example, we find the column $a=56°$ again to contain values of co-hypotenuses approximately equal to the given values; and therefore have :—

			Co-hyp.	A.
$a = 56°$	1.	$b=54°$	19° 11′	61° 23′ = Sun's hour-angle.
		$b=56$	18 13	60 47 = Sun's azimuth (N. towards W.).
	2.	$b=55$	18 42	61 5 = Sun's hour-angle.
		$b=57$	17 44	60 30 = Sun's azimuth (N. towards W.).

which give

Greenwich apparent time (in arc)		85° 30′	85° 30′
Sun's hour-angle	(1)	61 23	(2) 61 5
Diff. = Longitude		24 7 W.	24 25 W.
Sun's altitude (observed)		18° 35′	18° 35′
Sun's altitudes (auxiliary)	(1)	18 13	(2) 17 44
Diff. =		+ 22	+ 51
Sun's declination from N. A.		19° 10′	19° 10
Sun's declinations (auxiliary)	(1)	19 11	(2) 18 42
Diff. =		− 1	+ 28

This example is represented in the third diagram annexed.

January 26, 1871.

General Sir EDWARD SABINE, K.C.B., President, in the Chair.

The following communications were read :—

I. "On the Mineral Constituents of Meteorites." By Nevil Story Maskelyne, M.A., F.R.S., Professor of Mineralogy, Oxford, and Keeper of the Mineral Department, British Museum. Received November 3, 1870.

(Abstract.)

In the memoir now offered to the Society the author gives the results of his investigation of the meteorites of Breitenbach and of Shalka. A preliminary notice of two of the minerals occurring in the former, which is of the Siderolite class, was read before the Society in March, 1869 (Proc. R. S. vol. xvii. p. 370).

After entering upon the probable history of the Breitenbach Siderolite, and endeavouring to identify it with certain other Siderolites that have been found, or have been recorded as found, in the region extending from

Meissen to Breitenbach, the author proceeds to describe the individual minerals which constitute the mass of the Siderolite.

These are: first, a bronzite with the formula $(Mg_{\frac{4}{5}} Fe_{\frac{1}{5}}) Si O_3$, orthorhombic in its crystalline form. The crystallography of the mineral was investigated by Dr. Viktor von Lang at the British Museum, and has been published in Pogg. Annalen, vol. cxxxix. p. 315. Secondly, a mineral composed of silica, having the specific gravity of quartz after fusion, and crystallized in the orthorhombic system.

Since his preliminary notice was published, the crystallography of this substance has been carefully studied by the author, and the details are given in the memoir.

The elements of the crystal are

$$a : b : c : \quad = \quad 1{\cdot}7437 : 1 : 3{\cdot}3120.$$

The angles are :—

$$100 : 101 = 27^\circ 46'$$
$$100 : 110 = 60^\circ 10'$$
$$110 : 101 = 63^\circ 19'$$

The optic axes lie in a plane parallel to the plane 0 1 0 ; the first mean line being the normal to the plane 1 0 0.

They are widely separated, presenting in air an apparent angle of about 107°.

There can thus be no question that this mineral is orthorhombic ; and if the tridymite of Vom Rath is, as that distinguished crystallographer asserts it to be, hexagonal in its symmetry, the mineral in the Breitenbach meteorite will be a trimorphic form of silica. Such a result obtained from the investigation of a meteorite is one of no small interest.

The nickeliferous iron, the chief constituent of the Siderolite, proved on analysis to be an alloy of the formula Fe_{10} Ni, and contained a trace of copper. In addition to the two siliceous minerals, the iron encloses occasional crystals of chromite in well-developed octahedra, an iron sulphide, probably troilite, and a small amount of Schreibersite.

The author then proceeds to detail the results obtained from the analysis of the Shalka meteorite. In 1860, Haidinger, in his paper on this meteorite (Sitzber. d. k. Akad. Wiss. Wien, vol. xli. p. 251), held the entire stone to be made up of a mineral, which he termed Piddingtonite, and which, according to Von Hawr's analysis, might be a compound of bisilicate and trisilicate of iron and magnesium. This latter acid silicate, however, which has long haunted the mineralogy of meteorites, no more forms a constituent of this meteorite than does the other acid silicate Shepardite, as Dr. Laurence Smith has shown, enter into the composition of the Bishopville meteorite.

The view held by Haidinger, that this meteorite, though apparently made up of two silicates, a grey and a mottled variety, was nevertheless

composed of a single mineral species varying in colour, is proved by the analytical results given in this memoir. It has been found to be a bronzite of the formula ($Mg_{\frac{2}{3}}$ $Fe_{\frac{1}{3}}$) Si O_3, and in association with it there occurs some chromite in distinct crystals.

Rammelsberg has also recently published the results of an examination of this meteorite (Pogg. Annalen, vol. cxlii. p. 275), and finds in it a bronzite associated with 12 per cent. of olivine. It is probable that the meteorite varies in its composition in different parts, and that Prof. Rammelsberg analyzed that portion where an olivinous ingredient was in appreciable preponderance.

The mottled kind was treated with hydrogen chloride in the cold, and subsequently with potash, and again with hydrogen sulphate and potash, but in each case it was noticed that the action of the acid was confined to that of a solvent. A little meteoric iron was dissolved, but no appreciable amount of olivine was found in the portion examined in the Laboratory at the British Museum.

II. "On the Organization of the *Calamites* of the Coal-measures." By W. C. Williamson, F.R.S., Professor of Natural History in Owens College, Manchester. Received November 11, 1870.

(Abstract.)

Ever since M. Brongniart established his genus *Calamodendron*, there has prevailed widely a belief that two classes of objects had previously been included under the name of *Calamites*—the one a thin-walled Equisetaceous plant, the *Calamites* proper, and the other a hard-wooded Gymnospermous Exogen, known as *Calamodendron*. This distinction the author rejects as having no existence, the thick- and thin-walled examples having precisely the same typical structure. This consists of a central pith, surrounded by a woody zone, containing a circle of woody wedges, and enclosed within a bark of cellular parenchyma.

The Pith has been solid in the first instance, but very soon became fistular, except at the nodes, at each one of which a thin diaphragm of parenchyma extended right across the medullary cavity. Eventually the pith underwent a complete absorption, thus enlarging the fistular interior until it became coextensive with the inner surface of the ligneous zone.

The Woody Zone.—This commenced in very young states by the formation of a circle of canals stretching longitudinally from one node to the adjoining one. Externally to, but in contact with, these canals a few barred or reticulated vessels were found; successive additions to these were made in lines radiating from within outwards; hence each wedge consisted of a series of radiating laminæ, separated by medullary rays, having a peculiar mural structure. At their commencement these wedges were separated by wide cellular areas, running continuously from node to node;