOŠANSKÝ 1980) was of the opinion, supported also by publications of Polish, Czech, Ukrainian and Romanian theriologists, that the intraspecific taxonomic subclassification of this species was not unambiguously settled, not only in the *tatricus*, but also in the *hercynicus* subspecies. He stressed that, according to present-day definitions of a subspecies, the mosaic-like occurrence of two subspecies in small territories is unacceptable along with the main criteria in their determination – body and tail length – which moreover show broad individual and age-related variations (variation in tail length was noted also by KOCYAN 1888). In his cited study, MOŠANSKÝ assumed that on the basis of his relatively large material caught in Slovakia (91 specimens) this was a monotypic species whose intraspecific and age-related variation (with respect to its rare occurrence) was poorly known. It should be also stressed that KRATOCHVÍL (1966), reviewing the monograph by FERIANCOVÁ-MASÁROVÁ & HANÁK (1965) entitled “*The Vertebrates of Slovakia – Mammals*”, emphasised that “in *S. alpinus* the problem of subspecies in Central Europe for a long time has been a matter of polemics and discussions”. It is therefore rather regrettable that DUDICH & ŠTOLLMANN (1983) in their publication, which presents the so far

most detailed information on the distribution of the alpine shrew in Slovakia, did not assume an opinion to this taxonomic problem despite the fact that they had at their disposal the largest documentation material (221 specimens) to that date. A certain progress in this matter was also done by ZIMA & KRÁL (1990) who performed karyological analysis in *S. alpinus tatricus*. They found interpopulation differences in the morphology of chromosomes between the specimens from Slovakia and those from the Alps that were explained by the mosaic-like distribution and isolation among the respective populations. They also stressed the necessity of further investigations from other areas of occurrence of this species. Now it can only be stated, along with MITCHELL-JONES et al. (1999), that in the alpine shrew several subspecies have been described whose validity however has not been confirmed at present.

Another mammal described in Slovakia as a new species by KRATOCHVÍL and ROSICKÝ was *Apodemus microps* Kratochvíl et Rosický, 1952. It should be noted that the determination and taxonomic classification of the genus of field mice means considerable problems, like elsewhere, also to the zoologists working in Slovakia, or in former historical Hungary, respectively.

Among the first researchers to determine field mice from the territory of former historical Hungary, PETENYI should be mentioned. From his data published only after his death (CHYZER 1881), it is apparent that he must have known also *Apodemus agrarius* (Pallas, 1771) and *A. sylvaticus* (Linnaeus, 1758) (for the latter species he also gave localities from Slovakia such as Ábelová in Novohrad district, 1853, Zvolen district, 1854, or Upper Hungary, i.e. Slovakia, 1816). KORNHUBER (1857) also mentioned two species from former Hungary, namely *A. sylvaticus* and *A. agrarius*, while JEITTELES (1862) mentioned only *A. sylvaticus*. KOCYAN (1888) reported on two field mouse species from the Tatras, namely *A. sylvaticus* and *A. agrarius*. In the case of *A. sylvaticus* he mentioned that during summer this species occurs at altitudes as high as the subalpine zone, and among those hundreds of specimens that he had seen there was a considerable variation in their fur coloration. In his above mentioned unpublished preparation journal he mentioned up to 80 specimens observed between 1869 and 1908 belonging to genus *Apodemus*, including also *A. flavicollis* (Melchior, 1834). This was also confirmed by MILLER (1912) who, from the Slovak part of former historical Hungary, mentioned Šamorín as a locality for *A. sylvaticus*, and Orava as a locality for *A. flavicollis*, and by PASZLAVSZKY (1918) who listed three field mouse species for the whole territory of former historical Hungary, namely *A. sylvaticus*, *A. flavicollis* (with localities in the Orava district and Hátszeg) and *A. agrarius*. Thus the collections of *A. flavicollis* by KOCYAN in the Orava region can be considered to be the first documented evidence of occurrence of this species for Slovakia. Therefore it was a surprise that JIRSÍK (1924) again listed only two species for Slovakia, i.e. *A. sylvaticus* and *A. agrarius*. Likewise, the data on the occurrence of only two field mouse species, *A. sylvaticus* and *A. agrarius*, from the Orava region were repeatedly published by MELICHAR (1928).

An uncertainty in determinations as well as the knowledge concerning the occurrence of *A. flavicollis* and *A. sylvaticus* in former Czechoslovakia was noted by ŠTĚPANEK (1935) who pointed out that zoologists in those times somehow “neglected” *A. flavicollis*. The complicated situation in telling the differences between *A. flavicollis* and *A. sylvaticus* has also been documented in a study on Central European small mammals by SCHAEFER (1935).

Later on, BABOR (1943) mentioned *A. flavicollis* (with the note “in the west”), *A. agrarius* and *A. sylvaticus* to occur in Slovakia.

In association with *A. microps* it is important to stress that in Hungary (Nagykunság, Pusztapó), as early as in 1927–1934, ÉHIK collected small field mice which he determined as *A. sylvaticus hungaricus* (nom. nud.) and deposited them in the Hungarian National Museum but did not

publish his findings. A later revision of the material revealed that these individuals belonged to the species *A. microps* (HAMAR et al. 1966, MOŠANSKÝ 1994).

