schlechterung der Fangbedingungen von Nahrung, ausgenutzt werden. Ich bin nämlich der Ansicht, dass „das Behüten" des Vorrates in den Lebenbedingungen in welchen sich Spitzmäuse befinden, und das noch auf eine längere Zeit, für sie unmöglich ist.

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SEASONAL VARIATIONS IN *SOREX ARANEUS* LINNAEUS 1758 IN POLAND

SEZONOWA ZMIENNOŚĆ *SOREX ARANEUS* LINNAEUS 1758 Z TERENU POLSKI

The aim of this work is to compare data on the seasonal variations of *S. araneus* from different parts of Poland, in the light of climatic factors. The comparison is based on works dealing with populations of the common shrew in the Białowieża National Park ($\varphi = 52°42'$, $\lambda = 23°51'$) — Dehnel (1949), Borowski & Dehnel (1952), Pucek (1955), Bielak & Pucek (1960); at Puławy ($\varphi = 51°25'$, $\lambda = 21°57'$) Kubik (1951), Serafiński (1955); and in Wrocław ($\varphi = 51°07'$, $\lambda = 17°05'$) Kowalska-Dyrcz (in print). Climatic data were taken from the Year Books of the State Hydro-Meteorological Institute.

In order to compare the course followed by seasonal variations in populations from Białowieża, Puławy and Wrocław the following were taken into consideration: variations in length and weight of body, height of braincase per bullae and weight of brain.

Height of braincase. As will be seen from table 1, the variations in this feature are most strongly expressed in the Białowieża population, and most weakly expressed in the Puławy population where, however, the winter material is very scanty.

Table 1.

Seasonal variations in height of braincase of shrews in Poland (in mm.).

Key for tables 1—4: In parenthesis — number of individuals. Data in tables 1—4 are cited after: [1]) Dehnel, 1949; [2]) Borowski & Dehnel, 1952; [3]) Pucek, 1955; [4]) Kubik, 1951 and Serafiński, 1955; [5]) Kowalska-Dyrcz, in print; [6]) Bielak & Pucek, 1960.

	VI juv.	I-II juv.	VI ad.	X ad.	Increase from VI /juv./ to II /juv./ %	Increase from I-II/juv./ to VI /ad./ %
Białowieża[1]	6.34 /22/	5.22 /10/	5.89 /24/	5.47 /24/	- 17.7	+ 12.8
Białowieża[3]	6.30 /49/	5.34 /16/	5.95 /30/	5.71 /31/	- 15.2	+ 11.4
Puławy[4]	6.15 /66/	5.36 /8/	5.80 /20/	5.40 /4/	- 12,85	+ 8.21
Wrocław[5]	6.33 /24/	5.42 /4/	5.90 /10/	5.56 /2/	- 14.3	+ 8.9

Table 2.

Seasonal variations in body weight (in g.).

	VI juv.	I-II juv.	VI ad.	X-XI ad.	Increase from VI /juv./ to II /juv./ %	Increase from I-II /juv./ to VI /ad./ %
Białowieża[6]	217.20 /28/	153.00 /11/	176.70 /4/	150.45 /3/	- 29.5	+ 15.6
Wrocław[5]	210.28 /21/	163.75 /4/	182,55 /10/	165.25 /2/	- 22.1	+ 11.5

Table 3.

Seasonal variations in weight of brain (in mg.).

	Young adult		Old adult		Increase from Summer /juv./ to Winter /juv./ %	Increase from Winter /juv./ to Summer /ad./ %
	Summer	Winter	Summer	Autumn		
Białowieża[3] 1948/49	7.05 /332/	5.33 /3/	11.21 /56/	9.20 /5/	- 24.4	+ 110.3
1949/50	6.98 /110/	5.17 /3/	9.92 /19/	8.71 /14/	- 26.0	+ 91.9
Białowieża[3]	7.20 /11/	5.75 /18/	11.01 /17/	9.01 /19/	- 20.1	+ 91.5
Wrocław[5]	7.04 /21/	5.51 /5/	10.50 /9/	9.76 /3/	- 21.7	+ 90.6

Weight of brain. Comparison of variations in this feature between the Białowieża and Wrocław populations gave results similar to those in the case of variations in height of brain case; seasonal variations in weight of brain occur most markedly in the Białowieża population (see table 2).

