PLATINUM.

THE *Engineering and Mining Journal* calls attention to a renewed demand during the last year or so for crude platinum, or "platinum sand," and gives a summary of the localities where the metal can be found in this country. There are so many localities in this country where it has been found, that it seems reasonable to believe that a regular platinum-mining industry may at some time be established, perhaps, independently of placer gold-mining.

The placer mines of California, Oregon, and other States and Territories, have shown a large number of localities in which platinum occurs. Small lots have come into the market from many of them, and the number would doubtless have been greater had the miners known that the crude metal could be sold in very small quantities. While aware that their "black sand" contained platinum, it seemed hardly worth while to take the trouble to collect the ounce or so of metal which might be obtained at a clean-up.

Now that hydraulic mining in California has received such a setback from invidious legislation, the quantities of platinum found, or to be found, are naturally less than before. Still the known localities, where gold-mining is still carried on by the hydraulic process, or by sluicing from drift or cement mines, are not few.

It is very possible that some arrangement of the undercurrents, by which a larger quantity of black sand would be collected with the amalgam, might be profitable. Whenever grizzlies are used, the addition of screens, placed below, might be an improvement. The platinum grains are, as a rule, in better shape for concentration than particles of gold, and they do not flour like amalgam.

In cleaning up the main line of sluice in placer mines showing platinum, if pains were taken to collect a comparatively large amount of the heavy material, — "black sand," etc., — this, together with the savings from the undercurrents, might be run over some mechanical concentrating apparatus, such as a vanner, with a production of platinum which would pay for the extra trouble.

But there are possibilities of finding platinum in other than gold-mining regions. Of course, wherever the metals occur together, any method of saving gold by gravity will also result in the saving of platinum, if present; and when amalgamation is the principal dependence, as in ordinary sluicing, still gravity is mainly relied on, even if plates are also used, to hold or to catch the amalgam, and therefore any platinum which may be present. It may be, however, and very probably too, that there are localities which have been prospected for gold and abandoned as unprofitable, which would furnish platinum in commercial quantities. The association of the two metals is by no means a necessary condition. That they are in practice found together, simply means that a gravity process which saves the one saves also the other. It is therefore worth while for prospectors exploring new fields to keep an eye open for platinum.

The same journal is authority for the statement that within the last few days a noteworthy discovery has been made: platinum has been found *in place* in the nickeliferous ore of Sudbury, Canada, by Professor F. W. Clarke. This discovery was made accidentally, in the course of determinative and analytical work upon the ore, which presents other peculiarities. While the amount found is of little or no commercial importance, it has a very great scientific significance, and is certainly something new. Platinum grains have been found in secondary rocks, such as recent sandstones, conglomerates, etc.; but never before, so far as we are aware, in vein stuff, although it has long been looked for, and such an occurrence was to be expected. There is therefore always the chance that actual veins of platinum-bearing material, so often falsely reported, may actually be found, and that perhaps some of them may be of a paying grade. The number of localities, and their wide distribution, in this country, point to such an outcome.

THE HISTORY OF PORPHYRITIC QUARTZ IN ERUPTIVE ROCKS.

IN a very suggestive communication with the above title, presented to the Philosophical Society of Washington, Saturday evening, March 16, Mr. J. S. Diller emphasized the distinction first clearly drawn by Rosenbusch between granitic and porphyritic quartz in eruptive rocks.

Granitic quartz, he remarked, is the last mineral to solidify, as may be well seen in such rocks as granite, where it fills the angular spaces between the crystals of felspar and other silicates.

On the other hand, porphyritic quartz is characterized either by a well-developed crystallographic outline or by rounded or embayed forms derived from such crystals by the corrosive action of the molten lava in which they were suspended. The destructive forms are by far the most common, and their distribution indicates that porphyritic quartz crystallized in the magma at great depths beneath the earth's surface before the majority of the silicates with which it is associated were formed. Mr. Diller laid special stress on the fact, that, while the silicates are crystallizing in a molten mass, if porphyritic quartz is present it undergoes resorption; and not until the silicates are developed, and granitic quartz begins to form, does the resorbent action discontinue.