Shortly after the World War II, thanks to the large-scale theriological field research that was carried out by HANZÁK, ROSICKÝ, KRATOCHVÍL, TURČEK, FERIANC and MOŠANSKÝ, our knowledge on the genus *Apodemus* was considerably broadened. In March 1952, during field research associated with an epidemic of tick-borne encephalitis in Rožňava, ROSICKÝ and KRATOCHVÍL collected 16 specimens (and later on another 7 specimens) of an unknown field mouse species in the old cemetery in Šaca near Košice (according to a letter by Prof. ROSICKÝ of 16 December 2001, the captured individuals were first considered to be one of the subspecies of *Mus musculus* Linnaeus, 1758, and, he continued, “if we had not caught several specimens at that locality, we would not have noticed them probably”). A detailed investigation showed that this was a new field mouse species that was called *A. microps* (KRATOCHVÍL & ROSICKÝ 1952b, 1953). Some further taxonomic traits of this species were published later by KRATOCHVÍL & ZEJDA (1962). It should be noted that its unambiguous taxonomic definition and classification as a separate species from the other three species occurring in Czechoslovakia were, especially in the beginning, subjected to critics (TURČEK 1954, FERIANC 1956). However, later on it was accepted and listed as a species occurring in Eastern Europe and in the Asian part of Turkey both in domestic as well as in foreign compendiums (e.g. FERIANCOVÁ-MASÁROVÁ & HANÁK 1965, CORBET & OVEN-DEN 1980, STEINER 1978).

The situation was further complicated by the finding of a small alpine form of field mouse that was collected in Slovakia by MOŠANSKÝ at altitudes between the montane and the subalpine zone of the Western Tatras (MOŠANSKÝ 1962, 1963), whose taxonomic position has not yet been settled. KRATOCHVÍL (1962) assumed that these individuals belonged to the species *A. microps*, as well as the specimens collected in northern Slovakia in the Turčianska (HUDÁKOVÁ 1974), Liptovská (DUDICH & ŠTOLLMANN 1979), Popradská and Hornádska (MOŠANSKÝ 1994) and Spišská basins (ŠTOLLMANN & RANDÍK 1979) from where, according to ŠTOLLMANN & DUDICH (1985), they penetrated up to the montane zone of the Western and Low Tatras. According to CHOVANCOVÁ and KUBALA, *A. microps* also occurred in the subalpine zone of the Velická valley in the Tatras (JANIGA & CHOVANCOVÁ 1994).

It should be noted that MOŠANSKÝ, despite the above opinion of KRATOCHVÍL concerning the determination of the individuals collected in the alpine zone of the Western Tatras, never considered this problem as solved. In his study in 1963 he pointed out that the alpine individuals differed from *A. microps* in their bionomy, occurrence and smaller size and partly also in fur colour. Recently, MOŠANSKÝ (1994) again presented a detailed analysis of this problem. He limited the occurrence of *A. microps* in eastern Slovakia by the altitude ranging from 94 to 700 m a.s.l. and ecologically he classified it as species inhabiting farmland and other ecosystems altered by human activity in the basins around the Tatras. MOŠANSKÝ (1994) determined the alpine population preliminarily as *A. parvulus* (nom. nud.) and expressed his opinion that this might be an isolated population (he associated its occurrence with sheep grazing and determined its range of occurrence at altitudes between 995 and 1450 m a.s.l.). He noted that such small field mice had been collected in alpine regions also by ŠTOLLMANN & DUDICH (1985) (4 specimens, Jamnická valley) and by ZIMA et al. (1984) (2 specimens, Belianske Tatry), who, however, determined them as *microps*. It is unknown on the Polish side of the Tatras (PUCEK 1981, PUCEK & RACZYŃSKI 1983, PROFUS 1996). ZIMA et al. (1984) assumed that *A. microps* penetrated into the Slovak part of the Western Tatras probably from the north from the Polish lowlands through the Orava region and along the Váh river, and into the Belianske Tatry from north-western Poland,

Pieniny and the north-eastern Spiš region. The situation is even more complicated because there is a number of so-called “small forms” of field mice from Eastern Europe and a part of Asia which had been described as separate taxa before the discovery of *microps*. The authors of recent studies (e.g. MITCHELL-JONES et al. 1999, VORONCOV et al. 1992, BOGDANOV 2001) pointed out that *A. microps* should be considered as synonymous with *A. uralensis* (Pallas, 1811). To be able to answer the question whether “*Apodemus parvulus*” as suggested by MOŠANSKÝ might become an accepted new taxon with isolated occurrence, like *A. alpicola* Heinrich, 1952 in the Alps, more detailed investigation including molecular study is needed.

## SÚHRN

Výskyt piskora vrchovského *Sorex alpinus* Schinz, 1837 na Slovensku je známy od druhej polovice 19. storočia, no podrobnejšie taxonomické štúdie sú len od konca 40. rokov 20. storočia. V r. 1952 KRATOCHVÍL a ROSICKÝ zo súboru 44 exemplárov z celého býv. Československa vyčlenili jedince, ktoré mali v porovnaní s príbuznými poddruhmi dlhšie telo a kratší chvost a popísali ich ako nový poddruh *Sorex alpinus tatricus* Kratochvíl, Rosický 1952. Za terra typica pre tento nový poddruh považovali Vysoké Tatry. Otázka tohto, ale aj iných poddruhov piskora vrchovského je predmetom polemik a diskusií a poslednom čase ich platnosť nie je potvrdená. Podobne v r. 1952 bol zo Slovenska, popísaný nový druh *Apodemus microps* Kratochvíl et Rosický, 1952. Pôvodne nížinný druh bol neskôr zaznamenaný aj horských dolinách. Situáciu komplikuje odchyť malých jedincov ryšaviek z hornej hranice lesa v Západných Tatrách, ktoré MOŠANSKÝ (1963,1994) považoval za samostatný taxón. Okrem toho, v poslednom čase sa objavujú práce, ktoré druh *Apodemus microps* považujú za synonymum *Apodemus uralensis* (Pallas, 1811).

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