Body weight. The data from Białowieża (table 3) show that the degree of winter depression in body weight in the same population, subjected to examination over a period of several years, may differ; this process depends to a great extent on edaphic factors (pessimum and optimum years — Borowski & Dehnel, 1952). The decrease in weight during the winter period fluctuated, in the case of the Białowieża population, within limits of 20.1 — 26% (in relation to the maximum monthly average in the summer). In the case of the Wrocław population, examined over a period of 2 years, this decrease is 21.7%, and is therefore close to the weakest depression noted at Białowieża.

Table 4.

Seasonal variations in body length of shrews (in mm.).

	Young adult		Old adult		Increase from Summer /juv./ to Winter /juv./ %	Increase from Winter /juv./ to Summer /ad./ %
	Summer	Winter	Summer	Autumn		
Białowieża¹	68.04	63.50	77.21	72.67	- 6.7	+ 21.6
Białowieża²						
1947/48	67.10	63.00	75.80	74.70	- 6.1	+ 20.3
1948/49	66.90	61.30	78.30	73.20	- 8.4	+ 27.7
1949/50	67.20	61.80	72.10	70.70	- 8.0	+ 16.7
1950/51	64.70	56.00	76.00	-	- 13.4	+ 35.7
Białowieża³	67.41	63.00	75.21	72.39	- 6.5	+ 19.4
Puławy³	59.46	55.44	69.00	59.00	- 6.8	+ 24.5
Wrocław³	64.58	56.70	71.20	71.67	- 12.2	+ 25.6

Length of body. Seasonal variations in this feature (table 4) are clearly marked in three populations, but there are no significant differences in the course they follow at Białowieża, Puławy and Wrocław. The reason for this may perhaps be that, on the one hand, a relatively large amount of material was available at Białowieża (investigations lasted several years), and on the other hand, only incomplete data referring to one generation of shrews from Puławy and Wrocław ware available. Intensification of the winter depression in the Białowieża population, which was examined over a period of several years (table 4) fluctuated between the limits 6.1—13.4% (a similar connection therefore exists between the degree of intensity of seasonal variations in body length and the „quality" of the year, as in the case of body weight). In the Wrocław population the winter depression was very strongly marked (12.2%), and in the Puławy population far more weakly (6.8%). Both values, however, come within the limits of data for Białowieża.

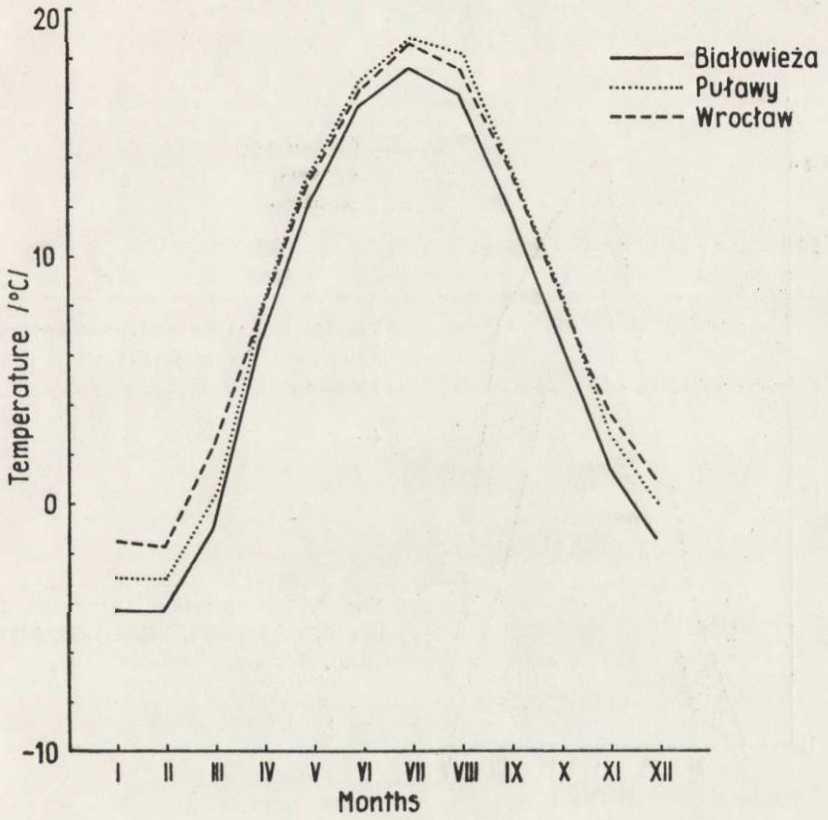

Fig. 1. Temperature. Averages calculated over a period of 10 years for different months (1950—1959).

