

primitive conception Nzambi was a celestial being or force, a Nature spirit like Zeus or Indra, who ruled the sky or controlled the tempest.

Among the Isubu, *e.g.*, a cognate form signifies "heaven," and such is the case also at Cape Lopez. Winwood Read's Mpongwe raised their hands to heaven when they appealed to Njambi to save them from the hurricane; and his Ashira slave pointed in the same direction when questioned on the subject of the deity. The Manyombe regard Nyambi as heaven, and the Basundi call him the "spirit on high"; and according to Kólbe the *otyí* Herero term Karunga Ondyambi = "heavenly bestower," "who gives and withholdeth rain."

The word bears little evidence of change, and is perhaps of comparatively modern origin.

It appears, therefore, that while the Eastern Bantus, who worship Unkulunkulu, indulge in *ahmen-cult*, the western adherents of Nzambi are more or less Nature worshippers. In this respect they appear to approach the Negroes of the Gold, Slave, and Oil Coasts.

A third and smaller, but very distinct group apply the term Morimo or Molimo to their conception of the deity. I refer to the Barolong, the Basuto, the Batlapin, and other clans, which are generally classed together as the Bechuana tribes. "Morimo" is the singular form of a word the plural of which, barimo, balimo, bedimo, bazimo, is found almost universally among the Bantu tribes to denote the spirits of the dead.

The application of the singular form, Morimo, Molimo, in a specialized and restricted sense to the Supreme Being is confined almost entirely to the Bechuana tribes, and has perhaps been only recently used in this monotheistic sense; although John Pory mentions (in his edition of Leo Africanus, A. D. 1600) Muzimo as the one god of the Monomotápa tribes, and Gravenbroek (A. D. 1695) says of the Kaffirs of Zimboe, "Divinitatem alicum Messimo dictam in lucis summo cultu venerantur."

One other tribe, the Lomwe, who live east of Lake Kilwa among the Namuli Hills, use the word Murimu for God; in this respect differing from their Makoa foes, who worship Mlugu; but this rather leads one to conclude that this tribe is an outlying Bechuana clan. Mr. O'Neill has pointed out the peculiarities of language and architecture which distinguish the Lomwe from their neighbours.

W. HAMMOND TOOKE.

Cape Town.

#### Aurora Borealis.

HAVE any of your readers observed the display of aurora borealis to-night (Wednesday)? I regret that insufficient knowledge of astronomical technicalities does not permit me to describe more exactly the size and position of the display. It appeared between 11 and 11.30 p.m., as white streaks or bands of light, varying in width and intensity, now shooting up a considerable distance, now dying away. It was especially brilliant just to the right of the constellation of Cassiopeia, and this was its furthest eastward limit; it extended more or less across the whole northern sky, and at times was bright enough to dim the stars it covered. The rays appeared to shoot up high into the sky above Cassiopeia. It was a very beautiful phenomenon, and was possibly more distinct in more northern latitudes.

WARINGTON STOCK.

S. Paul's Vicarage, Derby, May 18.

#### THE NEW ELEMENT, MASRIUM.

FURTHER details concerning the new element, whose probable existence was announced in a paper communicated to the Chemical Society at their meeting on April 21, are contributed to the number of the *Chemiker Zeitung* dated May 11. The mineral containing the new substance was discovered in 1890 by Johnson Pacha in the bed of an old river in Upper Egypt long since dried up, but of the former existence of which there are records dating back some 6000 years. Indeed, the name by which it is known in the neighbourhood is "Bahr-bela-Mä," or "river without water." Here and there in the track of the old watercourse are small lakes whose water is of considerable repute for its medicinal value. Specimens of the mineral were sent by Johnson Pacha to the Khedivial Laboratory at Cairo, where it was examined by Messrs. H. Droop Richmond and Hussein Off, the authors of the

paper laid before the Chemical Society. The mineral is found to be a fibrous variety of a mixed aluminium and iron alum containing ferrous, manganous, and cobaltous oxides. In addition, however, to these ordinary constituents, a small quantity of the oxide of another element would appear to be present, having properties entirely different from those of any yet known. This element the discoverers have termed *masrium*, from the Arabic name for Egypt, and the mineral has accordingly received the name of *masrite*. The symbol adopted for masrium is Ms.

