

Recent changes in the distribution of the field mouse (*Apodemus agrarius*) in the western part of the Carpathian basin

B. Herzig-Straschil*, Z. Bihari** & F. Spitzenberger*

Abstract

Two *Apodemus agrarius* recently collected in the Austrian part of the drained fen Hanság are taken as evidence that a dead field mouse which was found in the reed belt of the Neusiedler See / Fertő-tó near Illmitz in January 2003 originated from a population existing in northwestern Hungary. Contrary to earlier data (including MITCHELL-JONES et al. 1999), the current distribution of *A. agrarius* in Hungary stretches to the north of lake Balaton and has reached Austria.

Key words: *Apodemus agrarius*, distribution, range expansion, Hungary, Austria

Zusammenfassung

Fallenfänge von zwei Brandmäusen im österreichischen Teil des entwässerten Niedermoors Hanság werden als Beweis für die Herkunft eines im Jänner 2003 im Schilfgürtel des Neusiedler Sees bei Illmitz tot aufgefundenen Exemplars aus Nordwestungarn gewertet. Im Gegensatz zu früheren Darstellungen (inkl. MITCHELL-JONES et al. 1999) hat sich der Nordwestrand der Verbreitung der Brandmaus seit den 1980er Jahren nordwärts vorgeschoben und Österreich erreicht.

Introduction

On January 15, 2003 Alois Herzig found a dead male field mouse (*Apodemus agrarius*) in the reed belt of the Neusiedler See/Fertő-tó, 300 m W of the Biological Station Neusiedler See near Illmitz (47°46' 16" 45", 116 m). The animal was lying at the base of a small embankment on the ice of a reed pool.

This finding was unexpected for two reasons. Firstly, the occurrence of *Apodemus agrarius* in the Neusiedler See/Fertő-tó area had never been recognized before (BAUER 1960, SCHMIDT & TOPÁL 1976, BÖHME 1978, SPITZENBERGER 1997, MITCHELL-JONES et al. 1999, SPITZENBERGER 2002), and secondly, extensive recent live trapping in the vicinity of the locality where the dead field mouse was found (MÜHLBÖCK 2003 and W. Haberl, oral comm.) as well as analyses of 691 small mammals from barn owl pellets, collected in 2003 in the lake foreland near Illmitz and Apetlon did not yield this species.

* Barbara Herzig-Straschil, Friederike Spitzenberger, Naturhistorisches Museum Wien, Säugetiersammlung, A-1014 Wien, Postfach 417, Austria – barbara.herzig@nhm-wien.ac.at, friederike.spitzenberger@nhm-wien.ac.at.

** Zoltán Bihari, Agrártudományi Centrum, H-4015, Pf. 36 – bihari@helios.date.hu.



Fig. 1: Geographic setting of the studied area in Austria and Hungary. Empty circles: trapping localities. Full circles: localities in which *A. agrarius* was found.

We therefore assumed that the dead male field mouse (NMW 63880) represented an individual that had dispersed from a population probably existing in Hungary and expanding its range westwards. This assumption was supported by an unpublished map of the current distribution of *Apodemus agrarius* in Hungary showing localities north of the previously known range in the northwestern part of this country. To corroborate our theory we set more than 1000 snap traps in the extensive fen of the Hanság on both sides of the Austro-Hungarian border, and we succeeded in catching two field mice.

Material and methods

Trapping was carried out in the Hanság on both sides of the Austro-Hungarian border (Fig. 1).

We trapped during three nights (Oct. 23 2003 - Kapuvár, Oct. 24 2003 - Tőzeggyármajor, Oct. 29 2003 - Andau). We set 1081 wooden and metal snap traps in lines with traps spaced approximately 3 m apart. The traps were set during the afternoon and inspected in the following morning. We used peanutbutter and bacon as bait.

The Hanság is a fen of approximately 100 km² situated to southeast of the Neusiedler See/Fertő-tó. Originally, the fen was flooded when the water level of the lake was high, nowadays it is drained by a system of channels. Parts of the Hanság are used for agri-

culture (meadows, corn- and wheatfields), other parts are covered by larger (Kapuvár alder wood, *Alnus glutinosa*, now mainly poplar plantation, *Populus* spp.) or smaller forests (white willow, *Salix alba*). Bushes of grey willow, *Salix cinerea*, accompany most of the catchwater drains. The artificial outlet of the Neusiedler See/Fertő-tó, the Hanság channel, begins in the southeastern reed belt of the lake, crosses the fen and forms part of the border between Austria and Hungary. The vegetation covering the slope of the embankment of the Hanság channel is composed of small bushes, weeds like goldenrods *Solidago* sp. and reed.

The recent distribution map of *Apodemus agrarius* in Hungary is based on the Hungarian Mammal Database. Only data derived after 1980 have been used. Altogether 515 data sets were included: 359 from owl pellet (*Asio otus*, *Athene noctua*, *Strix aluco*, *Strix uralensis*, *Tyto alba*), 140 trapping results, 7 visual observations, 5 from scats (*Martes foina*, *Martes martes*, *Vulpes vulpes*), 4 road kills. Several data sets referred to the same locality at different times.

