

The occurrence of wild-living American Mink *Neovison vison* in Transylvania, Romania

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Abstract

American Mink *Neovison vison* is a common wild-living alien species across most of northern Europe, but few data are available about wild presence in Eastern Europe. Field observations and collected specimens from the last 25 years indicate wild-living American Mink along the River Mureş in Transylvania, Romania. These are likely to have originated from fur farms, three of which existed in the area. Earlier observations suggested only the presence of escapees; more recent records might imply the existence of wild populations. Part of the study area held European Mink *Mustela lutreola* until at least the 1990s. This highly threatened species might still occur there. The presence of the alien species might reduce its chances of survival.

Keywords: alien species, European Mink, fur farms, *Mustela lutreola*, mustelids, River Mureş

Vadon élő amerikai nyérc *Neovison vison* előfordulása Erdélyben (Románia)

Kivonat

Az amerikai nyérc *Neovison vison* gyakori idegenhonos faj Európa északi felének nagy részén, viszont vadon élő állományainak kelet-európai előfordulásáról csekély számú adat áll rendelkezésre. Az elmúlt 25 évben a Maros folyó mentéről (Erdély, Románia) származó terepi megfigyelések valamint begyűjtött példányok arra utalnak, hogy a térségben előfordulnak a faj vadon élő egyedei. Ezen példányok minden bizonnyal szőrmefarmokról származtak, amelyekből a vizsgált területen korábban három is működött. Míg a korábbi megfigyelések csupán farmi szőkevények előfordulását sugallták, az újabb adatok valószínűsítik egy vadon élő állomány itteni jelenlétét. A vizsgált terület egy része a fokozottan veszélyeztetett európai nyérznek *Mustela lutreola* is otthont adott legalább az 1990-es évekig, és az sem kizárt, hogy az őshonos menyétféle napjainkig is fennmaradt itt, utóbbi esetben viszont az idegenhonos amerikai nyérc itteni jelenléte komolyan veszélyeztetheti a faj túlélését.

Introduction

American Mink *Neovison vison* is a medium-sized semi-aquatic generalist and opportunist predator, native to most of North America. It was first brought to Europe in the 1920s for commercial purposes, as a fur animal (Kauhala 1996b, Bonesi & Palazon 2007). Accidental escapes or deliberate releases from fur farms led to the establishment of feral populations in many regions of Europe by the second part of the 20th century. Rapid colonisation was documented in several cases (e.g. Bevanger & Henriksen 1995, Kauhala 1996a). In Norway the development of mink farming correlated well with the dispersal of feral populations (Bevanger & Henriksen 1995). American Mink is now believed to have self-sustaining populations in at least 20 European countries, with a continuous distribution in much of northern and western Europe (Mitchell-Jones *et al.* 1999, Bonesi & Palazon 2007, Reid & Helgen 2008). American Mink poses serious threats to indigenous fauna by predation, especially to waterfowl (Ferreras & Macdonald 1999, Bartosiewicz & Zalewski 2003) and to vulnerable Water Vole *Arvicola amphibius* populations (mainly in Great Britain; Rushton *et al.* 2000), but also to invertebrates such as crustaceans (Fischer *et al.* 2009). Genovesi *et al.* (2012) identified American Mink as the alien mammal with the highest impact on native species in Europe. Competition of American Mink with the Critically Endangered European Mink *Mustela lutreola* is a serious threat to the remaining populations of the latter (Maran & Henttonen 1995, Sidorovich 2001, Maran *et al.* 2011).

Very little information is available about the presence of American Mink in Romania. The species is generally omitted from works such as national species lists (Murariu 1984, 2010). The Romanian fauna volume (Murariu & Munteanu 2005) merely mentions the intrusion of the species in northern Romania from Ukraine, without any exact data. Although there were no published records of wild-living American Mink in Romania, the species was listed in the hunting law from 1996 (Law n° 103; 23 September 1996) as a game species. It was removed from later versions of the law, for unknown reasons. It was listed in a nature protection legal act (Law n° 462; 18 July 2001; Annex 5) as a species for which harvesting requires management measures. Cuzic *et al.* (2002) provided the first published record of wild-living American Mink in Romania: a single individual found dead near Somova, at the periphery of the Danube Delta. Two records based on museum specimens are provided by Kranz *et al.* (2004), the same authors also reporting a feral American Mink population east of Izmail, in the Ukrainian part of the delta. Recent introductions of American Mink in the Danube Delta were mentioned by de Jongh *et al.* (2007), without specifying the information source or region of the delta. Most recently, Marinov *et al.* (2012) mentioned an American Mink occurrence in the Romanian part of the Danube Delta.

