

Cases of Coat Colour Anomalies in the Common Shrew, *Sorex araneus* L.*

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Coat colour anomalies in the common shrew, *Sorex araneus* L., in the geographical range of this species, including Poland, are extremely rare. This study describes atypically coloured common shrews. Light colouration of the coat is a result of lack of pigment in the entire hair or hair fragments. It appears that atypically coloured shrews occur more often in isolated populations whose gene transfer with neighboring populations is limited.

Key words: Fur colouration, shrews, white ear tufts.

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Coat colouration is an important factor that determines a mammal's survivorship in the environment, primarily because of its camouflage function (SEARLE 1968). Typically coloured young common shrews have deep brown or chestnut backs, shading gradually into gray brown on the underside. In winter their backs are almost completely black and overwintered animals have black backs and reddish brown sides (PUCEK 1981). The coat colouration of the common shrew is characterized by low variability, and both melanistic (SKARÉN 1973) and light (van BREE *et al.* 1963; PUCEK 1964; MERCER & SEARLE 1994) forms occur only rarely. The purpose of this study is to describe colouration anomalies in common shrew caught in Poland and to attempt to explain their causes.

Material and Methods

On June 17, 2002 in the vicinity of Pasłek (Rzeczna-Osiedle: 19°33'E 54°04'N), four common shrew specimens were captured; two of which had atypical colouration. One specimen had white hair on the ear tufts, and the rest of the body was normally coloured (no documentation – the shrew was released). The second specimen also had white hair on the ear tufts; the anterior part of the back and belly were much lighter and the distal part of the tail was white (Fig. 1 A). The shrew died

on July 10. It was a young female of the following measurements: head and body – 64.7; tail – 41.7; hindfoot – 12.1; body mass – 7.67 g. On August 18, 2004, a young female *S. araneus* with white ear tufts was captured in the Roztocze region near Smółsko (22°48'E 50°30'N) (Fig. 1 B). Her body dimensions were as follows: length of head and body – 67.8; length of tail – 39.7; length of hindfoot – 12.1; body mass – 8.10 g. The skins and skulls of the shrews are deposited in the Department of Genetics at Białystok University.

Results and Discussion

The lighter fur colouration of the “white” shrew is a result of the fact that melanophores in some sections of guard hairs (terminology after Ivanter 1994) do not contain pigment or its quantity is reduced (Fig. 2). Microscopic images of ear hairs demonstrate that in comparison to normally coloured shrews (Fig. 3 A), pigment is not present in ear tufts of either the “white” or “white-eared” shrews (Fig. 3 B, C). Pigmentation disturbances are most clearly visible in single-segmental tail hairs. The “white” shrew hairs contain only trace quantities of eumelanin in comparison to the hairs of normally coloured shrews (Fig. 4 A), and the pigment occurs only in the place where it initiates accumulation during ontogenesis (Fig. 4 B). Col-

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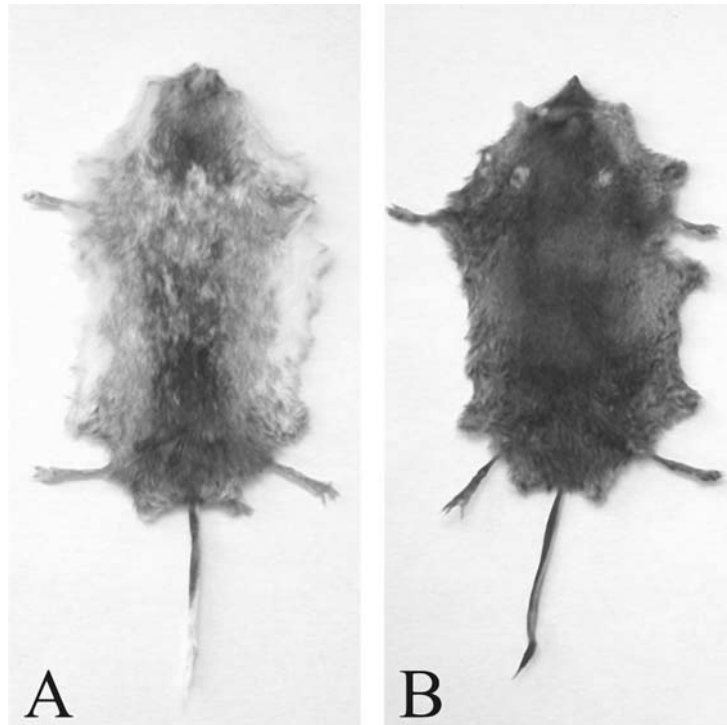


Fig. 1. Coat of a partially albino shrew (A) from the Rzeczna-Osiedle population and the “white-ear” shrew (B) from the Smólsko population.