Mr. Iddings was quoted as having shown that the crystallization of porphyritic quartz is not determined by the chemical composition of the magma, but due to physical conditions; and the speaker agreed with Lagorio, also, that the resorptive phenomena of porphyritic quartz and other minerals in eruptive rocks is a consequence chiefly of the relief of pressure in the process of eruption.

To explain the crystallization of silica as porphyritic quartz, right in the face, so to speak, of the iron, magnesia, and other bases which, as we would suppose, were thirsting for the silica to form silicates, Mr. Diller advanced a novel hypothesis as to the influence of pressure on the crystallization of minerals in deep-seated magmas.

Reasoning from the results of Hallock's observations (*Science*, xi. p. 152) and other data, he concluded that an increase of the pressure, already enormous, upon the magmas within the earth, only removed them further from crystallization, instead of producing it, as has been suggested by some petrographers.

At a considerable depth beneath the earth's surface the pressure upon the magma is so enormous, and the difficulty of moving the molecules among themselves so as to segregate those of a certain kind and arrange them in crystals is so great, that the crystallizing force, which has a comparatively small limit of strength, is unable to overcome the resistance, and crystallization is wholly prevented. Thus it would appear that the interior of the earth is maintained in an amorphous condition by pressure alone, and only a comparatively thin crust allowed to crystallize. It would follow from this view that the crystallization of the magma within the earth is rendered possible only by the relief of pressure; and the minerals which could crystallize first (and they are similar in all lavas) must be determined to a large extent by the relative strength of their crystallizing forces. As a consequence of the gradual relief of pressure, it would be expected that simple minerals such as the oxides, of which quartz is one, could crystallize before the more complex silicates. A further relief of pressure may enable the silicates to form, and, in the struggle for silica, the quartz is partially or wholly resorbed. If the rock cools slowly, and becomes holocrystalline, any silica that is left over after the bases in its neighborhood are satisfied will fill out the irregular spaces between the crystals of silicates, and form granitic quartz.

The production of twinning lamellæ in many minerals, of rocks which have been subjected to high pressure, was regarded as a step in the direction of reducing crystallized matter to an amorphous condition.

The full paper, which is only an abstract of a forthcoming bulletin of the United States Geological Survey, will probably be published in the "Proceedings of the Philosophical Society."

ETHNOLOGY.

The Man of Spy.

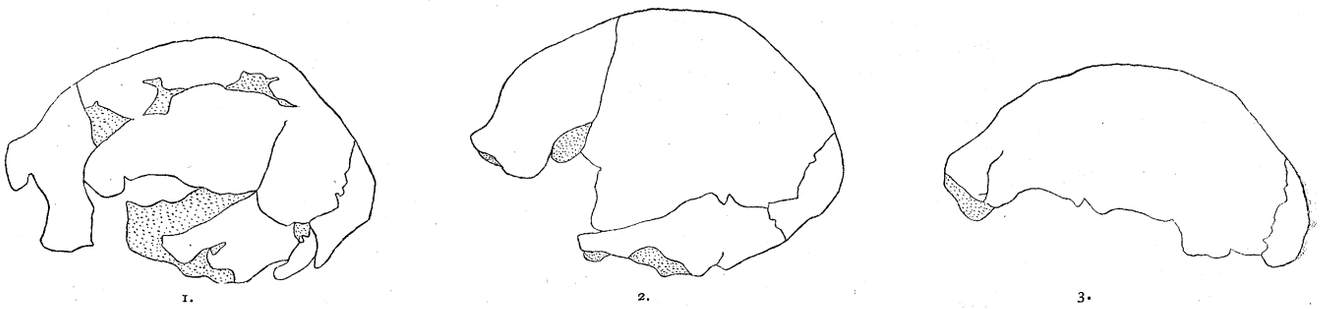
AT a recent meeting of the New York Academy of Sciences, Professor J. S. Newberry described the important finds of human remains in a cave at Spy in Belgium, which were made in 1887, and illustrated his lecture by interesting photographs of the crania and other portions of the find. Since the discovery of the Neanderthal man, no other discovery of equal importance has been made; the more so, as Messrs. Ed. van Beneden and Ch. van

