

The Length of Awakening Time from Hibernation of Three Species of Bats

DŁUGOSC CZASU BUDZENIA SIĘ Z HIBERNACJI TRZECH GATUNKÓW NIETOPERZY

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Harmata W., 1985: The length of awakening time from hibernation of three species of bats. *Acta theriol.*, 30, 20: 321—323 [With 2 Figs.]

The time of awakening from winter sleep has been studied in three species of bats: *Rhinolophus hipposideros*, *Myotis myotis* and *Plecotus auritus* under natural conditions. Seasonal changes in the time of awakening have been found in bats *R. hipposideros* wintering in constant thermal conditions. In autumn (October) and in spring (April) the time was shorter than that observed in the middle of the winter sleep (January).

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1. INTRODUCTION

Several species of hibernating bats can arise from a torpid state in winter couple of times entering the winter sleep again after a short time (Verschuren, 1949). However most of the detailed studies on the winter awakening time have dealt with bats under laboratory conditions (Eisentraut, 1937; Elliasen, 1955, Jánský & Hájek, 1961; Hughes, 1968; Brenner, 1974). The purpose of this study was to determine the length-awakening time from hibernation of three species of bats in natural conditions in different thermal conditions and to note aspects of their behaviour during this process.

2. METHODS

The research was carried out in the certain types of winter hiding places, natural and artificial caves, cellars and underground passages in vicinity of Cracov town (50°04'N, 19°57'E), from 1961 to 1964 and from 1978 to 1983. Bats were forced to awake once by taking the specimen from the site of winter sleep to other place, with the time taken till the full awakening and flaying out. The awakening time from hibernation were measured in minutes to first flight.

3. RESULTS AND DISCUSSION

The average time in *Rhinolophus hipposideros* (Bechstein, 1800) (139 observations) measured since awakening till the moment it is able to fly is 52 min. at 5.5°C and 26 min. at 9.5°C (Fig. 1). In *Myotis myotis* (Borkhausen, 1797) (71 observations) this time is 49 min. at 3.5°C but 30 min. at 8.5°C, whereas in *Plecotus auritus* (Linnaeus, 1758) (18 observations) it is 38 min. at 3.5°C but 24 min. at 9.0°C. The data show that time of awakening from hibernation is shortest in *P. auritus* at high

temperature that corresponds to the ethology and ecology of hibernation of these species. In all three species studied the time of awakening from hibernation depends on air temperature in winter habitat, body temperature and thermopreferendum (Harmata, 1969, 1973).

There were found some changes in length of awakening time in different periods of hibernation in *R. hipposideros*. 79 observations were gathered in one of the natural cave (The Ciemna Cave) in winter 1979/1980 where the annual air temperature was nearly constant (changing only from 6 to 7°C) while humidity oscilated from 90 to 100%. It was found that the shortest time of awakening of both male and female bats was observed

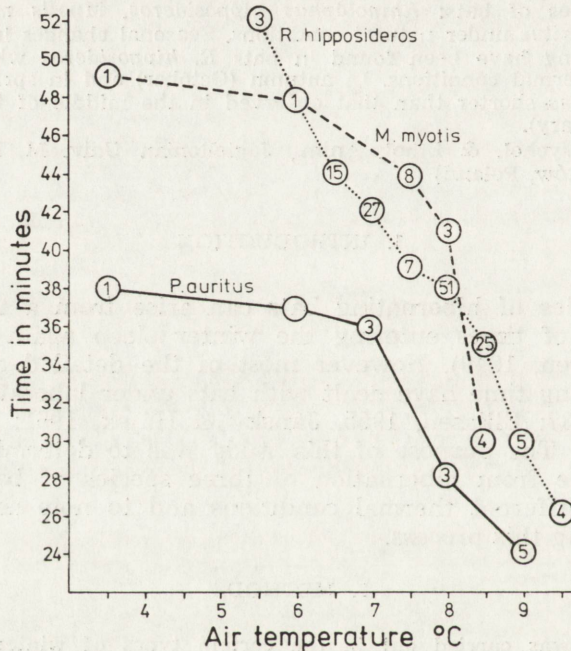


Fig. 1. The length of the awakening time (in minutes) in three species of bats in different temperatures. Number of observations are given in the circles on the diagram.

at the beginning of hibernation in October (mean average is 27.23 ± 1.5 min.) and the longest one was in January when the hibernation was deepest (mean average 47.11 ± 1.1 min.). The awakening time at the end of hibernation, i.e. in April was 40.23 ± 0.7 min. (Fig. 2). Seasonal changes in awakening time in *M. myotis* and *P. auritus* cannot be studied because of small number of observations.

The short awakening time in autumn is caused by the fact, that bats can quite often fly out from caves in that period. The longest time in spring resulted from debility after the hibernation period and great difficulties in hunting because of bad weather conditions. It seems that quickness of awakening of bats from hibernation indicates how deep the hibernation is.

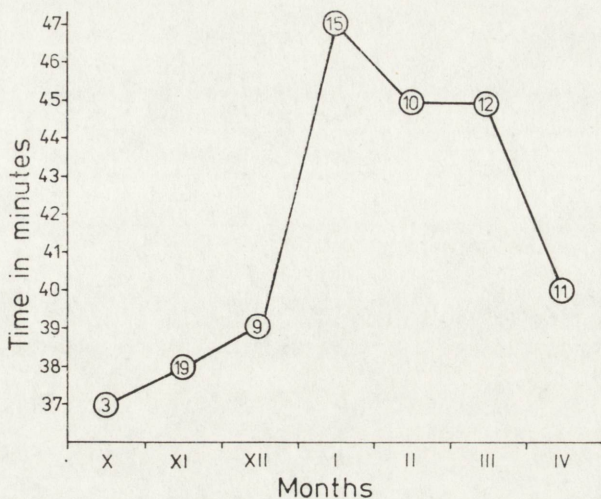


Fig. 2. The length of the awakening time (in minutes) from hibernation in the *Rhinolophus hipposideros* in different months. Number of observations are given in the circles on the diagram.

Results of investigations presented above remain in a good agreement with relevant data for *M. myotis* observed in artificial conditions (Eisen-
traut, 1937; Jánský & Hájek, 1861.

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