

They obtained a vigorous effect from Balmain's luminous paint, but when this was mixed in gelatin there was no external effect. Schmidt's results as to the continuance of photo-electric activity when bodies in general are dissolved in each other lead us to believe that an actual conservative property of the medium and not an effect of this on the luminous paint is here involved. This conservative effect of the gelatin may be concerned with its efficacy as a sensitiser.

In the views I have laid before you I have endeavoured to show that the recent addition to our knowledge of the electron as an entity taking part in many physical and chemical effects may be availed of, and should be kept in sight, in seeking an explanation of the mode of origin of the latent image.

GLACIAL STUDIES IN CANADA.

DR. WILLIAM H. SHERZER has published in the *Smithsonian Miscellaneous Collections* (pp. 453-496) a handsomely illustrated preliminary report entitled "Glacial Studies in the Canadian Rockies and Selkirks." The five glaciers selected are conveniently located in Alberta and British Columbia, and the line of the Canadian Pacific Railway passes near them. Observations have been made on the rate of motion of the Victoria Glacier, which is as low as about 52 feet a year, and on the lowering of its surface by ablation. The front of this glacier shows a shearing movement of one layer over another, as was tested by the pushing forward of iron spikes driven into an upper and a lower stratum. The right lateral moraine receives a certain amount of ground-moraine or sub-glacial material from a hanging glacier on Mount Lefroy, which breaks away in avalanches on to the main Victoria flow. This incident, which is well illustrated, serves to warn us from assuming that all sub-glacial material at a glacier's edge results from plucking action on the wall or floor in contact with the local ice.

A brief but useful discussion of "dirt-bands" follows, in which three types are distinguished. Layers of the glacier may vary in the percentage of foreign matter contained in them, and these stratified dirt-bands may be too thick to represent mere temporary variations in snow-fall, and probably then correspond with short cycles of variation in the "activity of the glacier-making agencies." A second type of dirt-band is that described by Forbes, conspicuous at a distance, and transverse to the length of the ice-stream; the author traces this appearance to the alternation of depressions and ridges, stones and mud becoming washed into the former, and producing the dark bands, which may be bent forward in the central region as the glacier flows. The explanation given is adopted from Tyndall. The greater rapidity of motion in summer produces a crevasse, or a close-set series of crevasses, where there is a marked increase in the drop of the valley-floor. The sun melts out a depression along the line of the crevasse or crevasses, which remains although the fracture heals. In winter, owing to the slower motion, the ice adapts itself better to its inclines, and the few crevasses that are formed are not emphasised at the top by melting. Hence each dirt-band represents a summer season, and the interval a winter one. The third type of dirt-band depends on the greater resistance to melting

offered by blue solid ice, as compared with the intervening layers of vesicular ice. The latter, therefore, form depressions on the melting of the mass, in which detritus gathers, as in the case of the far coarser dirt-bands of the second type. Dr. Sherzer proposes to call a band of the first type a "dirt-zone," and of the third type a "dirt-stripe." The well known blue bands are shown later to have no relation to stratification, and we are left in ignorance as to their origin.

On the lower Lefroy Glacier "ice-dykes" are noted, true mineral veins, as it were, with ice-crystals deposited on their walls and meeting from opposite sides along the central plane. These represent crevasses, which have been healed by the freezing of the water that at one time filled them.

The author's examination of the surfaces of junction of glacier-grains shows that melting opens up a network of delicate tube-like capillaries, which are here photographed—we presume on a natural scale—both before and after injection with potassium permanganate. As melting proceeds, this network disappears, apparently by a general



FIG. 1.—Formation of Forbes's "dirt-bands," Deville Glacier, Selkirks. From Summit Mt. Fox, looking Eastward. Photographed by Arthur O. Wheeler, 1902. Canadian Topographic Survey.

coarsening of the hollows developed between adjacent grains.

We shall hope to hear more of the author's views on "block-moraines," since we cannot help thinking that such phenomena are far too common for the invocation of earthquake-action as a cause. The double moraine below Lough Coumshingaun, in the county of Waterford, would seem to come into this category; and in that case the jointed nature of the rocks higher up the mountain accounts for the preponderance of huge and angular blocks. The discovery of ice-cores within the steep lateral embankments of the Asulkan Glacier raises the question of such embankments in general; and here again we hope for further details. The illustrations, one of which is here reproduced, are richly varied, and are of equal value to the geographer and the geologist.

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