Bambeke, who have submitted the remains to a careful and thorough examination, arrive at the conclusion that the man of Spy, that of Neanderthal, and that of Canstadt were of the same race, and possessed certain characteristic features which they consider as pithecoid. The following figures are taken from the report of these gentlemen, and show that there really exists a striking similarity between the Neanderthal and the Spy skulls. The authors sum up their researches on the anatomical character of the remains as follows: "To sum up, we believe that we can advance the opinion, founded solely on the anatomical character of the man of Spy, that he possessed a greater number of pithecoid features than any other human race. These features are the following: the superciliary arches and the frontal sinus are strongly developed; the forehead is low and retreating; the occipital prominence is large; the region of the chin is of very small size; the marked prognathism and the central elevation of the row of teeth, beginning at the canine teeth; the curvature of arm and leg; the small size of the tibia; and the bearing of the man when standing upright." The authors add that these peculiarities are far more exaggerated in the anthropoid apes than in the case of this man. The other features of skull and body are entirely human.

"Between the man of Spy and the ape there is still an enormous gap. In comparing the race of the Neanderthal to those which have made their appearance later on, — that of Cro-Magnon, the race of Furfooz, the neolithic races, and those of the present time, — we observe that the pithecoid features have diminished constantly, and that they disappear one after another. Some of them may still be found in one or the other of the lowest races: they may re-appear by atavism individually among Europeans. It might well be that such a feature could re-appear more prominently than it does in the case of the man of Spy; but the grand total of so great a number of pithecoid features is impossible except in the case of the most ancient race known up to this time. Besides this, we believe we have shown that the Chélléan man, the predecessor of the man of Neanderthal and Spy, who led a nomadic life without shelter and habitation, who chipped the paleolithic flints, the contemporary of *Elephas antiquus* and *Rhinoceros Merckii*, is unknown to us so far as his anatomical character is concerned. The manufacture of the pliocene stone implements of Monteaperto, of the upper miocene in Italy, of the upper miocene of the Tagus valley in Portugal, are also unknown to us.

"If the most ancient ethnic type that is known to us was capable of assuming modifications during the quaternary sufficient to give rise to races of as different a character as those of Cro-Magnon and Furfooz, if during this period it could lose numerous inferior features and gain others instead, it is not difficult to assume that pliocene man was far inferior to the man of Spy. It is true, the distance separating the man of Spy from the recent anthropoids is enormous, but it is smaller between the same man and the *Dryopithecus* of the middle miocene of St. Gaudens; but, on the other hand, the ethnic type of the man of the lower quaternary had to be modified considerably to assume the character of the present races, if he really was their ancestor."

Although the authors' views will not remain unchallenged, the results of their thorough measurements are well worthy of a careful consideration. But it will be well to remember the history of the famous Neanderthal skull, which was, when first discovered, believed to be much more pithecoid than the men of Spy are now described. J. Ranke sums up the interesting history of this skull as follows: "It is remarkable how rapidly and completely the views expressed after the first discovery of the skull were refuted. Although we are unable to concur with Darwin's views, who called the Neanderthal skull well developed and capacious, the researches of Virchow, Spengel, and others proved that the general form of the cranium — chamæcephalic dolichocephalic — was widely spread in ancient and modern times in the region in which the skull was found, but especially in Friesland. At the Anthropological Congress of Brussels, Dr. Hamy maintained that he had seen in the streets people with skulls of the same type. Other scientists had seen similar shapes of skulls in various parts of Europe. Virchow proved that a number of the peculiarities of the skull under discussion were due to pathological processes. At a young age the Neanderthal man had been afflicted with rachitis: in old age he had suffered from gout. The latter seems to have been very frequent at this period, and may have been due to life in the damp caves. Cave bears have been frequently a prey of the disease. Besides this, traces of various lesions are found. Virchow sums up his views, saying that the whole form must have been modified by these pathological processes, which he describes in detail."

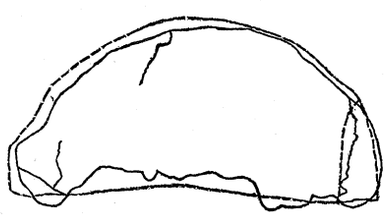


1. 2. 3.

