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, $MsSO_4 . 8H_2O$, 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, $MsC_2O_4 . 8H_2O$, 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 vapor 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

SOME NOTES ON THE VICTORIA NYANZA.

THE following observations on the Victoria Nyanza have been sent to the Royal Geographical Society by Mr. Ernest Gedge, who has spent a considerable time on the lake and in its neighborhood: "The appearance of the lake suggests the formation at some remote period of a vast trough or valley; the western coasts give striking indications of this, especially in Karagwé, where the cliffs come sheer down with deep water close in shore. Inland, behind these, can be noticed a succession of lines of fault, running parallel to one another, forming a series of terraces or steps, which finally culminate in the high grassy plateaus stretching away westwards. There is nothing either on this side or on its southern shores suggesting volcanic action; the geological structure consisting for the most part of gneissic formations and schists, with enormous boulders of porphyritic granite, the latter constituting the most prominent feature on its southern coasts, as well as forming a remarkable island in the lake, known as the "Makoko" or white rocks. On the northern shore outcrops of honey-combed iron stone and lava blocks are to be seen, and this change in the geological structure is accompanied by a corresponding change in the vegetation, from the sterile arid wastes so characteristic of the southern coasts, to rich tropical growth. The main visible sources of the water supply for this great reservoir are the Kagera, Nzoia, and Ngure Darash rivers; and these, though continually discharging a certain amount of water into the lake, are of no great size, except during the rainy season, appearing totally inadequate to maintain the equilibrium of the lake, when we consider the volume of water constantly being carried off by the Nile, as well as the loss that must be caused by evaporation from so large an area. This would lead one to suggest the existence of springs to make up the deficiency. The lake is of great depth in places, and the water fresh and clear, though flat and insipid to drink. Fish are plentiful, being mostly caught with a rod and line, the nearest approach to netting being a screen of grass mats, used as a sieve by the people in Lower Kavirondo, and the basket traps used by the Ba-Sesse. Amongst others is a Silurus, which has evidently been mistaken for the porpoise, owing to its shiny black body, and its habit of coming to the surface and indulging in porpoise-like gambols in calm weather. Hippopotami are not very plentiful, as they chiefly confine themselves to the coasts and rivers. Those that are found in the open water are, however, extremely vicious and much feared by the Ba-Sesse canoe-men, who, strange to say, are unable to swim. This is no doubt largely due to the fact of the lake being infested with alligators, rendering it dangerous for any one to enter the water. Cyclonic storms of great violence occur at certain seasons, and are most dangerous to small craft. These storms in August usually occur at daybreak, coming from the south-west, with much thunder and lightning. Following the coast-line for a time, they would suddenly sweep across the lake in a north-east direction, raising a tremendous sea, and on several occasions we were in imminent danger of being swamped. During this month I noticed that about 3 A.M. the wind was invariably off-shore, varying from the north-north-east to north and north-west. This would drop about 11 A.M., to be followed by a calm lasting to about 2 P.M., when the wind would again come up and blow strongly, in gradually increasing force, from the south-west to south, dying away again at night about 8 P.M. During November the prevailing wind was from the north-east. One of the most remarkable phenomena I witnessed was the apparent tide observable at irregular intervals, the waves coming in and overflowing the beach in exactly the same way as the tide on the sea-shore, the rise and fall lasting from half an hour to an hour or more. This

has occurred during a comparative calm on some occasions, whilst on others, though a strong gale has been setting inshore, I have not noticed any difference in the lake's level, so it would seem that this occurrence is not altogether attributable to the wind backing up the water. Another curious feature is the periodical rise and fall which, according to the natives, takes place every twenty-five years, and which is shown by the water-marks on the shores. At the time of my visit the lake was between eight and nine feet below high-water mark, and the people told me that certain lands then under cultivation would again be flooded in due season, and that the peninsula on which my camp was pitched would again become an island." Similar changes of level have been noticed, both in Lake Tanganyika and Lake Nyassa, and it is very desirable in the interests of geography as well as the development of the continent that continuous observations should be made, in order to discover what is the real character of these changes.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

The Relative Hardness of Cut Diamonds.

WILL you allow me to add the result of my experience to the testimony of Mr. Kunz that the hardness of diamonds is not perceptibly reduced by cutting and polishing? In the earlier years of my experience in ruling upon glass I was accustomed to select a gem with a smoothly glazed surface, and, splitting the stone in a cleavage plane inclined at a rather sharp angle to the natural face selected, this split face was then ground and polished.

In this way I was able to obtain at several points short knife-edges, which gave superb results in ruling. It was soon found, however, that after ruling several thousand rather heavy lines the diamond was liable to lose its sharp cutting-edge, and this experience became so frequent that I was compelled to resort to the method now employed, that of grinding and polishing both faces to a knife-edge. I have one ruling diamond prepared in this way, which has been in constant use for four years, and its capacity for good work has not yet been reduced in the slightest degree.

