I. *Description of* STERNBERGITE, *a New Mineral Species.* By W. HAIDINGER, Esq. F.R.S.E.

(*Read December* 4. 1826.)

THE mines of Joachimsthal in Bohemia, have long been celebrated for their riches. They were successfully worked at an early period, and though their produce has been exceedingly fluctuating, yet the mining district, in which they occur, continues one of the most important of that country. They seem to have been particularly lucrative and important while they belonged to the house of the Counts SCHLICK, and when, in the beginning of the sixteenth century, a larger kind of silver coin was introduced into Germany, it took the name of *Joachimsthaler*, from the place of its coinage, a name which was afterwards changed into *thaler*, *talaro*, and *dollar* *.

These mines are not less remarkable for the variety of the species, and for the beauty of the specimens which they have produced. The ancient collections of minerals at Vienna, the Imperial cabinet, that of VON DER NÜLL, that of VON MORGENBESSER, and others, contain magnificent suites of sulphuret of silver, of red silver, &c. chiefly crystallised. The finest specimens, however, of the red silver, and perhaps the finest that ever were

* These Thalers bear the head and the name of the then reigning Count SCHLICK, and the earliest of them the date of 1517. There are some coins, however, of the same value, with the head of the Emperor MAXIMILIAN I., as far back as 1493. They used to be called *Klüpplinge*, an antiquated German word, which means something ponderous, giving a sound when struck against a hard body.

known in the species, were dug up so late as 1817 and 1822. The National Museum at Prague possesses one of them, consisting of a group of crystals several inches long, without having any rock attached to it, and weighing about twelve marks, or upwards of six pounds Avoirdupois, the value of the silver of which is more than L. 16 Sterling.

It was in the same collection that I first observed a variety of the species of Sternbergite, which it is the object of the present paper to describe. Professor ZIPPE, the keeper of the museum of natural history, directed my attention towards it, as being something he could not bring under any of the species already known; and as it appeared an interesting mineral, I requested his permission to take it with me to Edinburgh, in order to examine its forms, and other properties, a request which was readily granted. Gubernialrath NEUMANN of Prague, late Professor of Chemistry there, was not less liberal in allowing me to take with me the only specimen of it contained in his collection, where it had been designated by Mr ZIPPE as a *pinchbeck-brown problematical fossil, crystallised in six-sided tables.* The crystals in this specimen are very distinct; they are aggregated along with crystals of red silver in drusy cavities in quartz, which protected their edges from being rounded off by rubbing, like the specimen from the collection of the National Museum. Here, too, the Sternbergite is associated with red silver, and with brittle silver, making the whole highly valuable as an ore of silver. It is likely that most of the specimens have long ago been melted down; perhaps some of them may yet be discovered in the Imperial cabinet in Vienna, which contains a great number of specimens from Joachimsthal. Professor ZIPPE informs me, that he has found another specimen of the substance in the Museum at Prague, since I had the pleasure of inspecting it in his company.

The following account contains the characters ascertained in the two specimens.

The forms of Sternbergite belong to the prismatic system. Its fundamental form (Plate I. Fig 8.) is a scalene four-sided pyramid, having edges of 128° 49′, 84° 28′, and 118° 0′. The ratio of its axis and diagonals $a : b : c$, is $= 1 : \sqrt{1.422} : \sqrt{0.484}$.

The specimens contained the following secondary forms, $P-\infty$ (*a*); P (*f*); $P+1$ (*g*) = 122° 17′, 68° 22′, 146° 34′; $(P\breve{r})^3$ (*d*) = 92° 28′, 107° 17′, 131° 17′; $P\breve{r}+1$ (*b*) = 61° 35′; $\frac{5}{4}P\breve{r}+3$ (*c*) = 13° 36′; $P\breve{r}+\infty$ (*i*); $\frac{4}{3}P\bar{r}-3$ (*h*) = 153° 2′.

The combinations observed are,

1. $P-\infty . (P\breve{r})^3$. $P+1 . \frac{5}{4}P\breve{r}+3 . P\breve{r}+\infty$. Fig. 1.
2. $P-\infty . \frac{4}{3}P\bar{r}-3 . P . (Pr)^3 . P\breve{r}+1 . P\breve{r}+\infty$. Fig. 2.

