

which lies as far north as our bleak Labrador coast, for instance, and why do people winter in the south of France, as far north as Ottawa, while in America people go to Florida or southern California to get mild winters?

What I am driving at is that a little change in the quantity of solar heating might alter the distribution of heat over the earth in such a way as to produce perfectly astounding changes. One per cent change of the heat available to warm the air over the enormous area of the tropics may be of little effect there but may easily produce very much larger effects towards the poles. For the areas of the zones grow less towards the poles. It is like the tides. On the open oceans they oscillate only a foot or two, but in the confined Bay of Fundy the tidal wave is over 40 feet high.

One looks forward to a time when daily telegrams shall come to a central station from at least four solar radiation observatories instead of from two as now and the condition of the sun shall be broadcasted for the use of meteorologists the world over. For, after all, the temperature and all life on the earth hangs on the sun's rays. They ought to be thoroughly investigated so that we may be informed in advance what we are to expect as the consequences of changes in the sun.

SUN SPOTS CONTROL ANIMAL POPULATIONS, SCIENTIST CLAIMS

Periodic increases in the numbers of certain animals are blamed on the sun and its spots by C. S. Elton, of the department of zoology and comparative anatomy of the University of Oxford. Extraordinary as this conclusion may seem, Mr. Elton offers scientific data to show that animals populations are influenced by the well known sun spot cycle.

By methods of mathematical analysis it is possible to recognize definite climatic cycles, he says, even in a country with a variable climate. In seeking the causes of these variations it is reasonable to look to the sun, the source of practically all our energy. For over 150 years records have been kept of the number of sun spots. These increase to a maximum about every eleven years. Increase in the number of sun spots is accompanied by an increased output of energy by the sun, and, strange to say, by a low temperature on the earth. Further, the average annual temperature of the whole earth, the atmospheric pressures and rain-falls of various parts of the earth, the tracks of storms in North America and the rate of growth of the redwood tree, have all been found to show marked eleven-year fluctuations which correspond to those of sun spot numbers. There are natural records in the case of the redwood dating back in many cases three or four thousand years.

Turning now to variations in the numbers of animals, if the return of rabbit skins taken by the Hudson Bay Company be consulted, the interesting fact is established that the numbers increase to a maximum every eleven years, and that each maximum corresponds to a sun spot minimum. The fur returns of this company, which have been kept since 1845, give a good index of the total rabbit population; hence the conclusion is reached that variation in the number of sun spots in some way affects the rate of reproduction of rabbits.

Biologists cannot yet explain this extraordinary relationship, but it seems

likely that the explanation will be found in the effect of sunlight on animals, both directly and indirectly, through their food. It is common knowledge now that the antirachitic vitamin is intimately related to sunshine.

The lynx and the fox feed on the rabbit, so it is not surprising that the numbers of these animals, too, vary in well marked eleven-year periods.

Another interesting little animals in this connection is the lemming, which lives in the Arctic regions. Periodically it attains vast numbers, and it migrates usually from the mountains to the lowlands, often even into the sea. Such migrations occur contemporaneously throughout Norway, Sweden and Northern Canada, and probably throughout the whole Arctic regions.

"The spectacle of processions of lemmings ecstatically throwing themselves over the ends of railway bridges, and falling to an apparently useless death beneath the sea strewn with dead lemmings like leaves on the ground after a storm; lemmings making a bee-line across crowded traffic oblivious to danger; all these things are bound to make people talk," Mr. Elton says. "The lemming-years are such conspicuous phenomena that it is safe to assume that all which have occurred since about 1860 have been recorded. Lemming-years in Norway have the status of great floods."

By studying their records it is found that their frequency is about three and one-half years, not eleven years as in the case of rabbits. Close examination of meteorological data shows that climate too fluctuates in three and one-half year periods, particularly in Arctic regions. The cause of this short period fluctuation is not known.

In the same way as the fox and lynx benefit by years of large rabbit numbers, so in lemming-years large numbers of short-eared owls collect to feed on them, and peregrine falcons, which in normal years do not visit Norway, collect in large numbers to feed on the owls. In Greenland Arctic foxes tire of ptarmigan in lemming-years and so allow it to breed and attain large numbers in the year following the lemming-year. Then the Arctic fox decides that he likes ptarmigan after all and down go the ptarmigan numbers.

DIPHTHERIA DANGER HIGH IN ISOLATED COMMUNITIES

Isolated communities such as Nome are in particular danger from epidemics of diphtheria, not only because medical supplies may be far off and hard to get, as in the present instance, but also because isolated populations apparently tend to become more susceptible than those in thickly settled regions. Dr. J. A. Doull, of the Johns Hopkins School of Hygiene and Public Health, points out certain peculiarities in the behavior of the disease that makes it an especial menace to lonely places.

As everybody knows, diphtheria is peculiarly a disease of children, Dr. Doull says. Its greatest incidence is among children three years old. After that age the number of children contracting the disease fall off rapidly; there seems to be a gradual upbuilding of immunity, beginning very early in life. Little is known of the means by which this immunity is acquired, but apparently we are always getting slight infections, and by throwing them off we store up enough natural antitoxin in our own blood to prevent a serious attack.