Climatic data. Diagrams 1—3 show some of the climatic data for Białowieża, Puławy and Wrocław, which might affect the formation of the phenomenon of seasonal variations in the dimensions of the shrews' bodies; these are as follows: temerature, precipitation and duration of the snow covering. Comparison of the course followed by curves of these three climatic factors with data representing the course followed by seasonal variations makes it possible to assume the existence of certain connections between these two phenomena. The relatively most strongly expressed seasonal variations in the shrew at Białowieża corresponds to the lowest average temperature for the different months of the year, the longest duration of the snow covering and the greatest amount of precipitation. This is particularly marked in the months of autumn, winter and spring, which period has a significant influence on the course followed by seasonal variations. In addition, as shown by Pucek (1955), the maximum winter depression of the braincase may undergo a shift from February to March,

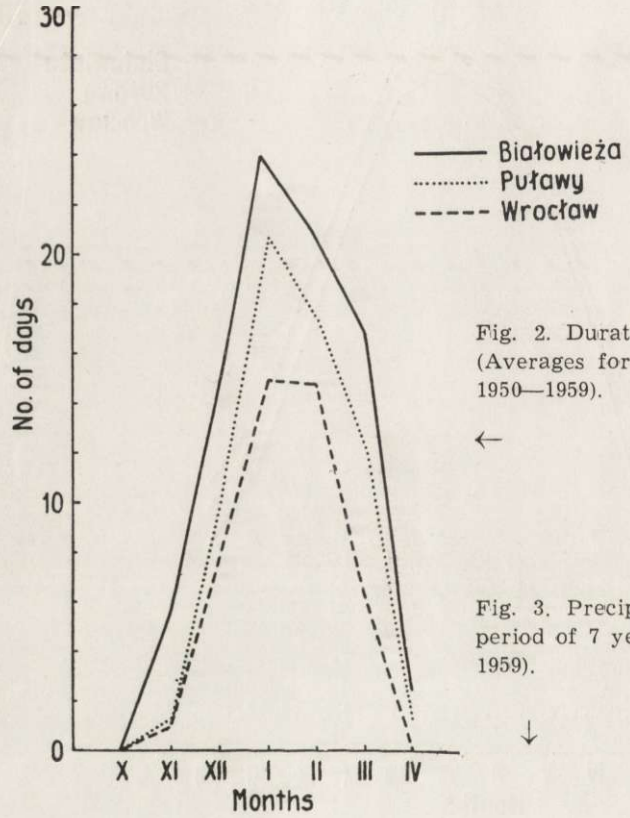

Fig. 2. Duration of snow covering (Averages for a period of 10 years, 1950—1959).

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Fig. 3. Precipitation (Averages for period of 7 years, 1950—1953, 1957—1959).

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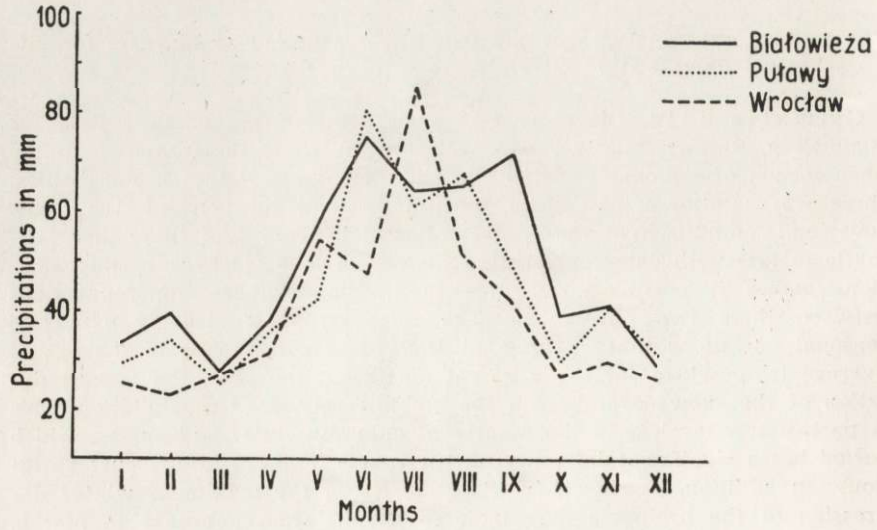

depending on climatic conditions in the given year. These findings are the more interesting in view of the fact that data from England (Crowcroft & Ingles, 1959) and from Northern Germany (Schubarth, 1958) would appear to confirm the existence of a connection between climate and the phenomenon of seasonal variations in the common shrew.

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