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**The Forest Dormouse (*Dryomys nitedula* Pallas)
in the Białowieża National Park**

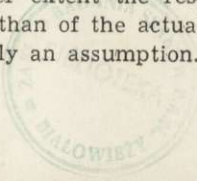
**Koszatka (*Dryomys nitedula* Pallas) w Białowieżskim
Parku Narodowym**

The aim of this work is to sum up the knowledge we possess so far of one of the lesser-known representatives of Polish mammalian fauna — the forest dormouse. As far as Polish representatives of this species are concerned, not even the limits of individual variation are known. Data supplied by keys are not complete and are in general based on the measurements made by Miller (1912), using material from the British Museum, which did not include specimens from Poland.

The only larger collection of forest dormice from Poland is that included in the collections of the Mammals Research Institute of the Polish Academy of Sciences in Białowieża. I did not succeed in obtaining more than a very few specimens from other zoological centres for purposes of comparison.

The forest dormouse was recorded, on the basis of data so far available, as occurring in the south-east areas of Poland (Lubicz-Niezabitowski, 1933). This agrees with the data given by Van den Brink (1956), who included a map of the occurrence of the forest dormouse in Europe in his work.

It is in general agreed that the forest dormouse belongs to the category of rare animals. As the north-western limit of its range runs through Poland, this may have some influence on its infrequent occurrence (as in the case of the edible dormouse). It appears to me, however, that the „rarity” of the forest dormouse is to a far greater extent the result of the unsuitability of the methods used to catch them, than of the actual numbers of this mammal in the area. This is, of course, only an assumption.



MATERIAL AND METHODS

The material forming part of the collection of the Mammals Research Institute of the Polish Academy of Sciences was caught in the Białowieża National Park over the period from 1946 to the present. Up to 1952 collection was carried out by the Białowieża branch of the Forestry Research Institute, and from 1952 onwards by the Mammals Research Institute. The animals were caught at random in Zimmer cylinders. It should be emphasised here that this method is not effective as far as *Muscardinidae* are concerned.

In the Białowieża Forest dormice are encountered in the following types of forest (I have adhered to Karpiński's (1949) terminology): *Carpinetum typicum*, *Querceto-Carpinetum*, *Pseudoquercetum* and *Alnetum glutinosae*. Despite the fact that operations for catching *Micromammalia* were carried out simultaneously in coniferous biotopes, the forest dormouse was never caught in these places. This is evidence that the forest dormouse, at least in the Białowieża National Park, is closely connected with the conditions prevailing in the deciduous forest. The reasons for this fact may differ, one of them being the question of food supply. The forest dormouse, which feeds chiefly on plant foods (nuts, seeds, fruits) is able to find a larger quantity and greater variety of food in a deciduous forest. There is very often dense hazel undergrowth in places where forest dormice are caught. A second reason is the greater possibility of finding hiding-places than in a coniferous forest (holes in trees, etc.), in which the animal spends the day or builds a nest. Apart from captures in cylinders, the forest dormouse has several times been encountered in the bat-boxes which are hung up in various parts, of the National Park. Sometimes females with their young have been found. No increase at all in the number of boxes occupied by forest dormice has been observed for three years. The probable reason for this is the existence of a large number of naturally-formed holes in tree-trunks, which the forest dormice use as sites for their nests¹⁾.

The month in which collection is carried out has a fundamental influence on the age composition of the material caught. An example

¹⁾ In the Kampinos Forest, in similar biotopes, but in a forest stand practically devoid of old trees, about 20% of the boxes in 1958 were occupied by *Muscardinus avellanarius* Pall., the numbers of which increased every year in these boxes over a period of three years.

of this is afforded by the forest dormice from Czarnohora, caught by Sagan at the beginning of July, consisting solely of large adult specimens. Young ones which begin to appear in the material caught during the second half of July, differ decidedly in dimensions from the adult specimens. In September, in addition to the old animals, which have lived through the winter, the population includes young animals born in June or at the beginning of July, and completely young specimens born in August. It is not certain whether the forest dormice have young ones twice a year. It is possible that we are concerned with a long-drawn-out breeding season, similar to that of squirrels in Poland. In the May-June material we have individuals of various ages which have lived through the winter and are sexually mature. It is also possible that the breeding season of the old individuals takes place earlier than in the case of the young individuals of the previous year, amongst which there may be differences in the date of occurrence of the first heat, depending on the time at which they were born (beginning or end of summer).

The differences in age, the existence of at least two age groups differing distinctly from each other, are extremely important, especially when making a comparison of different sets of material. It is necessary to be very careful in drawing conclusions as to the systematic differences, which may sometimes be caused simply by differences in age structure of the material examined.