Istrate (2005) hinted the occurrence of American Mink in Transylvania: he erroneously mentioned the presence of European Mink along the River Târnava Mică, stating that the observed individuals escaped from fur farms along the River Târnava Mare, then expanded from the confluence of the two rivers upstream on the Târnava Mică. In Romania, former tax-

onomy treated the two mink species as conspecific, under the scientific name *M. lutreola*. This confounds information on the two species in Romania. As examples, in the Fur Animal Research Station from Tîrgu-Mureş, old cage boards held the inscription “*Mustela lutreola*”, while some American Mink specimens are labelled “*Mustela lutreola*”, such as two mounts in the mammal collection of the Babeş-Bolyai University Museum of Zoology from Cluj-Napoca, originating from a nearby fur farm (inventory number 1379/2; Gergely Osváth *in litt.* 2014).

The few American Mink records from some countries neighbouring Romania refer to single individuals, with no proof of the existence of populations. As such, a single Serbian record is available, just near the Romanian border: in Banatska Palanka (Vojvodina) an American Mink was trapped on the River Danube on 15 September 1972 (Miric 1992, in Kryštufek *et al.* 1994, Mitchell-Jones *et al.* 1999). There is no further information on American Mink occurrence in Serbia (Boris Kryštufek *in litt.* 2011). Scattered observations in Hungary attested to at least occasional presence of American Mink; no feral populations have ever been known (Bihari *et al.* 2007). In Ukraine however, the species is believed to be widespread in the forest and the forest-steppe zone, but less so in the steppe zone and in the mountains (Andriy-Taras Bashta *in litt.* 2013). It was reported to be common in plain areas of Transcarpathia, a region bordering Romania and Hungary (Bashta & Potish 2007).

The present paper summarises all known records of wild-living American Mink from the River Mureş valley of Transylvania, Romania.

Study area

The study area is the middle stretch of the River Mureş downstream of the Mureş Gorge, in the hilly region of the Transylvanian Plateau, in Mureş County, Romania. The landscape is characterised by a mosaic of broad-leaved (mostly oak *Quercus* – hornbeam *Carpinus*) forests, grasslands and arable land, at 300–600 m asl. Apart from the River Mureş, the area’s most important water bodies are two tributaries, the Gurghiu and the Niraj on the left bank (as proceeding downstream), as well as the Glodeni-Păingenii fishponds and the Fărăgău lake on the Mureş’s right bank. Following river and stream regulations during the past decades, wetlands are generally few. They comprise mostly oxbows, canals, gravel pits and temporary ponds.

Methods

American Mink records were collected opportunistically over 2007–2012, during surveys of museum collections as well as discussions with hunters, anglers, fur-farm workers and field biologists. Most records comprise museum specimens or animals hunted or found dead. Sight-records were included from observers (field biologists and fur farm workers) able positively to rule out similar species (Western Polecat *M. putorius* and European Mink), as attested by discussion about identification. Two-thirds of the data come from the collection of the Kohl István Natural History Museum, Reghin (KINHM), which holds specimens collected in the neighbourhood, prepared by the late István Kohl. His personal notes on the specimens, stored in the Library of the Transylvanian Museum Society from Cluj-Napoca, provided additional information about the

specimens’ circumstances of collection, weight and colour morph, as well as his records of other species.

Results and discussion

The total of 21 occurrence records date from 1986 to 2009 (Fig. 1, Table 1). Museum specimens (14) are from 1986–1991, whereas other records (including four sight records, all by day) come from the 1990s and 2000s (Table 1). This difference in timing might reflect diminishing hunters’ interest in furbearers during the past two decades, caused by the gradual reduction of the fur market. The concentration of field observations near Tîrgu-Mureş and their lack near Reghin could be caused by the presence of numerous field biologists in the former locality, versus their general lack in the latter. Apart from three museum specimens, habitat types are only available for the more recent seven records (Table 1).

Escaped or established in the wild?

