angles of an equilateral triangle whose sides are about 5″, instead of one exposure of three times the length. It was asserted that a photograph obtained in this manner, in which each of the exposures was continued for twenty minutes, would exhibit more stars than a photograph with a single exposure of one hour. It was eventually decided that the chart plates taken at the even degrees should have a single exposure, while the exposures of the plates taken at the odd degrees should be left to the discretion of the observers.

The third and last point to which reference may be made here is the length of time to be generally devoted to securing a plate for the chart. It was generally felt that, if the exposures were made long enough to secure the impressions of a fourteenth magnitude star, as generally understood in photometric work, the length of time required would entail too great a strain upon the capacity of the observer. It has therefore been recommended by a sub-committee to confine the exposures to about forty minutes, which, it is believed, will be about eight or ten times the exposure required to impress the image of an eleventh magnitude star on plates as at present employed, and under the ordinary meteorological conditions of the Paris Observatory.

CRYSTALS OF PLATINUM AND PALLADIUM.

I HAVE found that crystals of the metals platinum and palladium are easily prepared as follows:—

A ribbon of the pure metal is stretched horizontally between two binding screws. Upon the ribbon, some topaz, reduced to a fine powder, is dusted. A current is now passed through the ribbon, of a strength sufficient to raise it to a bright red heat. In about half an hour's time, if the current be stopped and the ribbon examined with a microscope, it will be found that very small brilliant crystals cling here and there to projecting points on the partially decomposed topaz. If the heat be maintained, these crystals steadily grow; in about two hours some will have attained to a size of about 0·1 mm.

Platinum was the first substance which I crystallized in this manner. When the topaz was scraped off the ribbon, the under surface of the caked fragments was found covered with a grey deposit of the small crystals. Under the microscope, using a 1-inch objective, these present a very brilliant appearance. They are opaque, and show a high metallic lustre, like that of clean mercury, but are somewhat whiter in colour. The faces are clean, and sharply defined. Their crystallographic system is very evidently cubic. The prevailing form is the octahedron, or some modification of it. When the octahedron is perfect, the triangular faces are equilateral. Strings of octahedra occur, after the manner of magnetite. A common modification of the octahedron is that well known in the case of alum, in which two opposite faces of the solid are dominant, giving a tabular form. Very thin hexagonal tables also occur, suggesting, at first sight, dimorphism. These, in the opinion of Prof. Sollas, might be referred to an extreme development of the alum habit. Many observations support this view, which seems preferable to supposing dimorphism.

Hemihedral forms occur, principally the tetrahedron and modifications of it. The combination of tetrahedron and cube, the tetrahedron being dominant, is observed. Acicular forms are also present, but are scarce. The following observations bear upon the nature of these crystals.

Treated in hot hydrochloric, sulphuric, or nitric acid, they are unattacked. They also appear unaffected in cold hydrofluoric acid. In hot hydrofluoric acid they seem slightly attacked. They are slowly but completely dissolved in boiling aqua regia, from which a precipitate of ammonium platinic-chloride is obtained on the addition of ammonium chloride. They are not attracted by the electro-magnet, and conduct electricity (shown by touching the opposite extremities of a crystal with fine needles in circuit with a battery and galvanometer). When crushed between two glass slips they spread out, giving the glass the appearance of a mirror. Although in this way much extended, they show no appearance of cracking upon the edge. They are therefore very malleable. Their melting-point approximates to that of platinum, for a ribbon with some of these crystals clinging to it may be raised to its melting-point, when some of the crystals will be found partially fused. The ribbon upon which crystals have been formed presents a roughened appearance.

The bodies present at their formation are platinum, fluorine, silica, alumina, and a trace of iron. From the physical characters observed, however, the crystals are certainly metallic, and in fact can only be platinum, probably in a very pure state. It would appear that fluorine, liberated at a high temperature from the topaz, attacks the platinum, forming a fluoride, which again breaks up, depositing the crystals.

M. Moissan has already observed that the tetrafluoride of platinum when reduced leaves distinct crystals of the metal (NATURE, vol. xli. p. 118). M. Moissan obtained the fluoride by the direct action of dry fluorine on platinum at a low red heat, and mentions that this body splits up again at a higher temperature. The position of the greater part of the crystals in the present experiment, close to the surface of the platinum, is in agreement with the instability of the fluoride at a high temperature. It seems necessary to suppose the formation of the fluoride to occur further away from the ribbon where the temperature is suitable. So that it appears that a considerable volatilization of the platinum takes place. It is remarkable that, if the conditions are such that the temperature throughout the mass of the mineral is uniform, the crystals of platinum are not formed. Thus, if powdered topaz is rolled up tightly in a tube of platinum, and this tube heated for a considerable time by the passage of a strong current, the mineral is decomposed, there is considerable loss of weight, but no platinum crystals are formed. On the other hand, acicular crystals, which are colourless and transparent, are found under these conditions plentifully intermixed through the partially fused *débris*.

It appeared probable that some related metals might afford crystals in the same manner. Palladium and iridium suggested themselves. The latter I have not yet been successful with, owing to the difficulty of obtaining a piece of suitable dimensions. Palladium ribbon was easily obtained, Messrs. Johnson, Matthey, and Co. supplying this and the other pure metals.

The ribbon of palladium was treated in the same manner as the platinum. Crystals were easily formed.

These are very similar in colour and lustre to the crystals of platinum. In form they appear isomorphous; I have not been able to detect any difference, so that the foregoing remarks on the form of the platinum crystals apply to these also. It seems reasonable to suppose that a tetrafluoride of palladium is concerned in their formation. J. JOLY.

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DR. NANSEN ON GLACIATION.

IT may be worth while to call attention to one or two points of scientific interest in connection with the results obtained by the heroic band of Norwegians, whom Dr. Nansen led across Greenland, as set forth by the chief of the expedition in the appendix to the "First Crossing of Greenland" (Longmans, 1890).

(1) The importance of the internal heat of the earth and its conductive transmission to the contact-plane, as a factor in the mechanics of glaciers, for which I contended eight years ago, may be said to be now established. The