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A VIEW OF THE PROGRESS OF DISCOVERY

IN NATURAL PHILOSOPHY, CHEMISTRY, MINERALOGY, GEOLOGY, BOTANY, ZOOLOGY, COMPARATIVE ANATOMY, PRACTICAL MECHANICS, GEOGRAPHY, NAVIGATION, STATISTICS, ANTIQUITIES, AND THE FINE AND USEFUL ARTS.

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M.DCCC.XXVIII.

changes. Much, very much, is to be looked for in the improvement of this thermometer. At some future period I may perhaps resume this subject. In the meantime, I remain your most obedient servant,

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ART. XVIII.—*Description of Pyrolusite, or Prismatic Manganese Ore.* By WILLIAM HAIDINGER, Esq. F. R. S. E.

As Mr Haidinger's valuable paper on the manganese ores was drawn up for this *Journal*, and first published in it, we propose to lay before our readers an account of *Pyrolusite*, or *Prismatic* Manganese Ore, which has been established as a new mineral species since the publication of that article. It is given by Mr Haidinger in his enlarged paper on the ores of Manganese in the *Edinburgh Transactions.*

Prismatic Manganese-Ore.

Pyrolusite.

Grau Braunstein, in part, *Hausmann*, p. 288.

Grey Oxide of Manganese, in part, *Phillips*, p. 243.

Form and cleavage probably belonging to the prismatic system; the cleavage taking place in several directions.

Lustre metallic. Colour iron-black; in very delicate columnar compositions the colour becomes bluish, and the lustre imperfect metallic. Streak black. Opaque.

Rather sectile. Hardness = 2.0 ... 2.5. Sp. gr. = 4.94, a specimen from Elgersburg, and another locality unknown, = 4.819, according to Dr Turner.

Compound Varieties.—Reniform coats. Both columnar and granular composition is often met with, particularly the former; the individuals often radiating from common centres. If the individuals are very delicate, the masses will soil the fingers, and write on paper.

Observations.—The name of *Pyrolusite* alludes to a property, for which this mineral is reckoned the most valuable one among the preceding species. It is derived from πῦρ, *fire*, and λούω, *I wash*, being employed, in consequence of the large quantity of oxygen which it emits at a red heat, to free glass

from the brown and green tints produced by carbonaceous matter and protoxide of iron. The manganese of commerce has been for this reason facetiously called by the French *le savon des verriers*, or *le savon du verre*.

There can be no doubt that pyrolusite should form a species of its own, if we only attend to the marked differences in its hardness, strength, &c. from all the rest. As yet, however, its regular forms are unknown. For some time past I have endeavoured to collect specimens either of crystals or cleavable masses of this substance, but have not succeeded in getting any fit for measurement. Mr Von Leonhard kindly communicated to me some crystals from Tiefe Kohlenbach, near Eiserfeld, in the province of Siegen, possessing the form (Plate IV. Fig. 5,) with uneven surfaces, and yielding a black streak. They form a coating on the reniform shapes of the uncleavable manganese-ore, or *Psilomelane*. Professor Gustavus Rose had obtained a similar specimen from the same source; and by some approximate measurements, but which were far from decisive, we found the inclination of *a* on *a*, over the small face *b*, to be = 86° 20′. The faces of the horizontal prism *d*, did not admit of measurement at all. There exists cleavage parallel to *a* and *b*, but not very perfect. Among the forms of Prismatoidal Manganese-Ore, (or *Manganite*,) there is no prism, parallel to the axis, which even comes near the one here mentioned, though the approximation at the angles be ever so rude; and the crystals may be therefore considered as the actual type of the species of pyrolusite, which is likewise the opinion of Mr Rose. I have observed crystals of the form of manganite, yielding the characteristic brown streak only in the interior portions of the crystals, while that of the exterior strata is black. This may be the result of one of those changes of substance, the form remaining the same, which are recorded in a preceding part of this volume. It may, however, be also one of those curious instances, where two species, of different forms, enter, as it were, into a regular composition with each other, as in felspar and albite, disthene and staurolite, and others; many of which I have observed, and propose to give an account of, on some future occasion.