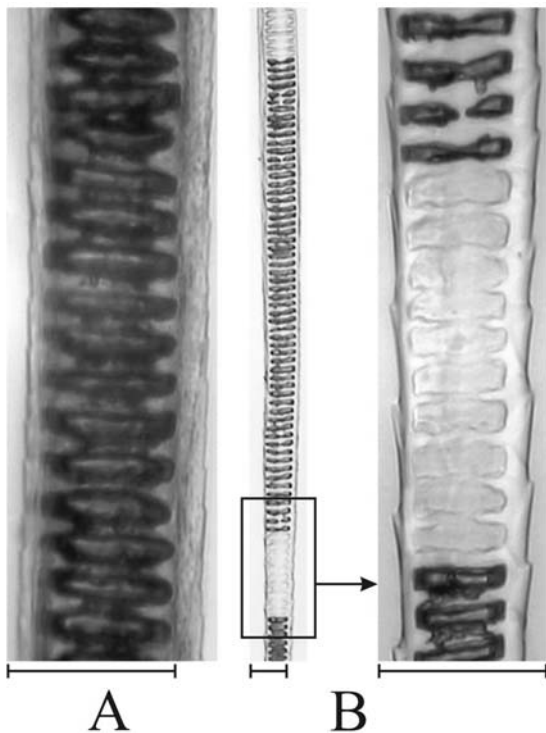


Fig. 2. Microscopic image of a guard hair from a back of a normally coloured shrew (A) and a partially albino shrew (B). Bar = 100 μm .

ouration anomalies, which occur in some specimens, result from mutations in one or more gene *loci*, which may cause this condition (SEARLE

1968). In *Soricidae*, the anomalies may be caused by mutations in *C*, *E*, and *S loci* (ROBINSON 1970; MERCER & SEARLE 1994). However, without cross-breeding, determination of the mutation type responsible for the colouration anomaly is impossible.

The partially albino common shrew, which was captured near Pasłek, is one of few animals of this type found in the species geographical range and the first that has ever been captured in Poland. *S. araneus* specimens of similar colouration have been found to date in Great Britain (GELLING 2003) and in Russia, where the case of complete albinism also has been observed (DOLGOV 1968). “White-eared” shrews are more common. Among 1090 specimens of this species collected in Poland by the Mammal Research Institute PAS, only three individuals had white ear tufts; whereas, among 4053 shrews caught in the Białowieża Forest, only one had this type of colouration anomaly (PUCEK 1964). However, common shrews with white ear tufts occur frequently (ca. 20% of individuals) among populations of this species in Great Britain (CROWCROFT 1955). The frequency of their occurrences is geographically diversified and they appear more frequently during dry years (CHURCHFIELD 1990).

It is noteworthy that in a relatively small sample (4 specimens) from the Pasłek region, no less than two colouration anomaly cases have been found. The reason for such a high concentration of



Fig. 3. Microscopic image of ear hairs of a normally coloured shrew (A), a "white" shrew (B), and a "white-ear" shrew (C). Bar = 100 μm .

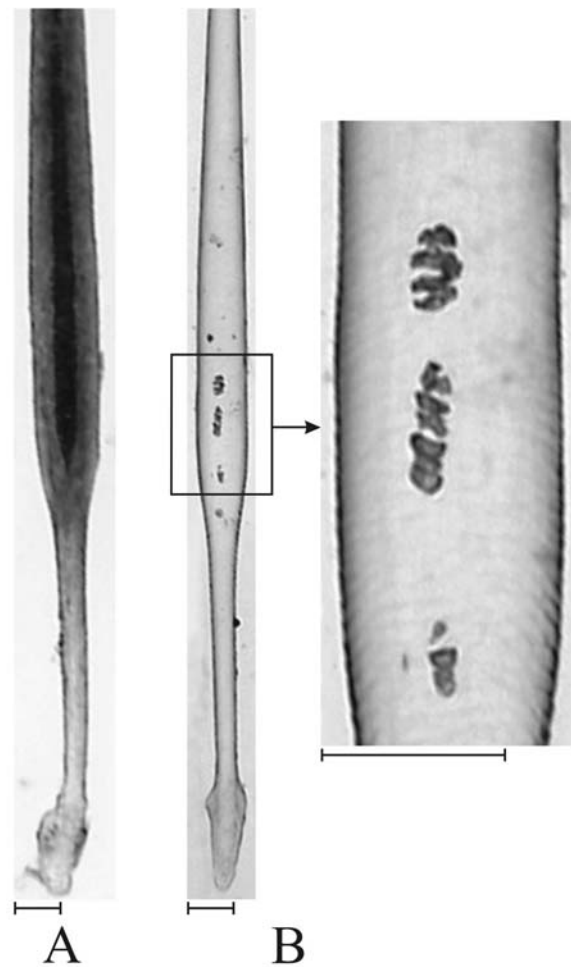


Fig. 4. Microscopic image of tail hairs of a normally coloured shrew (A) and a "white" shrew (B). Bar = 100 μm .

anomalies may be the high degree of isolation of the Rieczna-Osiedle population, which, considering the limited possibility of gene exchange, enabled the manifestation of recessive alleles that condition colour. As was observed by VAN BREE *et al.* (1963) and FONS *et al.* (1983) in *Neomys fodiens*, this type of anomaly can be more common in some local populations than in others. The data related to the distribution of specimens with white ear tufts in Great Britain (CHURCHFIELD 1990) also suggest such a cause. Furthermore, in captivity, cross-breeding of normally coloured individuals produced litters in which some of the offspring had this feature (CROWCROFT 1957). It is possible that shrews with colouration anomalies occur more often in natural populations, but are under the strong pressure of selection. This might be caused by lower viability of such animals, pleiotropic effects of genes that determine colouration (SEARLE 1968), or a reduced ability to hide from predators. It is also notable that the populations

where the studied shrews originated are located on the boundaries of the contact zones between chromosome races (BANASZEK 1994).

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