We do not possess suitable material on the death rate of forest dormice during hibernation. Comparison with the *Muscardinus cvellanarius* Pall. in the case of which the death rate may be as high as 80% of the hibernating population (data given by Lichačev, 1955) would give grounds for presuming that the percentage is high. Indirect evidence of this is the fact that no mass occurrences of forest dormice are observed in Poland.

INDIVIDUAL VARIATION

The following dimensions were analysed: length of body, tail, hind foot and ear. Craniometric measurements were made according to the methods described by Wasilewski (1952). Material was divided into two age-groups — young and old. This division corresponds to the biological division into sexually immature or mature individuals. All individuals in their first calendar year of life were

included in the "young" group. The basic criterion for division was the degree to which the molar teeth were worn. I also took into consideration, for control purposes, remarks in the index or on the labels as to the state of the gonads and age.

Table 1.

Body dimensions and weights of Forest Dormice from Białowieża.

Measurement	Y O U N G			A D U L T		
	min.	avg.	max.	min.	avg.	max.
Head and Body	67	77.25	87	77	88.90	100
Tail	62	72.10	80	78	80.60	91
Hind foot	15	19.45	22	20	21.30	22
Ear	8	12.00	14	12	13.50	15
Weight	10.4	16.76	20.8	16.9	22.81	28.2
Number of animals	13			12		

Table 2.

Craniometric measurements of *Dryomys nitedula* Pallas from Białowieża.

Measurement	Y O U N G			A D U L T		
	min.	avg.	max.	min.	avg.	max.
Condylbasal length	20.3	21.59	22.9	22.1	24.21	26.7
Basal length	17.7	19.61	20.9	19.8	22.08	24.1
Diastema	5.1	5.69	6.2	5.8	6.29	7.0
Occipital breadth	11.4	12.20	12.7	12.6	13.37	14.1
Zygomatic breadth	11.8	13.20	14.8	15.2	15.87	16.9
Interorbital constriction	3.8	4.11	4.6	4.1	4.27	4.50
Height of skull per bullae	9.5	10.47	11.0	10.6	11.65	12.0
Palatal depth	4.8	5.04	5.4	4.8	5.24	5.9
Depth of brain-case	7.2	8.16	8.9	8.1	8.55	8.9
Maxillary tooth-row	3.8	3.90	4.0	3.7	3.91	4.2
Mandibular tooth-row	3.9	3.99	4.2	3.8	4.15	4.4
Number of animals	13			12		

All measurements are set out in Tables 1 and 2. They reveal large differences between young and adult specimens in the majority of the

measurements. These differences almost disappear in the material caught in the spring. It should therefore be presumed that very intensive growth processes take place over a short period following the awakening from winter sleep, so that the spring material is almost homogeneous. A similar phenomenon takes place in the case of the dormouse *Muscardinus avellanarius* Pall. (Sidorowicz, 1959).

These tables, which give a picture of the extent of individual variation in the various measurements of forest dormice from Białowieża, show how large the age differences can be. The use of averages embracing individuals of differing ages therefore serves no useful purpose. This has been emphasised by Caboń (1958) in relation to wild pigs. When material is collected in the autumn we may catch a group of individuals, 80% of which are young. The averages of all dimensions will consequently be much lower than those obtained from material caught at the beginning of July, in which there are no young at all. In the following part of this work, in discussing the systematic position of Polish forest dormice, comparison will be made of dimensions of adult specimens only.

COLOUR AND MOULT

One of the most frequently mentioned features in distinguishing subspecies in mammals is colour. It would, however, appear that the significance of this feature is often overestimated and leads to excessive development of subspecific systematics, especially when other features are not taken into consideration, in particular cranio-metric measurements. In addition, it is difficult to avoid being subjective in describing colouring. For instance, one of the subspecies, *Dryomys nitedula intermedius* Nehring, is described as follows by Miller (1912) „Similar to *Dryomys nitedula nitedula*, but general colour of upper parts greyish brown without tinge of yellow”. This description is based on material consisting of four individuals from different places.

In material from the collections of the Forest Research Institute (now in the possession of the Mammals Research Institute, Polish Academy of Sciences), and of the Mammals Research Institute in Białowieża, skins of this colour can easily be found. This form is also described from the Lienz district (Austria), that is, from a place situated over 1000 km. from Białowieża.