There were traces of planes taking off the edges between *d* and *d′*, which I could measure. The measurement gave for the base of the pyramid *d*, by approximation 81° 12′.

3. $P-\infty . \frac{4}{3}P\bar{r}-3 . P\breve{r}+1 . (P\breve{r})^3 . P+1 . \frac{5}{4}P\breve{r}+3$. Fig. 3.

The edges between *b* and two adjacent faces of *d* are parallel.

4. $P-\infty . P . P\breve{r}+1 . (P\breve{r})^3 . P+1 . \frac{5}{4}P\breve{r}+3$. Fig. 4.

The crystals are very much compressed between *a* and *a*. They assume the aspect of Fig. 5., or of a six-sided table with two angles of $119\frac{1}{2}°$, and four of $120\frac{1}{4}°$. The faces *i* are usually smaller than those marked *m*, which in fact are nothing but a succession of planes, having the inclination of *f* and *g*.

Cleavage is highly perfect, and easily obtained, parallel to the face *a*; in other directions the laminæ may be torn asunder, like

PLATE I.

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STERNBERGITE

Fig. 1.

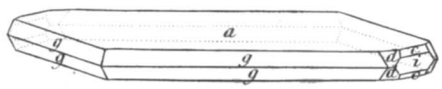


Fig. 2.

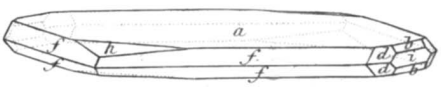


Fig. 3.

Fig. 4.

Fig. 5.

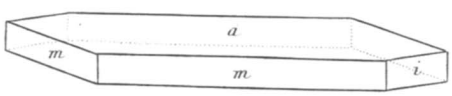


Fig. 6.

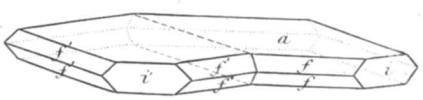


Fig. 7.

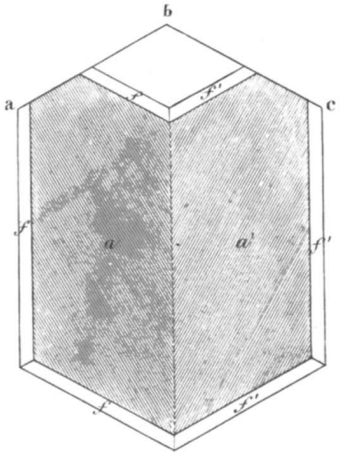
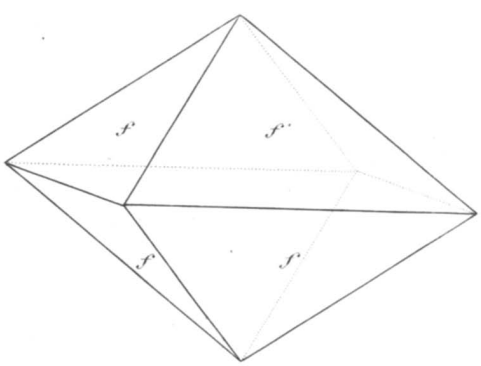


Fig. 8.



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thin sheet-lead, but they do not present any traces of cleavage.

The broad faces *a* are delicately streaked parallel to the edges of combination with *h*, or in the direction of the long diagonals of the rhombic plates. They possess high degrees of lustre. The lustre upon the other faces is not so bright, and they are streaked parallel to their intersections with *a*; the faces *d* less than the rest. A difference of tarnish is likewise often observable. The faces *a* retain their original colour, while all the rest assume a superficial violet-blue tint.

The lustre is metallic; colour dark pinchbeck-brown, nearly resembling the colour of magnetic pyrites, only it inclines more to black.

It affords a black streak. It is very sectile. The laminæ are perfectly flexible, and after having been bent, they may be smoothed down again with the nail, like tin-foil or platina leaf.

The hardness is $= 1.0 \ldots 1.5$, little superior to talc. On account of this low degree of hardness, the mineral leaves traces on paper like black lead, which may be removed by a piece of caoutchouc. The specific gravity of several fragments, amounting to 598 milligrammes, I found $= 4.215$.

