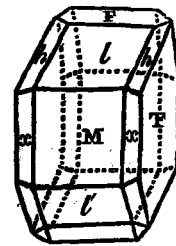


VI. *Description of Hopeite, a New Mineral, from Altenberg near Aix-la-Chapelle.* By DAVID BREWSTER, LL.D. F.R.S. Lond. & Sec. R. S. Edin.

(Read June 17. 1823.)

ABOUT the end of the year 1821, when I was engaged in the examination of the Family of the Zeolites, Mr HEULAND was so obliging as to send me a variety of Stilbite from a Calamine mine at Altenberg near Aix-la-Chapelle. Upon comparing its optical structure with that of the Stilbites, it was manifest that it had no connection with this class of crystals, and that it constituted a new mineral species. Upon mentioning this result to Mr BROOKE, this acute mineralogist was of opinion that it was the Silicate of Zinc. Mr HEULAND had been led to regard this substance as a Stilbite, in consequence of having received it as such from Major PETERSEN; but, particularly, from finding in the collection of Mr C. H. TURNER, a single crystal of the same substance attached to Carbonate of Zinc, and bearing the annexed figure, with an inscription in the handwriting of the Abbé HAUY, stating it to be a new variety of Stilbite, to which he gave the name of *Stilbite Duovigesimale* *.



* Attached to this figure is the following memorandum in HAUY's handwriting: *La position de cette figure est en rapport avec celle du noyau dans les planches du Traité.*

Having determined, by many physical experiments, that it was not Silicate of Zinc, I was anxious to obtain as much as would be sufficient for the purposes of analysis. Mr HEULAND exerted himself with his usual zeal for science, to obtain additional specimens; but Major PETERSEN, to whom he applied for this purpose, informed him, that there was reason to believe that no specimens had been found excepting those which Mr HEULAND had already received.

As those specimens were insufficient for chemical analysis, it became necessary to examine the mineral by means of other methods of observation, by which its existence as a New mineral species was completely established.

Description of the Mineral.

Physical Character.—The specific gravity of a perfect crystal was 2.76, and that of a larger specimen, with some black metallic particles adhering to it, was 2.91. It is scratched by calcareous-spar, and its hardness is consequently below 3.0 of MOHS'S scale. It is neither phosphorescent nor electric by heat.

The mineral must therefore be placed beside *Anhydrite* and *Cryolite*, in the 1st order, or that of *Haloide* of the 2d class of MOHS'S System.

Optical Character.—It has two axes of double refraction, the principal one of which is perpendicular to the axis of the prism, and also to the planes of most eminent cleavage. The action of this principal axis is *negative*, like that of calcareous spar; and the inclination of the resultant axes of double refraction, measured with as much accuracy as the specimen would permit, is about 48°. The index of the ordinary refraction, through one of the summit planes, and one of the faces of the prism, was nearly 1.601.

*Crystallographic Structure**.—The perfect crystal of this mineral is shewn in the annexed figure. The angles taken by the reflecting goniometer were,

$$\begin{aligned} a \text{ upon } a &= 78^\circ 36' \\ b \text{ upon } b &= 81^\circ 34' \end{aligned}$$

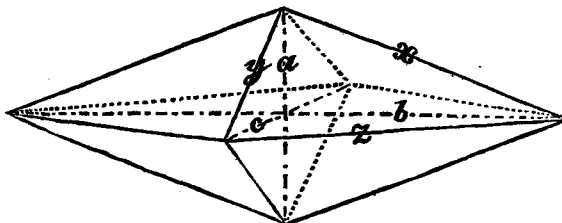
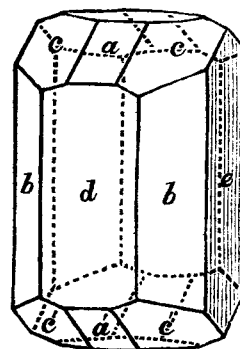
If we suppose the faces c, c, c, c enlarged till all the others disappear, the crystal will assume the form of a scalene four-sided pyramid (as shewn in the annexed figure) whose edges have the following values :

$$\begin{aligned} x &= 107^\circ 2' \\ y &= 139^\circ 41' \\ z &= 86^\circ 49' \end{aligned}$$

Hence the ratio of the axes will be

$$a : b : c = 1 : \sqrt{4.443} : \sqrt{1.493}.$$

As the form resulting from the enlargement of the faces c, c, c, c is the fundamental one according to MoHs's System, and designated by P, we obtain, by taking the angle of the horizontal prism at the apex of the pyramid, $a = Pr = 101^\circ 24'$, and $b = (Pr + \infty)^3 = 81^\circ 34'$, the angle of the vertical prism corresponding to the obtuse angle of the base of P. The mineral has two cleavages perpendicular to each other; the one parallel to d , which is easily obtained, and distinguished by its pearly lustre; and the other parallel to e , which is less distinct.



* I have been indebted for this crystallographic description of the mineral to Mr Haidinger.

Hence the specific character of the mineral, in relation to its form, will be

Prismatic, $P = 139^{\circ} 41'$; $107^{\circ} 2'$; $86^{\circ} 49'$

$Pr^{-} = 101^{\circ} 24'$ ($Pr^{\circ} + \infty$)³ = $81^{\circ} 34'$

Cleavage, $Pr^{-} + \infty$ perfect, eminent. $Pr^{\circ} + \infty$ imperfect.

Chemical Character.—It is entirely soluble without any residue, and without swelling or effervescence, in the muriatic and the nitric acids; but more rapidly in the former than in the latter. It is acted upon very slowly by sulphuric acid, whether strong or diluted; but is finally dissolved by it.

When exposed to the blowpipe * alone in the matras, it gives off a great quantity of water, without any trace of carbonic acid. It becomes first milk-white, and melts afterwards very readily into a clear colourless globule, which, in melting, gives the flame a greenish tint. With salt of phosphorus it melts in all proportions very readily into a clear colourless glass, no skeleton of silica being observed. If the mineral is in great proportion to the salt of phosphorus, it turns opaque in cooling, but no fumes of zinc are condensed on the charcoal †. With borax it fuses into a clear colourless glass, which does not turn opaque in cooling. It gives with soda a scoria, which, when hot, is of a yellowish colour. The oxide of zinc is condensed round it in great quantity upon the charcoal, and nearest to the scoria is a reddish-yellow tint, which does not vanish in cooling, and indicates the presence of Cadmium. When melted with soda, and moistened, it exhales no hepatic odour. A solution of cobalt communicates a fine bluish tint to the melted fossil.

* This examination of the mineral with the blowpipe was made for me by M. NORDENSKJOLD, an able chemist from Abo, during his visit to Edinburgh.

† With all the siliceo-carbonates of zinc, when melted with salt of phosphorus, in such a quantity that the glass turns opaque in cooling, a very perceptible ring of oxide of zinc is condensed on the charcoal.

This mineral seems, therefore, to be a compound of some of the stronger acids, such as phosphoric or boracic acid with zinc, mixed with an earthy base and a little cadmium.

Having thus established the existence of this rare and interesting substance, as a new mineral species, I avail myself of the privilege of giving it the name of HOPEITE, in compliment to our learned Vice-President Dr HOPE, who, to many general claims of having his name associated with mineralogical science, adds one more particularly memorable in the annals of this Society, namely, the discovery and examination of the New Earth of Strontites.