Three fur farms (all with American Mink) are known from the study area. One closed in 2013 after the others during the 1980s–1990s. One was founded as an institute in 1981, but the fur farm itself existed prior to this (Fig. 1). Considering the distance of individual records from the fur farms (Table 1), these farms are the potential sources of the wild-

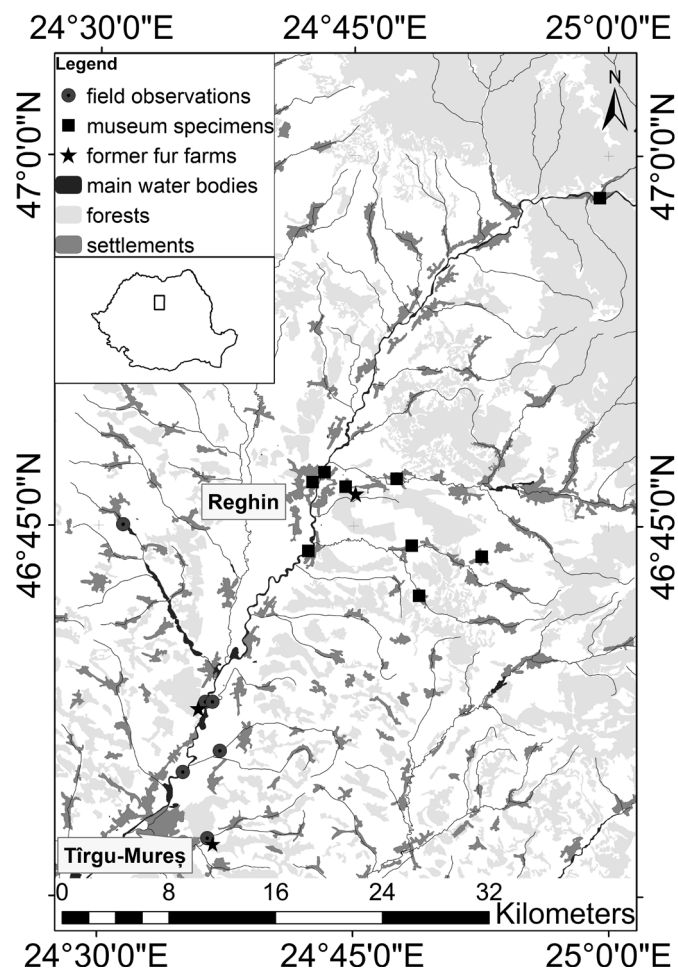


Fig. 1. American Mink *Neovison vison* records in Transylvania, Romania.

Table 1. Records of wild-living American Mink *Neovison vison* in Transylvania, Romania.

Locality	Co-ordinates ¹	Date	Sex	Weight (g)	Colour	Type of record	Habitat ²	Distance ³ to nearest fur farm (km)	Source
Răstolița	46°58'N, 24°59'E	28 Nov 1986	♀	700	white	Specimen		29	KINHM
Reghin	46°47'N, 24°42'E	4 Dec 1986	♂	1,430		Specimen		3.1	KINHM
Reghin	46°47'N, 24°42'E	14 Jan 1987	♂	1,020	white	Specimen		3.1	KINHM
Unknown	-	10 Aug 1987	♀	660	white	Specimen			KINHM
Reghin	46°46'N, 24°42'E	24 June 1988	juv ♂			Specimen	Slain by R. Mureș	2.6	KINHM
Petelea	46°44'N, 24°42'E	1988	♀	660	blackish	Specimen	Caught by R. Mureș	5.7	KINHM
Beica de Jos	46°44'N, 24°48'E	15 Nov 1988	♂	1,120	dark brown	Specimen	Caught by stream	3.2	KINHM
Reghin	46°47'N, 24°42'E	22 Mar 1989	♂	1,540		Specimen		3.1	KINHM
Sânmihai de Pădure	46°44'N, 24°52'E	26 Aug 1989	♀	520	dark brown	Specimen		8.3	KINHM
Reghin	46°47'N, 24°42'E	2 Sept 1989	♀	720	grey	Specimen	In sawmill, under wood pile	3.1	KINHM
Reghin	46°47'N, 24°44'E	13 Sept 1989	♀	530	dark brown	Specimen	Gurghiu road	1	KINHM
Jabenița	46°47'N, 24°47'E	4 Sept 1990	♀	780	dark brown	Specimen		2.2	KINHM
Reghin	46°47'N, 24°42'E	5 Nov 1991	♀	930		Specimen	Caught by slaughter-house	3.1	KINHM
Nadășa	46°42'N, 24°49'E	19 Dec 1991	♀	600	grey	Specimen		6.7	KINHM
Sângeorgiu de Mureș	46°35'N, 24°35'E	1990s	-	-	dark brown	Observed	Gravel pits	4.8	Z. Szombath verbally 2010
Țirgu-Mureș	46°32'N, 24°36'E	1998	-	-	dark brown	Observed	Stream	0.5	AK
Glodeni	46°38'N, 24°37'E	1999	-	-	dark brown	Observed	River	1.2	Cs. Ajtay verbally 2009
Fărăgău	46°45'N, 24°31'E	between 2003 and 2005	-	-	blackish	Hunted	Natural lake	15	T. Palotás <i>in litt.</i> 2010
Ernei	46°36'N, 24°37'E	27 Oct 2005	-	-	dark brown	Observed	Stream	3.5	A. Deák <i>in litt.</i> 2011
Glodeni	46°38'N, 24°36'E	4 Apr 2009	-	-	dark brown	Found dead	Gravel pits	0.8	AK & T. Sos
Fărăgău	46°45'N, 24°31'E	3 Nov 2009	-	-	blackish	Observed (photo)	Natural lake	15	I. Plájás <i>in litt.</i> 2012