A diamond prepared by Mr. Max Levy of Philadelphia has given even better results, and so far it shows no evidence of wear.

WM. A. ROGERS.

Colby University, Waterville, Me., June 6.

The Notion of Four-Fold Space.

IN a paper by Professor T. Proctor Hall, entitled "The Possibility of a Realization of Four-fold Space," a digest of which appeared in *Science* for May 13, the author, after making certain allusions, remarks "there is therefore nothing inherently absurd or improbable in the supposition that any of us may attain to a concept of four-fold space 'as clear as the designer and the draughtsman have of three-fold space.'" The word "therefore" refers to what immediately precedes, and here we read: "Perhaps most of us can remember times in the course of our education when new conceptions of quantity entered into our conscious life, conceptions which correspond in a general way with those of length, area, and volume, in that they enable us to find at once such relationships as are most frequently required for practical purposes by a general, synthetic, instinctive method . . . . The sense of propriety, the sense of honor, and numberless other 'inbred' or 'instinctive' concepts are examples of this mental tendency." There is no such connection, however, between this and the succeeding paragraph, quoted above, as to justify the assertion made with reference to the conception of four-fold space, and the utmost that can be properly inferred is, that, in the words of the following sentence, "such a conception would be of great value to all classes of scientists"—assuming always that it is a possible conception, that is, possible to us with our present mental constitution. I do not propose to enter into this question, but it seems to me that Professor Hall's argument is open to criticism in other respects.

For instance, he does not sufficiently meet the objection based on the fact that "our conception of three-fold space is derived directly from sensations in three-fold space, and that the conception of four-fold space cannot be derived in a similar way, nor yet from sensations in three-fold space." It may be admitted that from the sense of sight we get only a two-dimensional sensation, and that the existence of a third dimension is solely a matter of inference. Yet, this inference has a physiological basis, and is justified by universal experience in past and present generations, so that we know that it expresses the truth. The conditions relative to the conception of four-fold space are quite different. There are apparently no grounds on which a fourth dimension can be inferred, and so far from such an inference being in accordance with experience, this entirely opposes it. To render the truth of such an inference probable, it would have to be shown that the existence of a third dimension is inferred solely from that of two-dimensional space, and yet even then, as the conception of a three-fold dimension would be supported only by that of a two-fold dimension, it would hardly form a sufficient basis for the existence of a fourth. In fact this would ultimately, like the second, be based on the conception of two-fold space.

The conditions of the question are such that the hypothesis of a fourth dimension cannot be made as real to us as that of the existence of a third dimension; any more than Professor Hall's plane being, that is, a being who has no conception of volume, could understand a geometric solid. It is one thing for a person who knows all about three-dimensional space to explain how an imaginary plane being might be able to form such a conception, but a totally different thing for the plane being to perform the operation. The conduct of animals shows that they act according to the same view of space that we do, and yet none of them could form any idea of the relations of the faces of a cube, although propably some very clever dogs can be taught the number of its faces. How much less could any plane being form an idea of those relations. In supposititious cases of this kind, it is always assumed that the imaginary being would be limited only in his ideas of space, but surely this notion is erroneous. A being thus deficient would, by virtue of the law of organic correlation, be equally deficient in other respects, and would rank in an inferior grade of organic development. Such being the case, it is impossible to imagine a plane being acting as a three-dimensional philosopher, and constructing a theory of the evolution of circles, true or false.

It seems to me that those who endeavor to imagine the possibility of four-dimensional space look in the wrong direction. It is very questionable whether, as we are at present constituted, we can possibly form any such idea of space, but there is another view which is worthy of consideration. We know space only in relation to formed matter, and if such matter were to disappear, space would, as so related at least, disappear also. According to present conditions such a state of things would seem to be highly improbable, but we can nevertheless, from what we know of the past, conceive its possibility. If we trace the evolu ional stages of organic nature back through the higher animals from man we reach the worm, from which, according to Hæckel, they have all sprung. Going still further back we come to the primitive moneral ancestor of all organic existence on the earth. But we can retrace the path of evolution beyond the primordial slime, until we arrive at its beginning when, says Professor Crookes, "primitive matter was formed by the act of a generative force, throwing off at intervals of time atoms endowed with varying quantities of primitive forms of energy." Before this there existed, we are told, the formless fluid, from knots and voids in which the chemical elements were formed.

But what has had a beginning can come to an end, and we can imagine therefore all organic and inorganic forms being reduced to the primitive elements, and these elements themselves resolved into the formless fluid from which they were derived. Professor