The fur of the forest dormouse shows, as it were, two groups of colour. Dark to light grey back, the colour of ash or grey with a clearly rusty tinge (slightly similar in tone to the colour of *Clethrionomys glareolus* Schreb.). The belly is creamy-white, and there is sometimes a light-grey tinge in the case of young specimens. The tail is dark-grey, with characteristic transverse striping.

The occurrence of two types of colour is not dependent on age, since both young and adult individuals are encountered with this type of fur. The light-grey colour is less frequently encountered in the Institute collections, (about 40% of the total). A specimen of the forest dormouse, belonging to the *intermedius* subspecies, and borrowed from the Zoological Museum in Vienna, has this type of colouring.

From the above data the fact emerges that two colour forms occur in the forest dormouse population in the Białowieża Forest. The occurrence of two colour forms in the birchmouse (*Sicista betulina* Pallas) and the existence of three types of colouring in the harvest mouse (*Micromys minutus* Pallas) in this same area has been demonstrated by Kubik (1952a and 1952b). It is possible that this phenomenon occurs more frequently among mammals and has features which indicate a certain degree of regularity.

We know almost nothing of the moult in the forest dormouse. Ogniev (1947) states that the moult begins in July and that at the end of August about 64% of the population is moulting intensively. There are no data as to the end of the moult. Only three specimens from the second half of August are moulting in the material used for this work. Forest dormice caught in May (earliest 2. V.) do not exhibit any trace of moulting. The question of dates and course of the moult in the forest dormouse is a matter which requires investigation.

SYSTEMATIC POSITION OF POLISH FOREST DORMICE

The subspecies to which forest dormice occurring in Poland belong has not so far been established. Lubicz - Niezabitowski (1933) considers that the following subspecies occur in our area: *Dryomys nitedula nitedula* Pallas, *Dryomys nitedula carpathicus* Brohmer and *Dryomys nitedula intermedius* Nehring. According to Ellerman (1940) the following subspecies of the forest

dormouse occur in Europe (with the exception of Caucasian strains²⁾:

1. *Dryomys nitedula nitedula* Pallas — Region of Lower Volga, Russia.
2. *Dryomys nitedula intermedius* Nehring — Near Lienz, Tirol, Austria
3. *Dryomys nitedula wingei* Nehring — Parnassus, Greece
4. *Dryomys nitedula carpathicus* Brohmer — Upper Silesia.
5. *Dryomys nitedula obolenskii* Ognev & Worobiev — Voronej government district, Russia.
6. *Dryomys nitedula tanaiticus* Ognev & Turov — Tarasovsky district (former Don Province), S. Russia.
7. *Dryomys robustus* Miller — Rustschuk, Bulgaria."

It would therefore appear from Ellerman's data that the subspecies described by Brohmer in 1927 from Upper Silesia may occur in Western Poland and possibly the foothills area. In order to compare forest dormice from Białowieża with other material, I collected specimens of this species, from various Polish collections to which I had access. In addition I obtained from C. Pieščiev, from Bulgaria, a series of skulls coming from the Sofia district, from the region in which the *robustus* form occurs. I found a specimen from the Lienz district labelled *Dryomys nitedula intermedius* in the collections lent by the Zoological Museum in Vienna. In the above collection there was a skull and skin of *D. nitedula nitedula* from the Voronezh district and a skull from Upper Silesia (*carpathicus?*). From Poland, apart from the Białowieża specimens, I had two skulls from Jordanów (Carpathians) from W. Grodzinski's collection and five skulls from Czarnohora, lent by the Cracov Branch of the Institute of Zoology.

²⁾ 8 subspecies are described from the Caucasus (Šidlovski, 1956). This author, in analysing 76 specimens from 24 sites, and comparing them with individuals from South Russia and the Balkan Peninsula, confirmed the occurrence of colour differences, similar to those which I found in the Białowieża population. Measurements of the body (averages and limits of variation) are greater than in the case of Białowieża specimens, while measurements of the skull do not differ from analogical measurements of Central European forest dormice (Table 3). Šidlovski considers that the subspecific systematics of this species require careful working out on the basis of numerous sets of material.

In Table 3 we have the comparison of measurements of adult specimens from Białowieża and from the other areas of Poland, from Bulgaria and data from literature concerning the subspecies *intermedius* and *nitedula* (Miller, 1912), and from the Caucasus (Šidlovski, 1956).

Table 3.
Cranio-metric measurements.