1. SIDE VIEW OF CRANIUM FROM SPY, NO. 1; 2. SIDE VIEW OF CRANIUM FROM SPY, NO. 2; 3. SIDE VIEW OF NEANDERTHAL CRANIUM. (1-6 NATURAL SIZE.)

Regarding another skull of the same age, that of Engis, which is classed with the skull of Neanderthal, Huxley says that it might well have been that of a great philosopher.

These facts make us loath to accept unhesitatingly the views expressed by the Belgian authors. Skulls are known from the Old World as well as from the New World, which, if found in a position suggesting old age, would be classed with these undoubtedly early quaternary skulls. The figures reproduced above are unfortunately not orthogonal tracings, but outlines of photographs. Orthogonal views make the crania appear considerably higher, as may be seen from the following figure, showing the Neanderthal



skull in solid lines as drawn by Huxley by means of the camera lucida, while the broken line is a geometrical (orthogonal) projection made by Th. Lanzert.

The fortunate find of Spy contributes materially to the final solution of the ethnic character of the early races of Europe, and is a most welcome supplement to the finds of Neanderthal.

BEANS CULTIVATED IN PREHISTORIC ARIZONA. — A number of years ago Mr. Wittmarck expressed the opinion that our bean (*Phaseolus vulgaris*) was not a native of the Old World, as was usually assumed, but that it was an American plant. This view, which was founded on finds made in Peruvian burials, was later on confirmed by researches of Körnicke, Asa Gray, and Hammond Trumbull. Recently Mr. Wittmarck has discovered seeds of the bean among the excavations of the Hemenway expedition in

Arizona, which were exhibited by Professor Edward S. Morse and Sylvester Baxter during the recent Congress of Americanists at Berlin. This discovery confirms the American origin of the bean. The plant called *phaselos, faseolus*, etc., in antiquity, is, according to Körnicke, *Dolichos chinensis*, or a variety of the species *D. melanophthalmos*. Mr. Wittmarck has found also seeds of the pumpkin in ancient Peruvian burials, and concludes that the pumpkin is originally an American plant. The so-called pumpkins of the Bible are, according to Ascherson and Magnus, melons (*Cucumis Chate L.*), and so are those represented on ancient Egyptian paintings. On the other hand, Gray and Trumbull have proved that before the arrival of the Europeans, pumpkins were used as far north as northern New York.

ELECTRICAL NEWS.

Electrical Lines of Force.

THIS subject was brought before the members of the Royal Institution, London, some years ago by Mr. Gordon; and recently a lecture was delivered on the same subject at the institution by Professor A. W. Rücker, an abstract of which appears in *Nature* of March 7. In the interval a considerable amount of work has been done upon it, both in England and Germany, and many experiments have been devised to illustrate it. Some of the more striking of these, though of great interest to the student, are rarely or never shown in courses of experimental lectures. The lecturer and Mr. C. V. Boys, F.R.S., last year devised a set of apparatus which has made the optical demonstration of electrical stress comparatively easy, and most of the results obtained by Kerr and Quincke can now be demonstrated to audiences of a considerable size. Before discussing this portion of his subject, the lecturer introduced it by an explanation of principles on which the experiments are founded.

Magnetic lines of force can easily be mapped out by iron filings, but the exhibition of electrical lines of force in a liquid is a more complex matter. In the first place, if two oppositely electrified bodies are introduced into a liquid which is a fairly good non-conductor, convective conduction is set up. Streams of electrified liquid pass from the one to the other. The highly refracting liquid phenyl thiocarbamide appears to be specially suitable for experiments on this subject. If an electrified point is brought over the surface, a dimple is formed, which becomes deeper as the point approaches it. At the instant at which the needle touches the liquid the dimple disappears, but a bubble of air from the lower end frequently remains imprisoned in the vortex caused by the downward rush of the electrified liquid from the point. It oscillates a short distance below the point, and indicates clearly the rapid motions which are produced in the fluid in its neighborhood. When the needle is withdrawn, a small column of liquid adheres to it. This effect is, however, seen to greater advantage if a small sphere about five millimetres in diameter is used instead of the needle-point. When this is withdrawn, a column of liquid about five millimetres high and two millimetres in diameter is formed between the sphere and the surface. A similar experiment was made by Faraday on a much larger scale with oil of turpentine; and he detected the existence of currents, which are in accord with the view that the unelectrified liquid flows up the exterior of the cylinder, becomes electrified by contact, and is repelled down its axis. In view of this explanation, and the movements assumed can be clearly seen in the phenyl thiocarbamide, the performance of the experiment on a small scale is not without interest. The possibility of the formation of such violent up-and-down currents in so small a space must depend upon a very nice adjustment between the properties of the liquid and the forces in play. It is obvious that such movements of the liquid must be a disturbing element in any attempt to make the lines of electric force visible.

