

way the exposure can therefore be safely made at least ten times longer than is usually possible by the ordinary method in general use and without damaging the superficial tissues.

It is to be noticed that the chief advantage of this plan lies in the fact that whereas at the apex of the cone swept out by the revolving beam the radiation is operative during the whole exposure, at the skin surface the pencil of rays only impinges upon a small area at any moment, always passing slowly on as the tube revolves so as to irradiate a large ring, section by section, of perhaps one inch in width.

Some rough experiments already made by the writer with a crude form of tube frame revolved by hand have given promising results. In spite of the fact that the source of radiation in a focus tube is practically a point, all rays being therefore divergent and their intensity falling off inversely as the square of the distance; in spite, too, of the absorption of some of the beam's energy as it traverses the tissues, it was found that the time-intensity factor could be made in this way considerably larger at the seat of the disease than at the skin surface.

The method is already being given a practical trial at the Cancer Hospital, London, and may prove later to be applicable also in treatment by radium.

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Australian Photographs.

READERS of NATURE, and especially members of the British Association, may be interested to know that I have received to-day (October 25), too late for incorporation in the "Overseas Camera in Australia," now being distributed to subscribers on behalf of the funds of the British Red Cross Society and Order of St. John, a remarkably fine series (300 or more) of photographs of features of general and scientific interest of New South Wales, presented by the Premier of this State through Mr. J. H. Maiden, the director of the Botanic Gardens, Sydney, and taken by the Government printer. The photographs are of interest to botanists, zoologists, foresters, agriculturists, geologists, miners, and astronomers. I shall be glad to supply lists or further particulars to anyone interested.

13 Palmerston Park, Dublin. T. JOHNSON.

Explosive Bombs.

I HAVE been studying the effects of explosive bombs on windows, and should greatly appreciate any information as to the effect of the explosions on the diagrams of recording barometers: (a) in the open air, (b) in rooms.

ALFRED S. E. ACKERMANN.

25 Victoria Street, Westminster,
London, S.W., October 28.

TRENCH "FROST-BITE."

DURING the winter campaign of 1914-15 a number of soldiers fighting in the trenches in Flanders became disabled from the effects of cold and wet on their feet. The condition is to be distinguished from true frost-bite, in which severe cold causes necrosis or death of the tissues; but though this may occur, it is infrequent in trench frost-bite, the characteristic symptoms of which are swelling, pain, and disturbance of sensation in the part affected. For this reason Delépine¹ suggests the name "frigorism" or

¹ "On the Prevention of 'Frost-Bite' and other Effects of Cold." *Journ. Roy. Army Med. Corps*, May, 1915.

"frigidism" for this condition, corresponding with "froidure," used by several French writers.

Three factors seem to be concerned in the causation of trench frost-bite, viz., cold, wet, and interference with the circulation in the leg and foot by tight puttees and boots. Lorrain-Smith, Ritchie, and Dawson² have investigated experimentally the pathology of the condition. The microscopic examination of the tissues showed that the chief effect of the cold is exerted on the blood-vessels, which become dilated and contain a certain amount of fibrin deposit, their internal endothelial lining becomes swollen, and the muscle fibres of the middle coat are vacuolated. The axis-cylinders of the nerves of the part become swollen and œdematous, and some slight changes in the fibres of the voluntary muscles may be observed.

Delépine (*loc. cit.*) has conducted a number of experiments on the causation and prevention of trench frost-bite. He finds that exposure to cold, dry air caused a lowering of temperature of the part, which, however, is slight and not progressive, but immersion in a limited amount of cold water caused a rapid and considerable, though not permanent, lowering of temperature, and, provided the bulk of water does not exceed twice that of the part immersed, is not detrimental. When, however, the amount of water at a temperature below that of the skin is unlimited, or if the water is limited in amount but contains ice, the lowering of temperature of the part is rapid, considerable, and progressive, and invariably results in *local frigorism*, and motion of the external water accelerates loss of heat by preventing the formation of a comparatively warm surface layer. The presence of a thick woollen covering retards loss of heat, even when saturated with water, owing to the warming of the comparatively still layer of water retained within the meshes of the fabric. It was found that a very thin layer of moderately dry air between the skin and the external cold water or ice suffices to reduce the loss of heat to an extent which is compensated by the heat brought to the part by the circulating blood. Such an air layer over the part can be secured by the use of a thin waterproof covering in combination with a woollen covering.

After many trials, Dr. Delépine has succeeded in preparing very thin and soft oil-silk, which can be made into absolutely waterproof bags for covering any part of the body by means of apposition seams. They are light, inexpensive, and wear well, should be worn over an inner woollen sock, and be protected by an outside sock. With such a combination it is possible for the men to use the boots they have at present, provided they are two sizes larger than ordinarily worn. The oil-silk bags should extend up to the knee, and could probably be made for less than 3s. a pair. The importance of having nothing tight round the leg is obvious—the circulation in the part should be as free as possible, so that the circulating blood may maintain the warmth of the limb.

R. T. HEWLETT.

Lancet, September 11, 1915, p. 595.