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Mediterranean water shrew, *Neomys anomalus* Cabrera, 1907 – a new mammal species for Lithuania

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Abstract. A single specimen of the Mediterranean water shrew (*Neomys anomalus*) was trapped in west Lithuania in 2009. Characteristics of *N. anomalus* shared by this specimen include: the keel on the ventral side of the tail only extending to the proximal third of the tail length, and the hind foot length and several skull measurements being significantly smaller than *N. fodiens*. The habitat of the specimen was flooded sedge meadows and reeds. A review of the skull collection at the Nature Research Centre (Vilnius, Lithuania) and its associated biometric data yielded two more *N. anomalus* individuals from the west of the country. These records extend the species' distribution by over 350 km to the north and represent a new mammal species for Lithuania and the Baltic countries.

Key words: *Neomys anomalus*, northern distribution limit, areal, Lithuania.

The Mediterranean water shrew (*Neomys anomalus* Cabrera, 1907) mostly inhabits the southern part of Europe, its range extending from Spain to the Balkans (Spitzenberger 1999). In the north-eastern part of its range, *N. anomalus* have been recorded in Białowieża National Park, Poland (Rychlik et al. 2006). Old records also exist from Belarus (Serzhanin 1961), but there is no recent published data (Savyckij et al. 2005).

In 2009, the species was recorded in west Lithuania, over 350 km north of its formerly known range. A single individual of *N. anomalus* was snap-trapped in the Nemunas River Delta, west Lithuania (55°20'34'' N; 21°18'07''E). It's habitat was high sedge meadow that is flooded in the spring, surrounded by drainage channels and edged by high dense reed beds.

A total of 445 individuals of 11 rodent and insectivore species were trapped in the Rusnė flooded meadows in 2009. One of the trapped shrews was not one of the familiar species belonging to the Lithuanian fauna. The keel on the ventral side of the tail did not extend the full length of the tail, but only to around the proximal third of the length. The colouration was typical for the genus *Neomys* – the back was almost black, the belly creamy silver, with the line between these colours on the flanks being well defined. It was an adult male with body mass: 9.0 g, body length: 65.9 mm, tail length: 41.0 mm, and hind foot length: 14.0 mm. The tail made up 62.2% of the head and body length. After comparing skull measurements with *N. fodiens* specimens from Lithuania and published data from other countries (Niethammer 1978, Peman 1983, Libois 1986, Spitzenberger 1999), we confirm that in the current taxonomic division of genus *Neomys* (according Wilson & Reeder 2005), our specimen is, without doubt, *N. anomalus*.

Re-examining the small mammal skull collection at the Nature Research Centre (Vilnius, Lithuania), we found two formerly misidentified individuals of *N. anomalus* amongst the more than 80 museum specimens of water shrews we examined, with one further individual showing morphometric characteristics intermediate between *N. fodiens* and *N. anomalus* according to the hind foot length and diagnostic skull characters (Peman 1983, Libois 1986).

We found that all measurements, excluding body length, were significantly smaller in *N. anomalus* than in *N. fodiens*. The hind foot length (P), tail length (C), height of coronoid process (HC), condylobasal length (CBL), condyloincisive length (CIL), post-glenoidal width (PGW) and zygomatic width (ZW) did not overlap between these species (Table 1). The difference between the two species in relation to hind foot length, zygomatic width and rostral length is very clear.

The skull of *N. anomalus* from Lithuania is presented in Fig. 1. The lacrimal foramen is situated between the positions M^1 and M^2 (Fig. 1d), which is typical for *N. anomalus* (Barti 2006). The position of mental foramen (which according to L. Barti (2006) for *N. anomalus* is under the anterior edge of M_1) is also typical (Fig. 1e).

All *N. anomalus* individuals found in Lithuania have been near water, in habitats characterized as sedge meadow bordered by reedbeds. Other

Table 1. Body and cranial morphometry of *N. anomalus* and *N. fodiens* from Lithuania. (all measurements in mm)

Character	*N. anomalus* (n=3)		*N. fodiens* (n=84)		*N. anomalus / fodiens* (n=1)
	Avg [1SE]	Min–Max	Avg [1SE]	Min–Max	
C	44.7 [2.08]	41.0–48.2	62.3 [0.54]	50.5–73.1	56.7
P	14.6 [0.35]	14.0–15.2	18.0 [0.10]	16.3–19.6	17.2
HC	4.0 [0.00]	4.0–4.0	4.7 [0.01]	4.4–5.1	4.1
CIL	18.9 [0.05]	18.8–18.9	20.8 [0.06]	19.5–21.7	19.7
CBL	17.7 [0.25]	17.4–17.9	19.8 [0.06]	18.4–20.7	19.0
PGW	5.5 [0.06]	5.4–5.6	6.1 [0.02]	5.8–6.4	5.9
ZW	5.7 [0.09]	5.6–5.9	6.6 [0.02]	6.2–7.0	6.2

