ANNALS OF PHILOSOPHY;

OR, MAGAZINE OF

CHEMISTRY, MINERALOGY, MECHANICS,

NATURAL HISTORY,

AGRICULTURE, AND THE ARTS.

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VOL. XIV.

JULY TO DECEMBER, 1819.

London:

Printed by C. Baldwin, New Bridge-street;

FOR BALDWIN, CRADOCK, AND JOY,

47, PATERNOSTER-ROW.

1819.

ARTICLE VI.

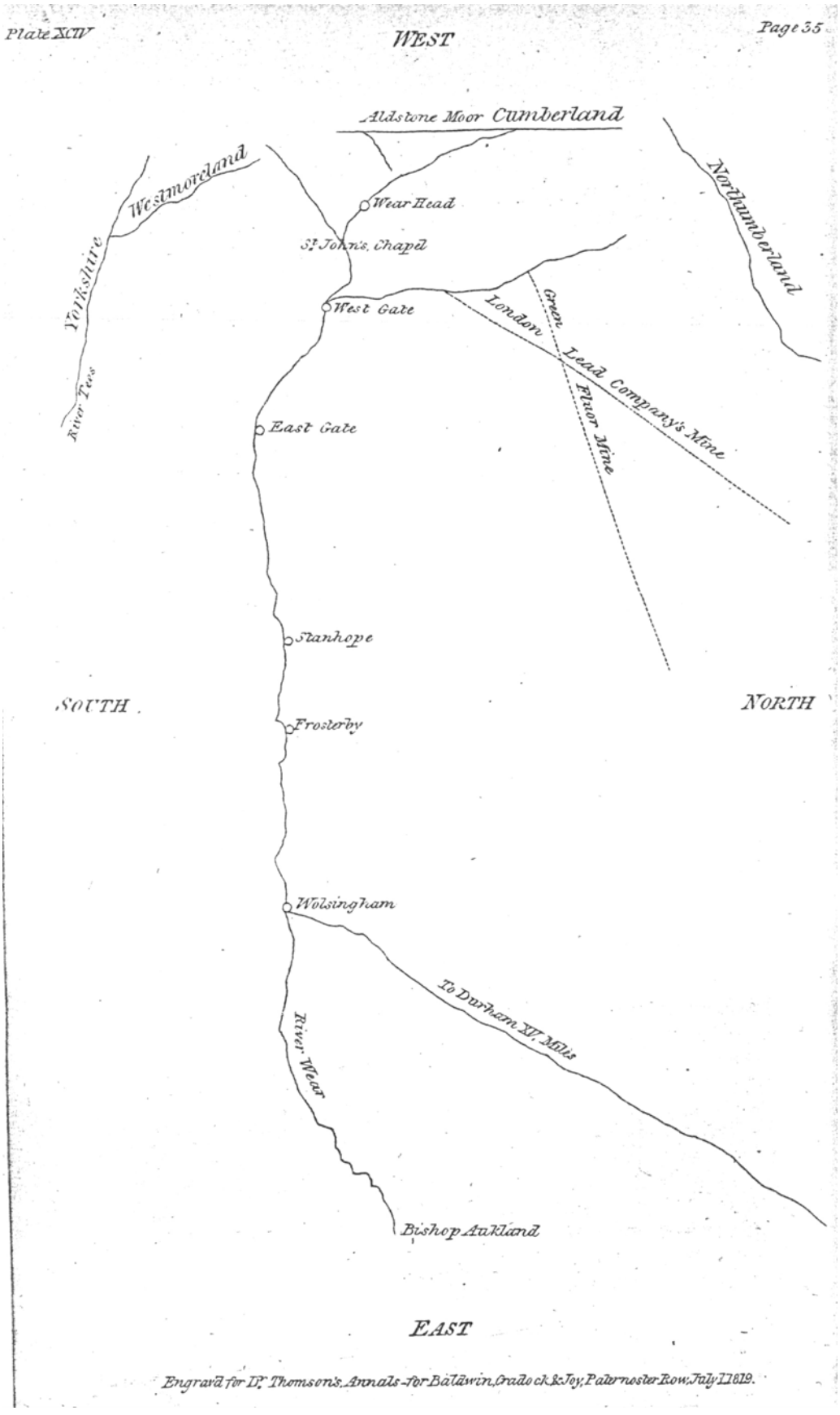
Account of a newly discovered Variety of Green Fluor Spar, of very uncommon Beauty, and with remarkable Properties of Colour and Phosphorescence. By Edward Daniel Clarke, LL.D. Professor of Mineralogy in the University of Cambridge, Member of the Royal Academy of Sciences at Berlin, &c. in a Letter to the Editor of the *Annals of Philosophy.*

