8752 C

Influence of Climate on Susceptibility of Monkeys to Intranasal Infection with Poliomyelitis Virus.

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Although sporadic cases of poliomyelitis occur throughout the year, the incidence of the disease rises sharply during the late summer (and early autumn months) and, as a rule, decreases with the onset of cold weather. The cause of this seasonal incidence is as yet obscure. The virus is supposedly transmitted from man to man by droplet infection without the intervention of an intermediary host or reservoir upon which changes in climate could exert an effect. That droplet infection is not in itself the factor is clear from the well-known fact that other diseases believed to be transmitted in the same manner have their own peaks of seasonal incidence, many of which vary and happen to be different from that of poliomyelitis.[1] Since the virus of poliomyelitis is less resistant to higher than to lower temperatures, it does not seem probable that the greater occurrence of the disease during the hot months is attributable to an effect of climate on the virus itself. Hence it appears that the host, more than any other factor, should be considered as the agent influenced by climate, although the nature of this possible influence remains unknown. Presumably the climatic effect may be either a local one, *i. e.,* the nasal secretions may perhaps be so changed as to prevent the virus from gaining access to the first cells (olfactory) which it apparently must infect in order to spread further to the central nervous system, or the change may be elsewhere along the course of the virus, which would impede its progress and thus prevent the disease from becoming clinically manifest.

The question which this investigation proposed to examine was whether or not cold weather or changes from warm to cold could in themselves so influence the nasal membranes or secretions as to render infection with the virus of poliomyelitis more difficult. Six *Macacus rhesus* monkeys were kept outdoors 8 to 9 hours each day during late February and March, when it snowed on 2 days and the temperature varied from 28° to 50°F. During the remainder of

1 Poliomyelitis, International Committee for the Study of Infantile Paralysis, Williams and Wilkins Co., Baltimore, 1932, p. 335.

the day they were kept indoors in a room in which the temperature is automatically regulated at 72° to 76°F. They were purposely allowed to spend part of the time indoors in order to approximate more closely living conditions of man during cold weather. The monkeys were outside every day for a week before they were given poliomyelitis virus intranasally. One cc. of a 10% suspension of pooled poliomyelitic monkey cords was instilled in each nostril on two occasions 48 hours apart. Subsequent to this treatment they remained outside during the day until the end of the experiment. Seven monkeys which were kept indoors in the same room during the same period as the others were similarly inoculated and the course of the disease in the two sets of animals observed (Table I).

TABLE I.

Group	Monkey No.	Result
Outdoors 8-9 hours each day for 1 week prior to inoculation and for duration of experiment. Temperature during period, 28° to 50° F.; average, 38.9° F.	7-52	Fever 4, Par. 8, Prostr. 9*
	7-53	" 4, " 11, " 12
	7-54	" 4, " 8, " 11
	7-55	" 4, " 7, " 7
	7-56	" 4, " 8, " 9
	7-57	" 4, " 8, " 8
Indoors for 1 week prior to and throughout course of experiment. Average temperature, 74° F.	7-58	" 4, " 9, D. 10
	7-59	" 4, " 7, Prostr. 8
	7-60	" 4, " 12, " 14
	7-61	Dead 14th day of Tbc. No clinical or histological signs of poliomyelitis
	7-62	Fever 4, Par. 8, Prostr. 9
	7-63	" 5, " 8, " 9
	7-05	" 6, " 9, " 10

*Fever 4, Par. 8, Prostr. 9 = Fever 4th day, paralysis 8th day, complete paralysis with subnormal temperature 9th day after first nasal instillation of virus.

It is obvious that under the conditions of the experiment the changes in climate to which the monkeys were submitted failed to diminish the incidence of experimental poliomyelitis among them. All six developed the disease and exhibited signs somewhat more rapidly than their mates which were kept under fairly constant temperature indoors. While these results do not exclude the possibility that cool or cold weather may affect conditions in the nose of man in a different manner, it seems more probable that the influence of climate is exerted on other factors in the host.

To elucidate this problem further, other studies are being considered which aim to determine (by means of antibody tests on children before and after the months of highest incidence) whether the total number of cases of poliomyelitis, both recognized and in-

apparent, is increased during the late summer and early autumn, or whether the climatic influence is merely to augment the number of clinically apparent cases without appreciably changing the total number infected.

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Concentration of a Hyperglycemic Factor from Urine.

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We have previously reported the preparation of a crude urine (male) extract which, when injected into rabbits, causes a hyperglycemia, an increase of acetone bodies and lactic acid in the blood, and a decrease of CO_2-combining power.[1] We now wish to report appreciable progress in the purification of the material responsible for the hyperglycemic effect. We are not as yet prepared to state whether our purified material will respond to the other tests of our earlier (crude) product. The crude substance, in the dry state, can be kept for a considerable time without any marked deterioration. The active material is dialyzable and can be further purified by removing the inorganic sulfates. From approximately 250 liters of urine (male), 52 mg. of a highly active, rather unstable organic substance have been isolated. The amount so far obtained was sufficient for physiological tests (confined to blood sugar determinations) but not for chemical identification.

The flow-sheet on the following page illustrates the method of preparing this highly active material.

Since various modifications in the procedures previously described have been adopted, we shall give specific details:

The urine used is obtained from men of 17-22 years of age. It is preserved with thymol and kept in the ice-box. Urine older than 3 days is discarded.

The urine is acidified to methyl red (pH 5) with glacial acetic acid. A warm solution of benzoic acid in alcohol (30 gm. benzoic acid in 60 cc. 95% ethyl alcohol per liter of urine) is added, drop

[1] Harrow, B., *Science*, 1934, **79**, 272; Harrow, B., Naiman, B., Chamelin, I. M., and Mazur, A., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 940: Harrow, B., Chamelin, I. M., and Mazur, A., *Am. J. Physiol.*, 1934, **109**, 436.