Pyrolusite was found by M. Gmelin to be a superoxide of manganese. In most mineralogical works, the descriptions given of the only species that they contain, is made up of the forms and colour of manganite; and the hardness, streak, and colour of pyrolusite.

This is at once the most common species, and the most useful one, on account of the large quantity of oxygen which it contains. It is *the* ore of manganese properly so called, in an economical point of view, and has been extensively, though not exclusively, worked for in many countries. The principal mines are the ancient ones of Ilmenau, Friedricksroda, Reinwege, Elgersburg, and other places in Thuringia. Almost every one of the varieties, particularly the compound ones, granular and columnar, are found there, consisting of individuals of all sizes. Here, at Oehrenstock, near Ilmenau, are also found the curious shapes of a parasitic formation, which present even the slightest peculiarities of the crystallizations of calcareous spar as to regular form, but consist of a tissue of crystals of pyrolusite, and engaged in a mass of the same description. From the mines of Ehrensdorf near Maehrisch Triebau in Moravia, since their discovery in 1798, many thousand hundred weights of excellent ore have been annually procured. At Ehrensdorf the pyrolusite occurs in large nodules or masses, I could not learn in what rock. It resembles the Thuringian varieties. In Thuringia it forms veins in porphyry, and is often accompanied with heavy spar. It is remarkable that no pyrolusite should have been found at Ihlefeld in the Hartz; at least there was no trace of it in all those collections which I examined, if we except some thin masses in porphyry, and slender crystals, evidently of the form of manganite, the superficial layers of which yield a black streak, a circumstance which has not yet received a satisfactory explanation.

Pyrolusite is very often the product of decomposition of the brachytypous parachrose-baryte, the carbonate of iron of the latter being converted by the natural agents into the hydrate of the peroxide, while the lime which it occasionally contains is deposited in the shape of calcareous spar or Arragonite, and the manganese is often found covering the surface of decomposed rhombohedrons of the original species, in the shape of

minute crystals. In this manner it occurs in the mines of decomposed sparry iron in beds in gneiss at Hüttenberg in Carinthia, at Schmalkalden in Hessia, and other places. It is likewise found in this manner in the counties of Sayn, Siegen, Salm, and Hamm in Prussia, in the veins of sparry iron traversing clay-slate, which are decomposed in the upper levels, and then contain much brown hematite. The localities are chiefly Friedewald and Knorrenberg in the district of Kirchen, Sayn; Streitberg near the town of Siegen, and Horhausen and Herdorf, Siegen; Berge, Salm; the mine Huth, near Hamm. One of the varieties from Horhausen is particularly remarkable for the delicacy of the fibres, which are disposed in small tufts within the geodes of brown hematite, and which greatly resemble the fibrous varieties of prismatoidal antimony-glance. There are specimens of it in the imperial cabinet in Vienna, and in that of Mr Von Struve in Hamburg. Weyer in the county Wied-Runkel, Hirschberg near Ahrensberg, and Bendorf on the Lower Rhine, are likewise named as the localities of superb specimens of pyrolusite. Krettnich on the Blies, west of the Rhine, is likewise one of its localities. Similar varieties occur in the iron mines of Bayreuch, as at Armnehülfe near Schnarchenreuth, and at Arzberg, in those of Platten, for instance Hilfe Gottes, and of Schwarzenthal in Bohemia, in those of Johanngeorgenstadt, Eubenstock, Langenberg, and others in Saxony, also at Reinerz in the county of Glatz, and at Conradswaldau in Silesia.

