

till well on in April. The diurnal variation, so marked at the surface, is almost completely abolished at this level, all the year round, and this is a circumstance which greatly favors animals with an imperfectly developed heat regulating mechanism, such as the woodchuck possesses.

Records of the air temperature taken at the Ithaca station of the U. S. Weather Bureau, situated about half a mile from the burrows, show that in 1912 the coldest month of the year was January, and in 1913, February, the average mean temperatures for the first four months being as follows:

	Jan.	Feb.	March.	April.
1912	16.3° F.	21.4	28.8	44.5
1913	34.7° F.	23.2	36.8	48.1

Notwithstanding the fact that the weather in these four months was much milder in 1913 than in 1912, the temperature at the depth of four feet, in March and April 1913, as indicated by the thermograph, was about 2° F. lower than in the corresponding months of 1912. The snowfall, however, was greater in 1912 than in 1913 and this will probably explain the apparent anomaly.

	Jan.	Feb.	March.	April.
Snowfall in inches, 1912	9.0	6.7	12.3	0.5
Snowfall in inches, 1913	2.1	5.0	2.9	0.8

In 1912, although the air was intensely cold, the comparatively thick layer of snow effectively retarded the radiation of heat from the surface of the ground.

It is interesting to note, then, that the woodchuck awakes from the hibernating state and becomes active just about the time the temperature of its surroundings has reached the lowest point for the year, and it would appear that some cause other than the temperature or carbon dioxide factor is at work to bring this result about.

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Anaphylaxis in immune animals.

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In his general review of anaphylaxis, Besredka¹ stated that an injection of horse serum into guinea pigs produced hypersensitiza-

¹ Kraus and Levaditi's "Handbook," 1911, p. 248.

tion, only if minute doses were employed. "The preliminary injection of more than .02 cubic centimeter is attended by an uncertain result." Similar statements abound in the literature. The great majority of the experiments on which these conclusions are founded have employed either the intracerebral or the intraperitoneal route for the intoxicating injections. If, however, the second injection is made intravenously, the results are entirely different. With this method, it can be shown that a preliminary injection of as much as five cubic centimeters of horse, or other serum, is invariably followed by a typical anaphylactic state, in which death is produced by the second injection of an amount of the same serum, which, for normal animals, is absolutely innocuous. If guinea pigs are given repeated large injections, *e. g.*, 3 c.c. of horse serum, on three or four successive days, the total amounting to nine or twelve cubic centimeters, exactly the same result follows. Finally, if spaced injections are employed, as in the procedure followed for purposes of immunization, again the animals become typically anaphylactic. There are, however, certain differences in the behavior of animals sensitized, on the one hand, by means of minute, and, on the other, by very massive injections of serum. In the former, the minimal lethal dose is often no greater than .005 cubic centimeter of horse serum. In the latter, it is often one hundred times this amount. Again, after a small injection, anaphylaxis frequently does not develop for three weeks; after massive injections, it may generally be demonstrated in ten or twelve days. These differences are traceable simply to the effects exercised upon antibody production by small, as compared with large doses of antigen. With the former, the antibodies are produced slowly and in small number; with the latter, rapidly and in large number. Thus, in the case of guinea pigs sensitized by small doses, it is generally necessary to use the entire amount of blood obtainable by exsanguination in order to sensitize another normal pig. After large injections, however, one tenth of the total blood may suffice for this result. It is probably on account of the larger amount of circulating antibody that guinea pigs sensitized by large doses require a larger toxic injection.