The composition of masrite may be expressed by the formula  $(Al, Fe)_2O_3 \cdot (Ms, Mn, Co, Fe)O \cdot 4SO_3 \cdot 20H_2O$ . The amount of masrium present is very small, averaging only about 0.2 per cent., but by working upon fifteen kilograms of the mineral a considerable quantity of the element in the form of various salts has been accumulated. A typical analysis of masrite published in the Proceedings of the Chemical Society is as follows:—

Water	...	...	...	...	40.35
Insoluble matter	...	...	...	...	2.61
Alumina	...	...	...	...	10.62
Ferric oxide	...	...	...	...	1.63
Masrium oxide	...	...	...	...	0.20
Manganous oxide	...	...	...	...	2.56
Cobaltous oxide	...	...	...	...	1.02
Ferrous oxide	...	...	...	...	4.23
Sulphuric oxide	...	...	...	...	36.78

100.00

Suspicious that the mineral contained some hitherto unknown constituent were first aroused by the fact that when it was dissolved in water, and sulphuretted hydrogen was passed slowly through the solution in presence of acetic acid, instead of the expected black precipitate of sulphide of cobalt a white insoluble substance was first precipitated. This white precipitate continued to form until the new substance in the solution was all used up, when black sulphide of cobalt began to be thrown down. By decantation before the formation of the latter, and subsequent washing with dilute hydrochloric acid, the white substance was isolated in a state of tolerable purity. It was found to dissolve in boiling nitrohydrochloric acid. The solution in *aqua regia* was evaporated in order to remove the excess of acid, and ammonium hydrate added, when a voluminous white precipitate of the hydrate of the new metal was thrown down. The hydrate was washed by decantation, and subsequently dissolved in the minimum excess of sulphuric acid. The solution of the sulphate of the new metal was next evaporated to syrupy consistency, water was added until complete solution was just effected, and the solution mixed with an equal bulk of alcohol. The effect of this addition of alcohol was to cause immediate precipitation of crystals of the sulphate of the new metal, a further crop of which was also obtained upon evaporation. By repeated recrystallization most of the small quantity of iron present was removed. In order to eliminate the last traces of admixed ferrous sulphate, the crystals were redissolved in water, and excess of sodium hydrate added. As the hydrate of the new metal is soluble in excess of soda, the hydrated oxide of iron was readily removed by filtration. Upon the addition of ammonium chloride the white hydrate was precipitated in a gelatinous form; the hydrate was redissolved in hydrochloric acid, and again precipitated and washed. The almost perfectly pure hydrate so obtained was then finally converted to chloride by solution in hydrochloric acid.

In order to obtain data as to the atomic weight of masrium the following determinations were made. A known quantity of the chloride solution was precipitated by ammonia, and the hydrate thus obtained was ignited, and the remaining oxide weighed. A second portion was precipitated by a solution of microcosmic salt in presence of ammonia, and the phosphate obtained ignited

and weighed. The chlorine contained in a third portion was determined by means of silver nitrate in the ordinary manner. From the numbers so obtained the equivalent of masrium was calculated. A pure preparation of masrium oxalate was also obtained by precipitating the neutral solution of the chloride with ammonium oxalate, masrium oxalate resembling the oxalate of calcium in being insoluble under such conditions. The precipitated oxalate was washed, dried, and ignited in a combustion tube whose forward end was filled with copper oxide, when the salt was decomposed with elimination of its water of crystallization, which was absorbed and weighed in the usual manner. The residual oxide was also weighed, and the oxalic acid, in another quantity of the salt, was determined by means of a standard solution of potassium permanganate. The crystals of the oxalate were thus found to contain 52.70 per cent. of masrium oxide, 15.85 per cent. of oxalic anhydride, and 31.27 per cent. of water.

From the whole of the analytical data yet obtained, assuming, as the reactions of the salts would indicate, that masrium is a divalent element, the atomic weight would appear to be 228. An element of atomic weight about 225 is, indeed, required to occupy a vacant place in the periodic system in the beryllium-calcium group, and masrium appears likely to be the element in question.

Masrium has only yet been observed to combine with oxygen in one proportion, to form the oxide  $MsO$ . Masrium oxide is a white substance much resembling the oxides of the lime group. The chloride,  $MsCl_2$ , is obtained upon evaporation of a solution of the oxide or hydrate in hydrochloric acid. The nitrate,  $Ms(NO_3)_2$ , crystallizes from 50 per cent. alcohol, and the crystals contain water, the amount of which has not been determined. The sulphate,  $MsSO_4 \cdot 8H_2O$ , is a white salt which crystallizes badly from water, but which separates in well-developed crystals from 50 per cent. alcohol. It combines with sulphate of alumina to form an alum, also with potassium sulphate to form a double sulphate. The oxalate above referred to,  $MsC_2O_4 \cdot 8H_2O$ , is a white salt, soluble in acetic acid, and also in excess of masrium chloride.

