Effect of Different Kinds of Feed on Wear of the Teeth in Individuals of a Field Mouse Population

Wpływ rodzaju pokarmu na ścieranie się zębów u osobników w populacji myszy polnej

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The crowns of the teeth were found to wear more slowly in a population of field mice, *Apodemus agrarius* (Pallas, 1771) living to a great extent on additional food (oat grains) than could have been expected from their absolute age. Age estimated on the basis of eye lens weight was in accordance with the absolute age of individuals. The authors suggest that slower teeth wear was due to replacement of hard animal feed (chitin) by oats.

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1. INTRODUCTION, STUDY AREA, MATERIAL AND METHODS

The two following criteria were chiefly used for estimating the age of field mice, *Apodemus agrarius* (Pallas, 1771): (1) weight of dry mass of eye lens (Adamczewska-Andrzejewska, 1971, 1973) and (2) degree of wear of the surface of molar teeth crowns (Varšavskij & Krylova, 1948; Adamczewska-Andrzejewska, 1973). Estimates of the age of field mice based on degree of wear of teeth crowns are less exact than these based on changes in lens weight. It would appear that the possibility of incorrect definition of age on the basis of tooth wear may be due to the differing hardness of tooth enamel (Adamczewska-Andrzejewska, 1966) and differing hardness of food consumed. The purpose of this study was to ascertain whether the kind of food affects the degree of wear of toth crowns and in consequence the accuracy of age estimates.

Examination was made of 31 individuals of field mice caught in the spring of 1975 in an isolated population inhabiting a 4-hectare island in a lake in northern Poland (53°40′N, 21°35′NE). The island was inhabited, in addition to the mice, by bank voles *Clethrionomys glareolus* (Schreber, 1780) which were the dominating species. The absolute age of the animals was known, as studies had been made by the *CMR* method for other purposes in five two-weekly trapping series over the course of whole year (Gliwicz *et al.*, 1968). The period of life before the first capture was also taken into consideration (Bujalska & Gliwicz, 1968). The population was constantly supplied *ad libitum* with additional food in the form of oat grains in wooden boxes, giving the animals free access to the cats, which were distributed in a grid of 15 × 15 m intervals over the island (Andrzejewski, 1975). Although there was no

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direct proof that the rodents changed over to feeding on oats, since stomach contents were not analyzed, this is indicated by the following: (1) intensive rate of consumption of the oats in boxes, (2) capture of the animals in live traps baited with oats immediately after setting out the traps.

The eyes of the individuals caught were fixed in 10% formalin water solution, *i.e.* commercial formalin diluted in parts of 1 : 4 (Lord, 1959). The lens were next excised and dried at a temperature of 80°C to constant weight and weighed with accuracy to one month, from the curve of changes in eye lens weight in the field mouse (Adamczewska-Andrzejewska, 1973). Age estimate based on wear of molar crowns was made by comparing wear of teeth in the specimens examined with the reference standard described by Adamczewska-Andrzejewska (1973). Three age estimates were thus obtained for each individuals, as follows: 1) absolute age, 2) age defined on basis of wear of the molar surfaces, 3) age defined on basis of eye lens weight.

2. RESULTS AND DISCUSSION

Two age estimates based on wear of the molars and on eye lens weight were correlated with true age. Correlation for the age estimates based on

Table 1

Comparison of age (months) defined on basis of eye lens weight and on tooth wear with actual longevity of the field mouse.

Actual age	Age on basis of eye lens weight					Age on basis of tooth wear		
	6	7	8	9	10—12	1¾—2.5	2.5—4¾	4¾—10
8			1			1		
9	3	3	3	1	6	5	7	3
10—12		1	4	2	7	1	12	2

the eye lens weight method was 0.342, being significant on a level of $p < 0.05$. The relatively low correlation is due to the fact that only 35% of the estimates were in agreement, while the remainder differed (Table 1). The coefficient of correlation calculated for the second age estimate compared, based on teeth crown wear, was not significant on a level of $p<0.05$. It was found that the method using eye lens weight underestimated the age of the animals examined in relation to known age, on an average by 1.6 ± 1.2 months, whereas underestimation of age determined on the basis of wear of the tooth crowns was on an average 5.9 ± 15 month in comparison with the true age.

This result does not agree with the data obtained by Varšavskij & Krylov (1948) and Adamczewska-Andrzejewska (1973) and shows that tooth crowns wear more slowly in a population of field mice fed on oats than was the case in the population feeding on natural food. The field mouse consumes considerable amounts (approx. 30%) of

animal food, consisting of invertebrates — chiefly insects (Holišova, 1967). It is of course obvious that the hard chitinous integuments of these animals increase the rate at which the tooth crowns wear.

Replacement of animal food by easily accessible food (oats) may suggest that invertebrates are only a subsititute food for the field mouse, supplementing a deficiency of high-caloric vegetable food.

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