Abbreviations: A = *Apodemus (Sylvaemus)* sp., Aa = *Apodemus agrarius*, Cg = *Clethrionomys glareolus*, Cl = *Crocidura leucodon*, Mm = *Micromys minutus*, Ms = *Microtus subterraneus*, Sa = *Sorex araneus*, Sm = *Sorex minutus*; NMW = Naturhistorisches Museum Wien.

Results

Trapping

Trapping site (number of traps): trapping result

Andau, small *Salix alba* forest W of the border, N 47°43' E 17°04', 115 m, (323): 4 Sm, 3 Sa, 4 Cl, 30 Cg, 33 A.

Andau, unmown meadow with little *Phragmites*, Stand of *Solidago*, edge of dry ditch, edge of cornfield, N 47°42' E 17°04'-05', 115 m, (125): 2 Sa, 6 Cl, 10 Ms, 23 A.

Andau, edge of meadow and shrubs along the Torfkanal and foot of the embankment along the Hanság channel, N 47°42' E 17°04'-05', 115 m, (528): 1 Sm, 3 Sa, 11 Cg, 1 Mm, 59 A, 2 Aa.

Kapuvár, former alder wood of Kapuvár edge of *Populus* plantation, along forest road in a *Quercus* forest, along a small channel, N 47°40' E 16°58'-17°02', 119 m, (50): 2 Sa, 1 Cg, 11 A.

Tőzeggyármajor, edge of wheat field, bush line of *Sambucus nigra*, edge of *Populus* plantation, N 47°40' E 16°56', 119 m, (55): 1 Sa, 2 Cl, 7 A.

Altogether we trapped 216 small mammals, among them two field mice. Other species of the genus *Apodemus* were much more common than *A. agrarius*. Most of the 133 *Sylvaemus* belonged to *A. flavicollis*, but there were also individuals belonging to *A. sylvaticus* and *A. uralensis*. The rarest species (only one individual) in our catch was *Micromys minutus*. Voles were represented by *Clethrionomys glareolus* and *Microtus subterraneus*. Of three species of shrews (*Sorex araneus*, *Sorex minutus* and *Crocidura*



Fig. 2: Habitat in which one adult male field mouse (NMW 63881) was trapped. Foto: E. Weiß.

leucodon) the bi-coloured white toothed shrew was the most common. *Apodemus agrarius* was represented by one adult male (NMW 63881) and one immature female (NMW 63882). The male was caught in a fringe of dense vegetation consisting of *Solidago* and *Phragmites* adjacent to a line of grey willow bushes that accompanied a small catchwater drain (Fig. 2). The female was captured at the foot of the slope of the Hanság channel in a patch of dense unmown grass in the vicinity of grey willow bushes and weeds (Fig. 3).

Distribution in Hungary

In Hungary the distribution of *Apodemus agrarius* was more intensely studied during the last 20 years (Fig. 4). It turned out that the field mouse is distributed also in the area north of lake Balaton. The distribution follows the river-valleys and wet and dense vegetation. As to be expected, it is absent from the central part of Hungary which is the driest sandy area as well as from the intensive agricultural areas and mountains.

Compared to the distribution map published by Schmidt and Topál (1976) one can clearly see an expansion of the range to the northwestern part of Transdanubia.



Fig. 3: Habitat in which one immature female field mouse (NMW 63882) was trapped. Foto: E. Weiß.

Discussion

Origin of the dead field mouse found in Illmitz

Apodemus agrarius is known for its preference for moist habitats. In regions with low precipitation it lives in areas with high groundwater table and regular inundations (KRATOCHVÍL & ROSICKÝ 1954, KRATOCHVÍL 1977). The fen Hanság, although drained, fulfills the ecological demands of the field mouse well. The habitats in which the two field mice were captured correspond well to the descriptions of the "littoral vegetation" and "reeds" by ZEJDA (1976). According to this author, in northern Moravia littoral vegetation (bushes along water courses, small woods) as well as "reeds" (small patches of *Phragmites*, interspersed with littoral and marshy vegetation as well as weeds) are inhabited by *Apodemus agrarius* in high numbers all year round.