The most important reactions of the salts of masrium, as far as they have yet been studied, are the following. Sulphuretted hydrogen produces no precipitate in presence of hydrochloric acid, but yields a white precipitate in presence of acetic acid. Ammonia precipitates the white hydrate of masrium from solutions of the salts; the hydrate is insoluble in excess of ammonia. Ammonium sulphide and carbonate produce white gelatinous precipitates, likewise insoluble in excess of the reagents. Ammonium phosphate yields a white precipitate of phosphate. Caustic alkalies precipitate the hydrate, but the precipitate is readily soluble in excess of the alkaline hydrate. Potassium ferrocyanide produces a white precipitate which is soluble in excess of masrium chloride, but not in dilute hydrochloric acid. Potassium ferricyanide yields no precipitate. Potassium chromate precipitates yellow chromate of masrium, which is soluble in a further quantity of masrium chloride. Potassium tartrate yields a white tartrate precipitate which dissolves in excess of the reagent, but the solution is not reprecipitated by the addition of ammonia.

Metallic masrium has not yet been obtained. Attempts to isolate it by heating the chloride with sodium under a layer of common salt, and by the electrolysis of a solution of the cyanide proved unsuccessful. The chloride, moreover, is not sufficiently volatile to permit of its vapour density being determined.

From the above interesting reactions, however, it will be evident that masrium possesses a strong individuality, although on the whole behaving somewhat like the metals of the alkaline earths and those of the zinc group. Further work will doubtless afford more definite information concerning its nature and properties. A. E. TUTTON.

### ON A NEW METHOD OF VIEWING NEWTON'S RINGS.

IF we observe the reflection of a rectangular strip of any opaque substance (A) about  $\frac{1}{4}$  inch wide in a piece of plate glass of about the same thickness, it appears thus:—

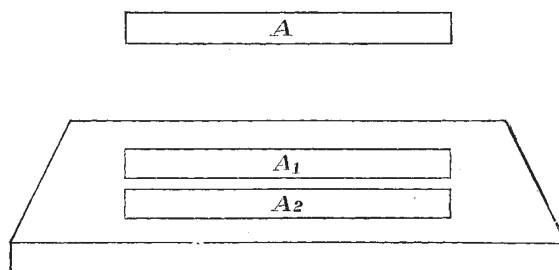


FIG. 1.

$A_1$   $A_2$  being the reflections caused by the upper and lower surfaces of the glass respectively.

If a second glass plate, of the same thickness, be added beneath the first, there is a third reflection ( $A_3$ ) added below  $A_2$  thus, drawing only the reflections for simplicity's sake:—

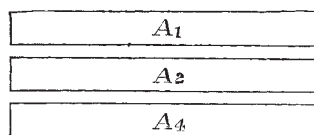


FIG. 2.

Now if the upper slab of glass be *gradually* raised above the lower, the opaque strip remaining in position, the reflection  $A_2$  (Fig. 2), which generally exhibits traces of colour when plate glass is used, splits up into two ( $A_2$   $A_3$ ), thus:—

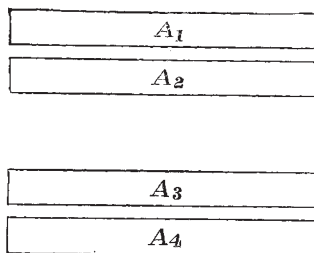


FIG. 3.

Thus it is proved that  $A_2$  (Fig. 2) is the resultant of the reflections of the strip by the lower surface of the upper plate, and the upper surface of the lower plate ( $A_2$  and  $A_3$ , Fig. 3, respectively).

In saying that  $A_1$  is the reflection of A caused by the top surface, we mean that light which would fall on that surface and be reflected to the eye is prevented from so doing by the presence of A; and so with respect to the other reflections: thus, if any one of the reflections is not perfectly dark, we can assert that the light seen in it is at any rate not due to reflection (for the first time) at the corresponding surface; e.g.  $A_4$  (Fig. 2) appears anything but dark, and we may assert that the light seen in it is not reflected from the bottom surface of the lower plate (at all events for the first time).

Now by means of two similar rectangular strips A and B, placed with their long sides parallel to the surface of the glass, B being further from the observer and from the top plate, it is very easy to arrange them so that  $B_4$ —the reflection of B in the lower surface of the lower plate—