

any considerable influence on human health, and the Laplander and the Eskimo in their winter darkness fare but little worse in this respect than the Londoner. We manage to survive our winters only because we have learned various means by which summer conditions can be reproduced in winter days.

Powers of Darkness.

The charts above referred to show that "the days of darkness are also the days of death and disease. . . . As the light diminishes the death rate begins to rise. Nor does the rate fall again to its low level until the summer is established. . . . Cold undoubtedly plays a part in lowering human resistance to disease, but the experience in Switzerland at the Alpine clinics has shown that intense cold is far less harmful than darkness. Given light or the equivalents of light, human beings seem to be able, for the most part, to set cold at defiance."

Winter Diseases.

"Winter diseases," we are told, "tend to attack the air passages of the body, the throat and lungs. Pneumonia becomes prevalent, for example, only when darkness is established; it disappears, at least in epidemic form, with the coming of the spring. The same is true of bronchitis, of broncho-pneumonia, and of the common cold. . . . In some subtle way, light endows the organism with power to destroy, or at any rate to repel, such micro-organisms as the pneumococcus."

Again, though influenza occurs at all seasons of the year, it is only when it occurs in the time of darkness that it is really dangerous, and measles resembles influenza in its tendency to be followed by bronchial troubles. "People do not die of influenza. What they die of are the complications of the disease—bronchitis and pneumonia. In other words, influenza possesses the power of robbing us of our resistance to the germs of winter ailments. Darkness—lack of sunlight—as we have seen, has the same power. When darkness and influenza combine their forces, human life is threatened on a big scale. . . ."

"These facts are of great significance just now, when a new study of the influences of sunlight on human health is being carried out, and when, at last, hope is justified of artificial means of dispelling the winter darkness. No amount of artificial sunlight will abolish influenza; the natural sunlight cannot achieve this. But artificial sunlight may very well prove to be a sure shield against the dangerous complications of influenza. It needs very little imagination to see that such a shield would constitute one of the greatest measures of preventive medicine which our world has known."

Deficiency Diseases.

"In the year 1915, Dr. Edward Mellanby, F.R.S., made the discovery that rickets is what is known as a 'deficiency disease.' This discovery at once brought rickets into line with the other known deficiency diseases, scurvy and beri-beri.

"These diseases occur when there is absent from the patient's diet some quality on the presence of which health normally depends. The absent quality where rickets is concerned is the substance known as 'Vitamin D.'

"Dr. Mellanby's original discovery revealed the fact that Vitamin D was a substance which could be dissolved in oil or fat and was present in the fat of animals. In its absence, rickets developed and there was malformation of the enamel of the teeth in young animals. The war was in progress, and observers all over Europe were remarking the great increase of rickets among the child population. This increase, as was pointed out, coincided in point of time with the deficiency of fats which was occasioned by the demand for nitro-glycerin. Every available ounce of fat was being turned into high explosives; the children

suffered from fat starvation. This state of affairs, naturally, directed wide attention to Professor Mellanby's discovery. Was the increase of rickets directly due to the absence of fats?"

The story of the mission of Dr. Harriette Chick, Dr. Helen Mackay, and others, sent by the British Medical Research Council, in collaboration with the Lister Institute of Preventive Medicine, to Vienna, at the conclusion of the Great War, to study the subject of rickets, and to offer guidance to relief measures in the light of the best available knowledge, has already been told in this JOURNAL.

The Medical Correspondent of the *Times* now reports that "Dr. Chick and her associates supplied animal fat, in the form of cod-liver oil, to large numbers of Viennese children who were afflicted with rickets. . . . It was found that this treatment exercised a most beneficial and striking influence on the disease, thus confirming fully the conclusions reached by Professor Mellanby.

"But Dr. Chick, as it happened, accomplished much more than she had set out to accomplish. She noted the extraordinary fact that, whereas in winter only the rickety children who were receiving cod-liver oil improved in health, in summer improvement took place in all the little victims of the disease—in those who were not receiving cod-liver oil as well as in those who were receiving it. It was difficult, at first, to understand why this should be so. Why should rickets tend to disappear in summer, no matter on what diet the sufferers were living? Dr. Chick made a careful and most brilliant study of the new fact which she had observed and came at last to the conclusion that, in some mysterious and unknown manner, the rays of the summer sun supplied the deficiency which, in winter, the cod-liver oil had supplied.

"Was cod-liver oil, then, a kind of bottled sunlight? The cod is a deep-sea fish which lives for the most part in the darkness of Northern waters. How could sunlight reach such a creature? These questions were put and answered. On the surface of the summer sea float millions of animalcules, called plankton, which possess the power of absorbing the sun's rays—as blotting paper absorbs ink. These minute creatures serve as the food of the squid, which, in eating them, acquires their treasure store of light. The squid is the food of the cod. Thus, in two stages, the summer sun is carried to the deeps of the ocean for use by fish which themselves have no place in the sun."

Meanwhile Dr. Huldchinsky of Berlin made and published the discovery that if, instead of giving cod-liver oil to a child afflicted with rickets, he gave it a light bath, by means of a quartz mercury lamp, recovery took place, and Dr. Chick, who "at once applied it to her patients in Vienna, was able to confirm the conclusion reached at Berlin—that light from a quartz mercury lamp was equivalent to cod-liver oil as a treatment for rickets.

Bottled Light.

"The whole scientific world speedily became interested in the new work—work which actually suggested that light was food and that a particular kind of food was merely 'bottled light.' But there was no knowledge to guide the workers."

Ultimately "Professor Steenbock, of Wisconsin, announced that many foods, which did not naturally contain animal fat, could be endowed with the fat vitamin by exposing them to quartz mercury lamps or to the summer sun. It was also announced that the fat vitamin was not, as had originally been supposed, identical with the growth-promoting vitamin, Vitamin A, but was a distinct and separate substance. It was therefore named 'Vitamin D' (there being already known Vitamins B and C)."

Vitamin D.

"The work of Professor Steenbock and others directed interest to substances in which Vitamin D could be developed

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