(To Dr. Thomson.)

SIR,

I AVAIL myself of the first moment of leisure granted at the close of my annual course of lectures in this University, to fulfil my promise of sending to you an account of the *Durham Fluor;* of which I have received specimens surpassing in magnificence and in the beauty of their crystallizations, any mineral substance I have ever before seen. I am indebted to the *Rev. G. Peacock,* M.A. Fellow of *Trinity College, Cambridge,* not only for making me acquainted with all the circumstances of the discovery, but also for having had the goodness to procure for me the specimens to which I allude. The same gentleman, from notes written upon the spot, has also supplied me with materials for making the present communication. The name of the mine, whence this singular variety of the *fluate of lime* has been obtained, is *Middlehope Shields;* it is the property of *Colonel Beaumont;* and it is situate about $1\frac{1}{2}$ miles to the *north* of the village of *West Gate,* in *Weardale,* in the county of *Durham;* about six miles to the *west* of the town of *Stanhope.* This mine has been worked with great success for a considerable time; but it was only during three months of the autumn of 1818 that this beautiful mineral was obtained in any considerable abundance. The excavations have since that time been partially interrupted, in consequence of the *vein* crossing another *vein,* which is the property of a company of miners, who are known in that county by the name of the *London Lead Company.* They are now employed in driving a level through the *intersecting vein,* and in sinking a shaft, for the more effectual ventilation of the mine.

The *rider* of the *vein* (a provincial term designating the substance wherewith the *vein* is principally filled) is a dark buff-coloured *magnesian limestone;* sometimes of a very friable texture; which is accompanied by masses of *fluor spar;* sometimes cubical, and sometimes amorphous; of different hues, *green, purple,* and *white;* all of which are not unfrequently exhibited in the same mass; the *white* occupying the centre, the *green* appearing towards the external surface, and the *purple* tinging the intermediate parts; but it is only in the *flats* (i. e. large openings or cavities) of what is called the *eleven fathom,*



Engravd for Dr. Thomson's Annals - for Baldwin, Cradock & Joy, Paternoster Row, July 1 1819.

or *great limestone*, that the finely crystallized and transparent *fluor-spar* is found. These cavities are invested with the substance of the *vein*, and the *fluor* is there found completely covering the sides; they are generally of inconsiderable extent, but sufficiently capacious to admit a man standing upright within the cavity. The *fluor* is there sometimes accompanied by cubical and dodecahedral crystals of the *sulphuret of lead* (*galena*), and sometimes by a little *quartz;* but, I believe, by no other substance.

The *vein-stuff* of the *intersecting vein* is a coarse kind of *purple fluor* and *calcareous spar;* but although the workings for this *vein* have been carried within 50 yards of the main deposits of the *green fluor* in the other mine, and in the same *limestone* (the richest of all the *metalliferous limestones* of this country) no similar substance has been observed. The only metallic substance ever found in these *veins* is the common *sulphuret of lead*, called *lead glance*, or *galena;* no *copper* has been discovered in the mines of *Weardale*.

Plate XCIV is a sketch of the situation of the *green fluor mine*, showing also the manner of its intersection by the *London Lead Company's Mine*.

Having thus stated the *geographical position* and *habitat* of this *fluor*, I will now proceed to detail its mineralogical characters.