¹For museum specimens, the coordinates of the indicated settlement are provided, because their exact finding location is unknown.

²I. Kohl's notes verbatim, for museum specimens.

³Distance of indicated settlements from the fur farm in case of museum specimens, exact distance for all other records.

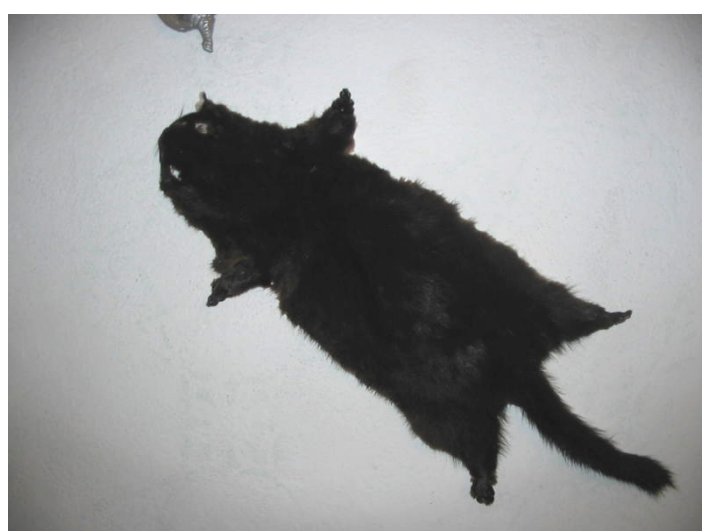


Fig. 2. Some of the American Minks *Neovison vison* recorded in Transylvania, Romania: (top left) carcass found near Glodeni, Romania, 4 April 2009 (Photo: T. Sos); (top right) observed by the Fărăgău lake, Romania, 3 November 2009 (Photo: I. Plájás); (bottom left) stealing fish from anglers by the Fărăgău lake, Romania, 3 November 2009 (Photo: I. Plájás); (bottom right) pelt hunted by the Fărăgău lake, Romania, within 2003–2005 (Photo: T. Palotás).

living individuals (Fig. 1). But some individuals found at considerable distances from mink farms suggest colonisation of available habitats. Among the more recent records, one (Tîrgu-Mureş, 1998) can be regarded as a former fur-farm escapee, because it was observed in a stream near a fur farm by AK. Fur colour of 10 of the 14 museum specimens is known from notes of I. Kohl (Table 1). The colour morphs can be associated with the four strains kept in some fur farms (e.g. in Tîrgu-Mureş): 'standard' (dark brown or blackish), 'hedlund' (jonquil), 'silver' (silvery grey) and 'pastel' (greyish-brown). Contrasting with the museum records, the other seven of the recorded individuals were all identified as dark brown or blackish (Table 1, Fig. 2). The above data, particularly the colour morphs involved, suggest that wild-taken American Minks in the region during the 1980s and early 1990s were farm escapees. More recent records from locations adjacent to closed-down fur farms and further away from these support the idea that wild-living individuals now exist.