The Hanság channel connects the trapping locality with the reed belt of the lake. The Hanság channel itself and the smaller local drains are accompanied by typical littoral vegetation. Patches of this vegetation type as well as reeds in the sense of ZEJDA (1976), frequently connected by small channels, are found also in the Seewinkel, a region of saline soils, to the east of the lake. It is therefore very probable that the field mouse

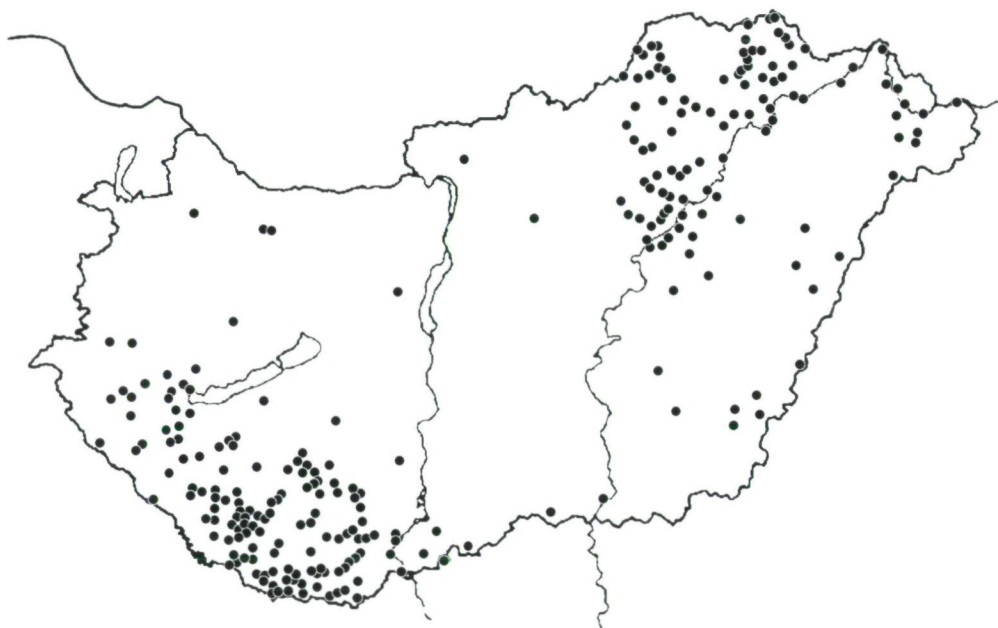


Fig. 4: Recent distribution of the field mouse, *Apodemus agrarius*, in Hungary.

found dead near Illmitz had used this network of suitable habitats for its migration from the Hanság. It is also possible that the mouse had migrated along the Hanság channel to the reed belt of the Neusiedler See/Fertő-tó and moved north through the almost monospecific *Phragmites* belt with its adjacent groups of grey willow bushes towards Illmitz.

Dynamics of the northwestern border of *Apodemus agrarius* in Hungary

In 1945 the distribution of *Apodemus agrarius* in Hungary comprised the upper reaches and the central part of the Tisza, a small isolate at the Danube near Budapest and southern Pannonia between the Danube in the east and the state border to Croatia, Slovenia and Austria in the west (SCHMIDT & TOPÁL 1976). The northernmost record here was Túrje (47° 00' / 17° 07'). The authors discussed the locality Nagylózs (47° 33' / 16° 46', only 6 km south of the foreland of Neusiedler See/Fertő-tó) published by SÓLYMOSY in 1939. With respect to the results of their own and BAUER's (1960) extensive faunistic surveys in this region they came to the conclusion that Solyimosy must have been mistaken and that this record probably concerned *Sicista subtilis*.

In 1976 the knowledge of the distribution of *Apodemus agrarius* in Hungary had considerably improved (SCHMIDT & TOPÁL 1976). One of the main changes compared to the map of 1945 was, that the northern border of the southern Pannonian range had withdrawn to the south, the northernmost locality being now the east end of lake Balaton (approximately 46° 47' / 17° 16'). But a publication by LÁZÁR (1983), who found the field mouse nearly in the same localities as shown on the earlier map, again casts some doubt

on the correctness of the conclusions of SCHMIDT & TOPÁL (1976). Lázár's locality Sümegcsehi (46 59/ 17 13) is only 9 km from the earlier reported northeast locality Túrje.

With the exception of Transdanubia, the recent distribution in Hungary is similar to the map published by SCHMIDT & TOPÁL (1976). Thanks to intensive collecting of owl pellets between 1985-1993, several new localities were found in the north of lake Balaton. Csorna (47 38/ 17 18), only 35 kilometres E of the Neusiedler See/Fertő-tó, was the most northern locality in that area before the finding of the field mouse near Illmitz. The data presented here show that the range includes the Neusiedler See/Fertő-tó area itself and thus throw a new light on the old record of SÓLYMOSY (1939).

The northwestern border of *Apodemus agrarius* in Central Europe is known to be dynamic (KRATOCHVÍL 1977, SPITZENBERGER 1997, KRYŠTUFEK in MICHELL-JONES et al. 1999, BRYJA & ŘEHÁK 2002). There is a general trend of range expansion to the west and south, but at the same time areas occupied during high population numbers can be lost again in later years. These processes explain the numerous isolated distribution patches characteristic for this species. In recent times two examples of expansion were published (along the Mura river from Slovenia to Styria/Austria – SPITZENBERGER 1997 and in southern Moravia – BRYJA & ŘEHÁK 2002). Our results suggest that *Apodemus agrarius* has occupied northwestern Hungary including the Hanság since the 1970s.

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