The finer crystals are perfectly transparent. Their colour by transmitted light is an intense *emerald green;* but by reflected light, the colour is a deep *sapphire blue;* and this remarkable character causes such a play of the *green* and the *blue* light to a person regarding these crystals, that at first sight he is unable to say which causes the more beautiful appearance, and to which of these hues their real colour ought to be referred. Some of the crystals are of such magnitude that their *major diameter* measures two inches, but it rarely exceeds one inch. I have said *major diameter*, because many of them are *parallelopipedons*, with or without bevelled edges; their surface most beautifully exhibiting the lines of decrement, formed by the laminæ of superposition upon the primary nucleus. These parallelopipedons are universally accompanied with twin crystals, which sometimes exhibit a solid angle, salient, above the face of the original crystal; and sometimes one nearly as large as the crystal in which it is imbedded; the superior edge of the imbedded crystal being always inclined at the same angle (somewhat less than 30°) to the face of the other; and its lines intersect the plane of the original crystal in lines which make when produced nearly equal angles with the edges or sides containing that angle towards which the prominent edge of the twin crystal declines. The twin crystal always displaces the parts of the edge which it intercepts, so that they are never in the same straight line, and rarely in the same plane; and this character in the crystallization

of this remarkable variety of the *fluate of lime* adds greatly to the peculiar play of light and beauty of the specimens.

Until these crystals were sent to *Cambridge* I had never seen crystallized *fluate of lime* in the form of *parallelopipeds*, neither does Mr. *Jameson*, in his valuable work on mineralogy, mention any such form; * their major diameter is to their minor diameter as three to two. The other forms exhibited by the same *fluor* is the *cubic*, with or without bevelled edges. The miners are assured of the neighbourhood of cavities lined with crystals by the increasing hardness of the substance of the vein.

This kind of *fluor* is also remarkably distinguished from every other variety by its *phosphorescence;* which is such that it becomes visible in a dark room simply by placing a large crystal in water heated nearly to the boiling temperature. But to exhibit its *phosphorescence* in perfection, it is necessary to reduce the mineral to powder in a mortar, and then scatter its particles upon the surface of an iron plate, heated nearly to redness. It then *phosphoresces* with a *violet-coloured* light. Mineralogists who have added to the nomenclature of the varieties of *fluor* by the introduction of the word *chlorophane* (as applied to the substance which emits a *green* light when heated), may, if they choose, call the *Durham fluor* by the name of *cyanophane*. Its other characters are those which are common to every variety of the crystallized *fluate of lime*. Its *specific gravity*, estimated in distilled water at a temperature of 65° of *Fahrenheit*, equals 3·14. Before the blow-pipe, when supported on *platinum* foil, it decrepitates, beautifully phosphoresces, loses its colour, becomes highly limpid, and is ultimately reduced to an opaque white enamel. Upon *charcoal*, its fusion is more readily accomplished; the results being the same. When first brought from the mine, it is extremely fragile; but (notwithstanding its natural brittleness and inferior hardness) when properly desiccated, owing to the intensity of its fine *green* colour, it is probable that lapidaries will cut and sell its transparent crystals as spurious imitations of *euclase* or *emerald*. I remain, Sir, faithfully yours,

Cambridge, May 10, 1819. EDWARD DANIEL CLARKE.

P. S. The crystals sometimes form two *parallelopipeds*, having a common solid angle; in this case the twin crystal is found at the re-entrant angle, and its superior edge declines towards the common angle; although not always directly. Some rough crystals, which are not highly transparent, are marked with small cavities, in the form of the inferior pyramid of a regular *octahedron*.

* See *Jameson's* Mineralogy, vol. ii. p. 222. Edinb. 1816. Among the remarkable instances of crystallization exhibited by the *fluate of lime*, there is one preserved in the *Woodwardian Collection* at *Cambridge*, exhibiting an *octahedron* formed by the juxta-position of *cubes*. I possess crystals of *Siberian fluor* with 26 sides.