THE COTTONTAIL AND THE WEATHER

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During the winter of 1941-42, a hundred cottontail rabbits were trapped near Prairie du Sac, Wisconsin. The daily catch through a period of three months shows fluctuations which seem to correspond to fluctuations in barometric pressure. A number of authors have noted increased catches or greater activity in mammals during certain types of weather, but none has suggested that these responses might be in phase with some one component of the weather. Bole (2) has pointed out that sudden peak catches of Blarina and Sorex fumeus often occurred on cool humid nights preceding or following rain. The writer has had similar experiences in trapping small mammals. Burt (3) believed that dark rainy nights produce better catches of Peromyscus leucopus than clear moonlit nights. Allen (1) thought the activity of fox squirrel in winter to be conditioned by temperature and snow depth. Studying the same species, Hicks (5) noted that extremes of temperature and the character of the sky affected the degree and time of their activity. Ingles (6) found that the Audubon cottontail (Sylvilagus a. audubonii) preferred clear nights and days, and that they were less active during windy rainy weather.

Had these investigators analyzed their observations or catches in relation to daily changes in barometric pressures, they perhaps might have found clearer correlations.

Methods and materials.

The daily record of rabbit catches was made while censusing the rabbits in 65 acres of woods and brush in Westpoint Township, Columbia County. Fifteen to 40 treadle box traps were employed during the two trapping periods: November 23 to
December 21, and January 6 to February 13. The traps were moved whenever their efficiency in catching unbanded rabbits suffered a noticeable drop. During a total of 2100 trap nights, 67 rabbits were caught, ear-tagged, and released. A total of 100 catches including repeats was made.

Carrots were the principal bait, though ear corn, apples, and other foods were experimented with occasionally.

The daily catch was then plotted and compared with temperature, precipitation, wind direction, cloudiness, relative humidity, and barometric pressures. Of these six aspects of weather, none showed any striking parallelism with the rabbit catch except barometric pressure.

Data on precipitation, direction of prevailing winds, character of the sky, and temperatures were recorded by the weather station at the Prairie du Sac dam. Relative humidity and barometric pressures were obtained from the Madison weather bureau, twenty-five miles distant.

Results.

I here assume that rabbits entered the traps when they were active or hungry, or both, and that failure to catch rabbits indicates cessation or diminution of activity or hunger.

The relation between the catch and barometer appears in the second and third graphs of Figure 1. The first and third graphs indicate no visible relation to temperature or depth of snow.

The highest catch per night was five. This is probably too small a figure to measure the degree of catchability, but not too small to show the alternation of catches and failures. On nights of low barometer, an average of 0.5 rabbits was caught; while on nights of high barometer, the average catch was 2.5 rabbits. Barometer troughs thus seem to correlate with failure or near-failure; barometer peaks with catches. However, the height of the barometer alone is of no significance, for a scattergraph of all pressure values plotted against all catches produced no discernible relationship. On the other hand, when daily change in pressure was plotted against catches, a relation was evident.

This relation is most pronounced in January and February. During early winter the correlation is vague or contradictory.

Statistical analysis failed to confirm the correlation. This
Figure 1. Relation of barometric pressure to rabbit catch. Lack of relation to temperature is also shown.
may, of course, be due to its vague definition in time, or to the numerical paucity of the data. It can only be claimed that the relation probably exists, and is worthy of more intensive investigation.

Discussion.

Changes in barometric pressures usually denote the passage of cyclonic storms. Passing over a given locality, these storms produce sequences in the weather lasting from four to six days (13, pp. 198, 238). The northern United States, and particularly that region west of the Great Lakes, has been cited by Petersen (9) as one of the areas creating the greatest autonomic demands on the human body, as it lies in the principal path of the cyclonic storms that sweep eastward across the country. Such a relationship between the body and barometric pressure likely holds true for all warm-blooded animals inhabiting areas of meteorological stress.

Dr. Mossman, of the Department of Anatomy at the University of Wisconsin, while making a study of their anatomy, collected over a thousand squirrels in an eight-year period. His field experiences in collecting these squirrels lead me to believe that the fox and gray and red squirrels are, like rabbits, sensitive to barometric pressures. Mossman repeatedly failed to secure squirrels on days which, to all outward appearances, were ideal for hunting. He noticed that storms of some severity usually occurred during the day following his failures to find squirrels. In such instances the effect of a falling barometric pressure is strongly implied.

A similar awareness of impending weather was demonstrated by a pet chipmunk kept by a woman in New York (New York Times, February 5, 1940). Two days before a blizzard it ran about uneasily in its cage, and when given newspapers which it usually tore up and scattered about the cage, the chipmunk instead quickly carried the pieces into a box and made a nest. By noon the animal had crammed the box full and disappeared, not to reappear until three days later when the blizzard had spent itself.

Entomologists have taken cognizance of the effects of changes in barometric pressures upon insects. Parman (7) writes:
“During the last three years observations have been made on several species of Muscids showing that with a rapidly falling barometer they first become nervously active, and then go into a state of partial coma. Some species have a tendency to seek a place of protection at this time, others show this tendency very little but become quiet at a most convenient place.”

A most forceful and illuminating account of the stimulating and depressing influence of changes in barometric pressures is given by Fabre (4). He observed two groups of caterpillars under circumstances that constitute in effect a controlled experiment. The caterpillars came out with small rises in the barometer and remained at home when it fell. But what is more significant is that his greenhouse caterpillars behaved much the same as those in the garden, exposed to all the vicissitudes of the environment.

Pictet (11) made a painstaking laboratory study of the relation of barometric pressure to the emergence of butterflies. He found that out of 1758 butterflies which he observed emerge from their chrysalids, 91 per cent emerged when the barometer was falling. The number of eclosions was also directly related to the rate at which the barometer fell. A drop of only one degree (mm. of mercury) was sufficient to cause the butterflies that had completed development to leave their chrysalids. However, if the barometric pressure rose when they were on the point of emergence, the eclosions were delayed until another day when the pressure was again decreasing. A uniform or rising pressure over too long a period resulted in the death of the butterflies within the chrysalids.

Responses of humans to changes in barometric pressure may offer some insight into the problem in other mammals. Although Hippocrates long ago recognized the effect of weather upon humans, only in the last few decades has it been given much attention. Modern research in the physiological effects of weather upon man is exemplified in the work of Petersen (9, 10, et al). Every investigator of wildlife problems should be aware of his studies.

According to Petersen (10), “A change in the oxidation-reduction potential of the tissues does occur in close association with changes in the barometric pressure in the normal person as
well as in the sick individual.” He points out that perhaps ionization and electrical charge may be even more important factors, but that at the present time they are more difficult to determine. He suggests “that the organism may react with an increase in blood pressure, and consequently with a feeling of well-being, to an air mass that will present increasing barometric pressure, lessened humidity, and bright sky even when the change in temperature may be negligible.”

Though animal rhythms have been reviewed by recent authors (8, 12, 14) it has not been suggested that changes in barometric pressures may produce fluctuating activity rhythms in animals. On the basis of the limited evidence here presented the writer suggests the existence of a pressure-activity rhythm in many species of small mammals.

BIBLIOGRAPHY

5. Hicks, Ellis A. 1942. Some major factors affecting the use of two inventory methods applicable to the western fox squirrel, Sciurus niger ruficenter (Geoffrey). Iowa State College Journ. of Science, XVI (2):299-305.