Measurement	D. nitedula Poland	D. n. nitedula (Miller, 1912)	D. n. intermedius (Miller, 1912)	D. robustus Bulgaria	D. nitedula (Šidlovskij, 1956)
Condylbasal length	22.1 - 26.7 /24.40/	- -	24.0 - 25.3 /24.45/	22.8 - 25.7 /24.73/	22.5 - 26.6 /24.42/
Basal length	19.8 - 24.1 /22.32/	- -	- -	20.5 - 23.3 /22.51/	- -
Diastema	5.8 - 7.0 /6.37/	5.6 - 6.4 /6.00/	5.8 - 6.2 /6.05/	6.0 - 6.9 /6.52/	5.4 - 7.0 /6.23/
Occipital breadth	12.6 - 14.1 /13.33/	- -	- -	10.4 - 12.8 /12.13/	11.6 - 13.8 /12.59/
Zygomatic breadth	15.2 - 16.9 /15.78/	- /15.2 /	14.2 - 15.2 /14.80/	15.1 - 16.8 /15.67/	13.5 - 17.1 /15.60/
Interorbital constriction	4.1 - 4.5 /4.25/	4.0 - 4.2 /4.06/	- /4.2/	3.9 - 4.2 /4.10/	3.5 - 4.4 /4.05/
H. of skull per bullae	10.6 - 12.0 /11.52/	- -	- -	10.6 - 11.6 /11.22/	- -
Palatal depth	4.8 - 5.9 /5.31/	- -	- -	5.2 - 5.9 /5.47/	- -
Depth of brain-case	8.1 - 8.9 /8.52/	- -	- -	8.1 - 8.7 /8.42/	- -
Maxillary tooth-row	3.7 - 4.2 /3.87/	- /3.8 /	3.8 - 4.0 /3.85/	3.7 - 4.1 /3.82/	3.6 - 4.4 /3.94/
Mandibular tooth-row	3.8 - 4.4 /4.08/	3.8 - 4.0 /3.86/	3.8 - 4.0 /3.90/	3.6 - 4.2 /4.01/	- -
Number of animals	17	3	4	10	76

The tables of craniometric measurements, based unfortunately on not very numerous material, does not reveal the existence of any fundamental differences in the samples compared. All the measurements are within the limits of the range of variation in

forest dormice coming from Białowieża. The small number of specimens renders a statistical analysis impossible.

The question of the subspecific systematics of the forest dormouse occurring in Europe is thus still an open one, requiring comparative investigations which must be based on a large quantity of material of uniform age.

For this reason I consider it difficult at present to give an opinion as to what subspecies, or subspecies, of forest dormouse occur in Poland. Material so far obtained is insufficient, and there are no other comparative series from other areas. I therefore consider that we should continue to use only the specific name *Dryomys nitedula* Pallas.

CONCLUSIONS

1. The forest dormouse is active from May to September in the Białowieża National Park

2. Measurements of the body and skull correspond to the data given by Miller (1912) for this species.

3. The autumn moulting period begins in the middle of August.

4. The biotope most suitable for the forest dormouse in the Białowieża Forest is deciduous woodland. This animal was never once caught in coniferous forests.

5. In view of the extensive subdivision of the subspecific systematics of the forest dormouse in Europe, and the similarity of Białowieża specimens to various forms described from places at a great distance to each other (Bulgaria and Austria) the author considers it difficult at present to establish exactly the subspecific place of the forest dormouse occurring in Poland and in view of the lack of more comprehensive material, is of the opinion that the specific name only should be used — *Dryomys nitedula* Pallas.

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STRESZCZENIE

Opisano zmienność osobniczą koszątek pochodzących z Białowieskiego Parku Narodowego. Na tym terenie gatunek ten występuje tylko w lasach liściastych. Jest on aktywny od maja do września. Linka jesienna zaczyna się w drugiej połowie sierpnia. W populacji białowieskiej występują jakby dwie fazy barwne — szaro-popielata i rdzawa. Porównanie materiału białowieskiego z czaszkami z Bułgarii i Austrii, wskazuje na brak istotnych różnic kraniometrycznych między okazami pochodzącymi z tak odległych okolic, a w świetle danych z literatury należących do różnych podgatunków. Również w ubarwieniu autor nie znalazł różnic. Wobec tego, autor nie precyzuje przynależności podgatunkowej koszątek z terenu Polski, pozostając tylko przy nazwie gatunkowej — *Dryomys nitedula* Pallas.

Państwowe Wydawnictwo Naukowe * Warszawa 1959 r.
 Nakł. 1455 egz. Ark. wyd. 1.366. Maszynopis otrzym. 7. V. 1959 r.
 Podpisano do druku 10. VII. 1959 r. Druk ukończono 25. VII. 1959 r.
 Papier druk sat. III kl. 80 g. Format B-1.
 Białostockie Zakłady Graficzne. Zam. nr 1490. P-2. Cena 5 zł.