The finest crystals of pyrolusite occur at Schimmel and Osterfreude near Johanngeorgenstadt, and at Hirschberg in Westphalia. These are chiefly short thick prisms, terminating on their extremities in numerous fibres. Large flattish crystals of great beauty, terminating in sharp elongated pyramids, with curved faces, occur at Maeskamezö, near Maggar Lapos, south of Kapnik in Transylvania, in geodes of brown hematite, and associated with crystals of quartz. This variety is found in a thick bed, of no great extent, of brown iron-ore in gneiss. A similar one occurs also in a similar position at Gyaláru ear Vayda Hunyad in the same country. Cleavable individuals of considerable size are found near Goslar in the Hartz, in a mountain called Gingelsberg, near the Rammels-

berg. They are imbedded in small veins of quartz and calcareous spar in clay-slate, particularly where they cross each other. Distinct though small crystals are met with in many of the mines in the west of Germany, for instance at Tiefe Kohlenbach in Siegen; still smaller ones were found many years ago in the Palffy iron-mines of Haerethof near Frohstorf in Austria, associated with gray quartz. Very small crystals are found imbedded in and alternating with layers of black wad in Bayreuth. A variety much resembling the German ones, found in similiar repositories, occurs at the mine of Antonio Pereira near Villa Ricca in Brazil, along with brown hematite and psilomelane, in beds in clay-slate, produced according to Dr Pohl's account, from the decomposition of sparry iron.

Small granular pyrolusite occurs at Skidberget in the parish of Lepand in Dalecarlia, Sweden. But the individuals are often much smaller, and appear in the form of a black sooty substance. Such are frequently found in the iron mines of Raschau and other places in Saxony, also at Platten and other similar repositories in the north of Bohemia; sometimes they include small globules and reniform masses of red hematite, or red iron-ochre. The same pulverulent oxide occurs also at Schladming in Stiria, at Felsöbanya in Hungary, and at Pütten in Austria. Dr Pohl observed several localities of it in Brazil, as at St Toao d'el Rey, with brown hematite; on the road between Anta and S^ta^ Rita, in the capitania of Goyaz, and at Banedrinha do Caelho in Minas Geraes. In the latter place it includes numerous reddish nodules, or cylindrical and ramified concretions of indurated clay.

The pyrolusite, as was observed above, is very generally found along with psilomelane. In fact, it is seldom found without it. Another species frequently accompanying it is the brown hematite, and these two species, like the pyrolusite and psilomelane, are often very curiously associated with each other. At Arzberg in Bayreuth crystals of quartz are found covered with a stratum of brown hematite, upon which is deposited another distinct stratum of pyrolusite. In some varieties from Berge in the county of Salm, thin stalactites of

brown hematite are uniformly covered with a stratum of pyrolusite. The same is found also in masses of larger dimensions at Friedewalde in the county of Sayn, and in these the concentric disposition of the brown and black layers of the two species, visible in the cross fracture, gives the whole a particularly elegant appearance. Pyrolusite occurs in England at Upton Pine, near Exeter, in Devonshire, and in Cornwall.

The *manganèse oxidé noir barytifère* of Haüy, from Romanèche, near Macon, does not appear to be a simple homogeneous mineral. When examined with the magnifying lens, it exhibits distinctly a compact and a fibrous substance mixed up with each other. The latter, as far as the minuteness of the particles will allow, shows the properties of pyrolusite, its colour and general aspect, and its hardness; for even on the fracture newly obtained this compound soils the fingers, though on the file the hardness appears as high as 5.0...5.5, that is, superior to apatite. The compact mass is aggregated into reniform shapes, which leaves numerous interstices between them. The colour is nearly the same as that of the uncleavable manganese-ore, a bluish or grayish black passing into dark steel-gray. The streak is black, with a slight tinge of brown; the place on the mineral where it has been examined becomes shining.

N. B.—The analysis of pyrolusite, and of the mineral from Romanèche, will be found in page 361 of this Number.

ART. XIX.—*Comparison of the Hourly Mean Temperature at Christiania and Leith in February and July.* By Professor HANSTEEN. Communicated by the Author.

THE observations contained in the following table are given in degrees of Fahrenheit's scale. Those for Christiania were made in the year 1827; and those at Leith are taken from Dr Brewster's paper published in the *Edinburgh Transactions*, vol. x. part ii. and are the means of four years observations made in 1822, 1823, 1824, and 1825.