Conservation implications

Competition aspects between American Mink and other riparian carnivores in this area have not been documented.

European Mink records in the study area date mainly from the first part of the 20th century (Szunyoghy 1974, Youngman 1982), although some records are much more recent (Table 2). Local extinction of this species from this part of the Carpathians has been suspected but never proven. Recent unconfirmed sightings from mountain regions suggest the persistence of some individuals at least, although we found no certified published records from the past two decades. Rigorous examination is needed given the confusion risks with American Mink and Western Polecat. The occurrence of American Mink in the Mureş Gorge (Răstolița locality) might mean another serious threat to a remnant (if still extant) European Mink population. I. Kohl's notes regarding mammal skins he prepared over several decades include four European Minks, all during 1964–1993 (Table 2) and 14 American Minks, all during 1986–1991 (Table 1). These records, however few, imply that during the presumed appearance of American Mink in the wild (possibly in the mid-late 1980s), the European species was already rare. A general scarcity of European Mink is further corroborated by the fact that during 1976–1995 he received 370 Western Polecats, another riparian mustelid. Uncertainty about the time of the first American Mink escapes hinders speculation

Table 2. Specimens of European Mink *Mustela lutreola* from Transylvania, Romania held at the Kohl István Natural History Museum, Reghin.

Locality	Co-ordinates	Date	Sex	Weight (g)
Lăpușna	46°46'N, 25°13'E	19 Apr 1964	♂	999
Răstolița	46°58'N, 24°59'E	25 Sept 1976	♂ (juv)	305
Senetea	46°38'N, 25°35'E	18 Nov 1979	♂	940
Lunca Bradului	46°58'N, 25°06'E	24 Aug 1993	♂	560

All animals were trapped or hunted.

about the beginning of potential competition between the two mink species, or the effects of American Mink on the native species.

Given the recent, albeit unconfirmed, American Mink sightings from various river basins of Transylvania (authors' unpublished data), as well as the history of fur farms in nearly all regions of the country, individuals or populations of American Mink are likely to exist in other river basins, at least in regions with a colder climate such as the Carpathians and the Transylvanian Plateau. Targeted surveys are needed, however, to clarify this issue, which might have significant conservation implications, given the obscure status of the European Mink in the region.