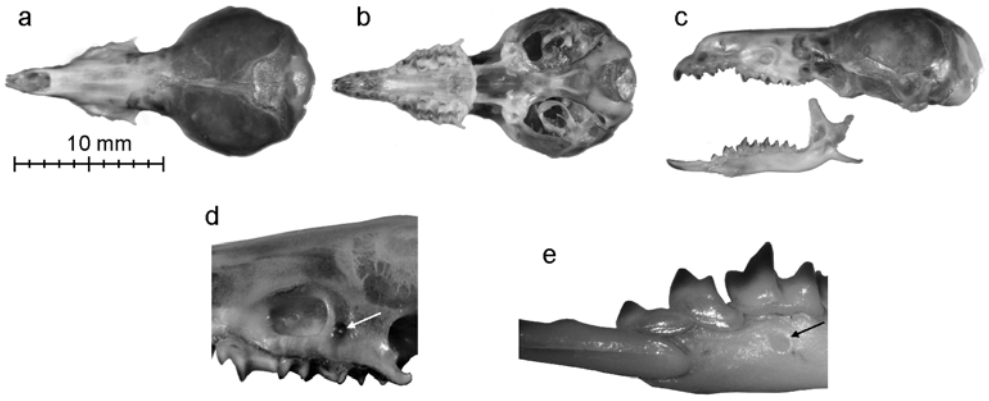

Figure 1. Skull of *N. anomalus* from Lithuania: **a)** dorsal, **b)** ventral, **c)** lateral view, **d)** position of lacrimal foramen (not to scale), **e)** position of mental foramen (not to scale).

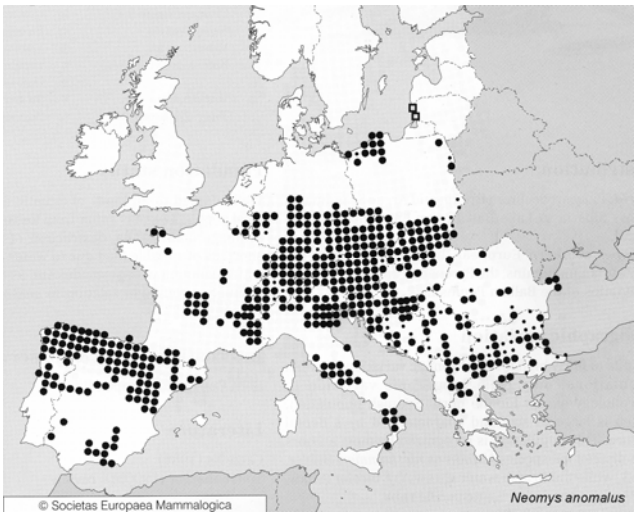

Figure 2. Range of *N. anomalus* in Europe with the new locality from Lithuania indicated by squares. (map from Spitzenberger 1999, modified).

authors describe the typical habitat of *N. anomalus* as densely vegetated shores of still water and rivers, bogs and marshes (Niethammer 1977, 1978, Pucek 1984, Spitzenberger 1999, Kryštufek & Vohralík 2001).

The size of *N. anomalus* is variable over its range, and converges with the size of *N. fodiens* in the southern parts of its distribution. With a hind

foot length of 14.0–15.2 (14.6 ± 0.35) mm and the height of the coronoid process being 4.0 mm, the Lithuanian *N. anomalus* fits into the frequently observed pattern seen in water shrews of decreasing size with increasing latitude (Kryštufek & Quadracci 2008). According to these two measurements, the individuals morphologically closest to Lithuania populations of *N. anomalus* are those found in Poland, the Czech Republic and Germany.

The three individuals of *N. anomalus* identified from two locations in Lithuania in 2001, 2008 and 2009 have expanded the known species distribution range by over 350 km to the north (Fig. 2). According to Danish colleagues, climate change may be the reason for a northward spread in this species (Fløjgaard et al. 2009).

Prior to this discovery, the only representative of the genus *Neomys* in the Baltic countries was the common water shrew (*Neomys fodiens*) (Timm et al. 1998, Balčiauskas et al. 1999, Zorenko 2008). Through analysis of earlier field work and skull collections, we conclude that *N. anomalus* was not present in Lithuania prior to the year 2000. Additionally, the species has not been recorded elsewhere in north-east Poland, other than in Białowieża National Park (Niedziałkowska et al. 2010). However, data is lacking for much of the territory between Lithuania and Białowieża (particularly in the Kaliningrad Region) and further investigation may reveal the presence of *N. anomalus* in these areas.

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