

experiment has also shown that it would be better to preserve one or two hundred hailstones separate from each other than a greater number of them, but partly—especially in lower layers—frozen together. That can be attained by placing the hailstones in some very viscous liquid (e.g. cylinder-oil, vaseline, or castor-oil) of a density nearly equal to that of hail.

For the investigation of the microstructure of a separate hailstone Mr. W. Dudecki and I made a thin section of it by first rubbing one side on emery-paper or by melting it with the warmth of a finger. This side was laid upon an object-glass and frozen to it, after touching for some time with a finger the other side of the glass. The other side of the hailstone was then polished in the same manner as the first until the requisite thickness was attained. These operations were made in free air, and were so much easier, as the temperature of the air was below 0°. Still, it was found possible to grind hailstones in the laboratory at the temperature of the room by means of cooling the object-glass, the emery-paper, &c., in double-walled vessels with a mixture of ice and common salt.

For the optical investigation of thin sections in free air a polarising microscope was used, and in a lecture-room a projecting lantern. In the latter case (Fig. 2) the section

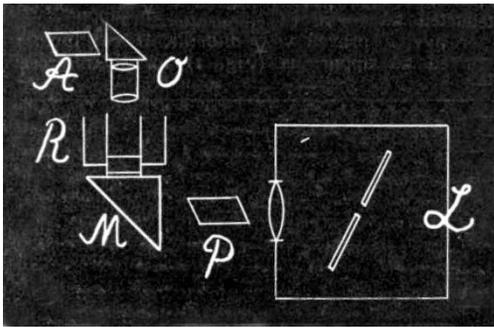


FIG. 2.—L, Projecting lantern; P, polariser; M, mirror; R, refrigerating vessel; O, objective; A, analyser.

was laid in a refrigerating vessel with double walls and double bottom (to avoid the condensation of aqueous vapour from the surrounding air) of plane-parallel glass plates. The space between the walls contained a mixture of ice and common salt. The real image of the section was thrown on a screen or on a photographic ("Autochrom") plate.

The greater part of the hailstones were crystalline individuals, as also was the case with "artificial hailstones"—drops of water frozen in a mixture of cinnamon and linseed oil of suitable density. In those hailstones, which consisted of several crystalline individuals, there was no regularity in the form of the boundaries between crystals, or in the angles between these boundaries, or in the directions of the optical axes, which lay indifferently to each other, as well as to the milky nucleus of the hailstone, which appeared in the section as a number of air-bubbles of different size.

I trust that my attempt will cause similar researches to be undertaken, and I should be very glad if anyone who may be able to preserve or study larger or more peculiar hailstones than I have hitherto done will do so, and in this way improve our deficient knowledge on the origin of hail and the details of its formation.

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Thoughtless Destruction of Wild Flowers.

MAY I ask through your widely circulated paper that those who organise the weekly or fortnightly visits of poor town children to country villages may be requested to instruct these children to pluck only a limited number of wild flowers? It is no uncommon sight to see a dozen or more of these children going along a road or railway embankment and plucking every flower they can find, as well as rooting up those which are small enough. In half an hour the flowers have withered, and are thrown away, when the same process is repeated.

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Oxford, Kent, May 27.

NO. 2119, VOL. 83]

RECENT PROGRESS IN INDIAN FOREST TECHNOLOGY.

THE excellence of the work of any public department depends on the character and ability of the men who direct it, and the Indian Forest Department was singularly fortunate in its first Inspector-General, the late Sir Dietrich Brandis, K.C.I.E., F.R.S. He secured State ownership and State management for the forests both in British India and in the native States, and also a trained staff of forest officers. He placed Indian forest law on a firm basis by selecting as Conservator of Forests, Mr. B. H. Baden-Powell, C.S.I., a member of the Punjab Civil Service, who, after working for a decade of his life in the forest service, became presiding judge of the chief court at Lahore. Baden-Powell drafted the Indian Forest Acts, models of forest law that are followed by all colonial legislators, and his "Manual of Forest Jurisprudence" is the only English book on the subject. No mere forester could have drafted those laws successfully, nor could any mere lawyer, but Baden-Powell was both lawyer and forester.

Brandis also established a forest survey under Lieut.-Colonel F. Bailey, R.E., and Mr. W. H. Reynolds, and their maps gained gold medals at two Paris exhibitions, and were the first Indian maps that showed a good system of contour lines. A forest school for training native members of the provincial and executive staffs of the Forest Department was established in 1881, at Dehra Dun. Useful manuals of forestry, by Mr. E. E. Fernandez, and of botany, were published soon after the establishment of this school for the use of the students. Brandis also published a Forest Flora of Northern India, followed quite recently by his last great work, "Indian Trees," a forest flora for the whole of India. Mr. Kurz had previously written one for Burma and Major Beddome for Madras, while Mr. J. S. Gamble, C.I.E., F.R.S., published a splendid monograph of Indian bamboos. Gamble, under Brandis's direction, published, in 1881, a "Manual of Indian Timbers," and again, in 1901, after collecting material for twenty years, a new and greatly enlarged and improved edition. "The Indian Forester" first appeared in 1876, Dr. Schlich, now Sir W. Schlich, K.C.I.E., F.R.S., being the first editor. Schlich succeeded Brandis as Inspector-General of Forests in 1881, and instituted a proper system of working plans for Indian forests. He came home in 1885 and established a school of forestry at Coopers Hill, and, in conjunction with myself, published a "Manual of Forestry."

The training of men in England for the Indian Forest Service was not at first in accordance with the wishes of Brandis and Schlich. They recommended that the Imperial School of Forestry should be at an English university, and that, as the so-called Civil Service of India is recruited chiefly from university men of good literary and legal attainments, so the Imperial Forest branch of the Civil Service, which manages one-quarter of the land of British India, should be composed of university men of good scientific attainments. But the India Office wished to support the Royal Indian Engineering College at Coopers Hill, and kept the forest probationers there until 1905, the year before the college was closed. In 1905, an Imperial School of Forestry was established at Oxford under Sir William Schlich, and is now training more than seventy men for India, the colonies, and for forest work at home.

Until 1904 very little progress was made in Indian forest technology, for which Brandis had laid such a