Two individuals often join in a regular composition, and produce a twin-crystal; the axis of revolution being perpendicular, the face of composition parallel, to a face of $P + \infty$. Fig. 6.

Fig. 7. shews a projection of such a twin upon a plane parallel to the face *a*. The appearance of the twins is, however, not always very regular. Sometimes they are joined by their sides, in a manner somewhat analogous to the twins of felspar found near Carlsbad in Bohemia.

Generally several crystals are joined in an irregular manner, and implanted together, being fixed to their support with one of their sides, so as to produce rose-like aggregations, and globules

with a drusy surface. Massive varieties usually present the appearance of certain kinds of mica.

The crystals subjected to measurement were taken from Mr NEUMANN'S specimen. Owing to the striæ upon the crystalline faces, parallel to the intersections of these faces with the face *a*, and to the great flexibility of the laminæ, the angles could not be ascertained with the utmost degree of exactness. The dimensions of the forms were calculated from the admeasurement of the angle at the base of P = 118°, and of the angle *a b c* in Fig. 7., shewing the inclination of two faces parallel to its short diagonal in a twin-crystal, the latter of which was found to be equal to 119½°. The remaining measurements which were taken, agreed with the angles obtained by calculation, as well as could be anticipated from the nature of the substance. There is no mineral, however, which could be confounded with it among those of a similar aspect, if we except, perhaps, the flexible sulphuret of silver, first described by Count BOURNON *, a substance which I never had an opportunity of examining. The angles given by Mr BROOKE † being 125° instead of 119½°, and the character of symmetry itself, since he considers a rhomboidal prism, and not a rhombic one, as the type of the forms of the species, sufficiently establish a crystallographic difference between the two substances. The difference among them is strengthened even by the difference in the shade of colour, said to be black in the flexible sulphuret of silver, whereas Sternbergite is decidedly brown, although the characters of flexibility and hardness pretty nearly agree. The remaining properties, particularly the specific gravity, which would be of great importance, have not been ascertained in the flexible sulphuret of silver.

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* *Catalogue*, p. 209.

† *Phillips' Mineralogy*, p. 289.

The flexible sulphuret of silver was found by Dr WOLLASTON to contain silver, sulphur, and some traces of iron. In this respect Sternbergite is very nearly allied to it, only the iron forms a much more considerable part of the composition, as appears from the experiments with the blowpipe.

In the glass-tube it gives off a strong odour of sulphurous acid, loses its lustre, and becomes dark-grey and friable. Alone on charcoal, it burns with a blue flame, and sulphurous odour, and melts into a globule, generally hollow, with a crystalline surface, and covered with metallic silver. The globule acts strongly on the magnetic needle, and before the blowpipe it has all the properties of sulphuret of iron. It communicates to fluxes the ordinary colours produced by iron, red while hot, and yellow on cooling, in the oxidating flame, greenish in the reducing flame. Borax very readily takes away the iron, and leaves a button of metallic silver.

The characters observable in Sternbergite, and its great resemblance to the black tellurium, to the flexible sulphuret of silver, to the rhombohedral molybdena-glance, unequivocally assign it a place in the order Glance of the system of Professor MOHS. Whether it should form a genus of its own, or be comprised within one genus, with one or several of the above-mentioned species, remains doubtful, as long as those species themselves are so imperfectly described. No systematic name, therefore, can at present be applied to it.

In proposing a single name for this mineral, I cannot find a more appropriate one than that of *Sternbergite*, in honour of Count CASPAR STERNBERG; and I know, that, in doing this, I concur with the feelings of my friends NEUMANN and ZIPPE, who so liberally furnished me with the specimens examined. I could not forego the pleasure of thus paying a just tribute to a man in his exalted station in life, equally high in scientific attain-

ments and in patriotic zeal, who has been most forward in establishing the National Museum at Prague, an establishment eminently calculated to be useful to travellers, who thus find means to examine at once the productions of the country; but still more important for the inhabitants, to whom it affords an opportunity of acquiring information in various branches of knowledge, and among whom, in particular, it diffuses a taste for the natural sciences.