Again: if a solid powder be suspended in a liquid into which electrified solids are introduced, it tends to accumulate round one of the poles. This subject has been investigated by W. Holtz. Sometimes the powder appears to move in a direction opposed to that in which the liquid is streaming. Sometimes two powders will travel towards different poles.

If powdered antimony sulphide be placed in ether, it settles at the bottom of the liquid; and if either two wires insulated with glass up to their points, or two vertical plates, be used as electrodes, on exciting them slightly the solid particles arrange themselves along the lines of force. If the electrification be increased, they cluster round the positive pole. On suddenly reversing the electrification by means of a commutator, they stream along lines of force to the pole from which they were previously repelled. Other methods of obtaining the lines of force have been devised. They can, for instance, be shown by crystals of sulphate of quinine immersed in turpentine.

The tendency of the lines of force to separate one from the other was illustrated by Quincke's experiment. A bubble of air is formed in bisulphide of carbon between two horizontal plates. It is in connection with a small manometer, and when the plates are oppositely excited, the electrical pressure acting at right angles to the lines of force, being greater in the liquid than in air, compels the bubble to contract.

Kerr's experiments depend upon the fact, that, since the electrical stress is a tension along the lines of force, and a pressure at right angles to them, a substance in which such a stress is produced assumes a semi-crystalline condition in the sense that its properties along, and perpendicular to, the lines of force are different. Light is therefore transmitted with different velocities, according as the direction of vibrations coincides with, or is perpendicular to, these lines; and the familiar phenomena of the passage of polarized light through crystals may be imitated by an electrically stressed liquid.

The bisulphide of carbon used must be dry, and, to make the phenomena clearly visible, it is necessary that the light should travel through a considerable thickness. Thus, to represent the stress between two spheres, elongated parallel cylinders should be used, the axes of which are parallel to the course of the rays of light. These appear on the screen as two dark circles. Between crossed Nicols, the planes of polarization of which are inclined at forty-five degrees to the horizontal, the field is dark until the cylinders are electrified, when light is restored in the space between them.

If parallel plates with carefully rounded edges, and about two millimetres apart, are used, the colors of Newton's rings appear in turn, the red of the third order being sometimes reached. If one plate is convex towards the other, the colors of the higher orders appear in the middle, and travel outwards as the stress is increased. The experiments may be varied by using two concentric cylinders, or two sheets of metal bent twice at right angles to represent a section through a Leyden jar. In the first case a black cross is formed; and in the second, black brushes unite the lower angles of the images of the edges of the plates. By the interposition of a piece of selenite, which shows the blue of the second order, two of the quadrants contained between the arms of the cross become green, and the others red. In like manner the horizontal and vertical spaces between the inner and outer coatings of the "jar" become differently colored.

There are several phenomena connected with the stress in insulators which present considerable difficulties. Thus in a solid it is found impossible to restore the light between crossed Nicols by a uniform electrical field. That the non-uniformity of the field has nothing to do with the phenomenon in liquids, though at first disputed, is now generally admitted. It may be readily proved by means of a Franklin's pane, of which half is pierced into windows. The glow is much weakened by thus removing part of the uniform field, though it is thus made much less uniform.

Again: though most dielectrics, when placed in an electric field, expand, the fatty oils contract. Professor J. J. Thomson has recently pointed out that this indicates that another set of strains are superposed upon those assumed in the ordinary explanations of these phenomena, and by which they may be neutralized or overcome.

In experiments with carbon bisulphide it is necessary to take every precaution against fire. For this purpose the cell which contains the liquid should be immersed in a larger cell; so that if, as sometimes happens, the passage of a spark cracks the glass, the liquid may flow into a confined space. This should stand in a tray