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References

- Bartoszewicz, M. & Zalewski, A. 2003. American Mink, *Mustela vison* diet and predation on waterfowl in the Słońsk Reserve, western Poland. *Folia Zoologica* 52: 225–238.
- Bashta, A.-T. & Potish, L. 2007. *Ssavci Zakarpats'koj oblasti [Mammals of the Transcarpathian region (Ukraine)]*. National Academy of Sciences of Ukraine, Lviv, Ukraine. (In Ukrainian, with summaries in English.)
- Bevanger, K. & Henriksen, G. 1995. The distributional history and present status of the American Mink (*Mustela vison* Schreber, 1777) in Norway. *Annales Zoologici Fennici* 32: 11–14.
- Bihari, Z., Csorba, G. & Heltai, M. (eds) 2007. *Magyarország emlőseinek atlasza*. Kossuth kiadó, Budapest, Hungary.
- Bonesi, L. & Palazon, S. 2007. The American Mink in Europe: status, impacts, and control. *Biological Conservation* 134: 470–483.
- Cuzic, M., Marinov, M. & Cuzic, V. 2002. American Mink (*Mustela vison*) – a new mammal species of the DDBR territory. *Scientific Annals of the Danube Delta Institute for Research and Development, Tulcea-Romania* 9: 52–54.
- de Jongh, A. W. J. J., Tokar, G. A., Matveyev, A. S., de Jong, T. & de Jongh-Nesterko, L. V. 2007. European Mink (*Mustela lutreola*) still surviving in Ukrainian deltas of the Danube and Dniester. *Lutra* 50: 49–52.
- Ferreras, P. & Macdonald, D. W. 1999. The impact of American Mink *Mustela vison* on water birds in the upper Thames. *Journal of Applied Ecology* 36: 701–708.
- Fischer, D., Pavlůvčík, P., Sedláček, F. & Šálek, M. 2009. Predation of the alien American Mink, *Mustela vison* on native crayfish in middle-sized streams in central and western Bohemia. *Folia Zoologica* 58: 45–56.
- Genovesi, P., Carnevali, L., Alonzi, A. & Scalera, R. 2012. Alien mammals in Europe: updated numbers and trends, and assessment of the effects on biodiversity. *Integrative Zoology* 7: 247–253.
- Istrate, P. 2005. *Contribuții la studiul faunei de mamifere mici din zona cursului inferior și mijlociu al râului Târnava Mică*. Casa Cărții de Știință, Cluj-Napoca, Romania.
- Kauhala, K. 1996a. Distributional history of the American Mink (*Mustela vison*) in Finland with special reference to Otter (*Lutra lutra*) populations. *Annales Zoologici Fennici* 33: 283–291.
- Kauhala, K. 1996b. Introduced carnivores in Europe with special reference to central and northern Europe. *Wildlife Biology* 2: 197–204.
- Kranz, A., Toman, A., Polednikova, K., Polednik, L. & Kiss, J. B. 2004. Distribution, status and conservation priorities of the European Mink in the Romanian Danube Delta. *Scientific Annals of the Danube Delta Institute for Research and Development, Tulcea-Romania* 10: 38–44.
- Kryštufek, B., Griffiths, H. I. & Grubestic, M. 1994. Some new information on the distributions of the American and European Mink (*Mustela* spp.) in former Yugoslavia. *Small Carnivore Conservation* 10: 2–3.
- Maran, T. & Henttonen, H. 1995. Why is the European Mink (*Mustela lutreola*) disappearing? A review of the process and hypotheses. *Annales Zoologici Fennici* 32: 47–54.
- Maran, T., Skumatov, D., Palazón, S., Gomez, A., Pödra, M., Saveljev, A., Kranz, A., Libois, R. & Aulagnier, S. 2011. *Mustela lutreola*. In IUCN 2013. *IUCN Red List of Threatened Species*. Version 2013.2. <www.iucnredlist.org>. Downloaded on 28 November 2013.
- Marinov, M. E., Kiss, J. B., Toman, A., Poledník, L., Alexe, V., Doroftei, M., Dorosencu, A. & Kranz, A. 2012. Monitoring of European Mink (*Mustela lutreola*) in the Danube Delta Biosphere Reserve – Romania, 2003–2011. Current status and setting of goals for the European Mink conservation. *Scientific Annals of the Danube Delta Institute* 18: 69–74.
- Mitchell-Jones, A. J., Amori, G., Bogdanowicz, W., Kryštufek, B., Rejnders, P. J. H., Spitzenberger, F., Stubbe, M., Thissen, J. B. M., Vohralík, J. & Zima, J. (eds) 1999. *Atlas of European mammals*. Academic Press, London, U.K.

- Murariu, D. 1984. La liste des mammifères actuels de Roumanie; noms scientifiques et roumains. *Travaux du Muséum d'Histoire Naturelle „Grigore Antipa”* 26: 251–261.
- Murariu, D. 2010. Systematic list of the Romanian vertebrate fauna. *Travaux du Muséum d'Histoire Naturelle „Grigore Antipa”* 53: 377–411.
- Murariu, D. & Munteanu, D. 2005. *Fauna României: Carnivora*. Editura Academiei Române, București, Romania.
- Reid, F. & Helgen, K. 2008. *Neovison vison*. In IUCN 2011. *IUCN Red List of Threatened Species*. Version 2011.2. <www.iucnredlist.org>. Downloaded on 2 June 2012.
- Rushton, S. P., Barreto, G. W., Cormack, R. M., Macdonald, D. W. & Fuller, R. 2000. Modelling the effects of Mink and habitat fragmentation on the Water Vole. *Journal of Applied Ecology* 37: 475–490.
- Sidorovich, V. 2001. Study on the decline in the European Mink *Mustela lutreola* population in connection with the American Mink *M. vison* expansion in Belarus: story of the study, review of the results and research priorities. *Säugetierkundliche Informationen* 5(25): 133–153.
- Szunyoghy, J. 1974. Eine weitere Angabe zum Vorkommen des Nerzes in Ungarn, nebst einer Revision der Nerze des Karpatenbeckens. *Vertebrata Hungarica Musei Historico-Naturalis Hungarici* 15: 75–82.
- Youngman, P. M. 1982. Distribution and systematics of the European Mink *Mustela lutreola* Linnaeus 1761. *Acta Zoologica Fennica* 166: 1–48.
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