at Rio Janeiro were coincident with polar lights in the northern hemisphere. At all events I believe that the attention of men of science is not sufficiently directed to this coincidence of northern and southern polar lights, at least not as much as it deserves in respect to the theory of polar lights at all; and I should be very glad if, in consequence of this notice, authorities would discuss this highly interesting phenomenon in NATURE.

I shall later, according to my diary, accurately describe the display of this splendid aurora australis, and mention the influence which it perhaps or probably had on the abnormal meteorological phenomena, which I observed during the succeeding days.

ADOLF BERNHARD MEYER

Manado (Celebes), January 9

P.S.—I beg to contribute to the records in NATURE of earthquakes, &c., over the whole globe :—

November 20, 1870, afternoon, an at first vertical, then horizontal, rather heavy shock at Manado.

January 28, 1871, 4h., a slight, very local shock in a part of Manado.

Manado (Celebes), March 5

The Eclipse Photographs

As an ardent and not inexperienced votary of photography, I am fully alive to the value of photographic evidence, and regard with enthusiasm each fresh victory which photography achieves, yet I cannot myself look with any very great degree of satisfaction upon the photographs of the late solar eclipse either as examples of photography or as evidence contributing to our knowledge of solar physics. In saying this I make no reflection whatever upon the ability or efforts of those by whom the pictures were produced. On the contrary, I am aware that when these pictures were taken the first grand requisite of photographic success—a clear view of the object to be represented—was scarcely to be obtained. Briefly; from a technical point of view, the pictures are of but indifferent definition, and the identity of the coronal rifts in the Cadiz and Syracuse photographs not satisfactorily conclusive, in addition to which in the picture by the American observers, the so-called coronal light extends a long way over the lunar disc, which seems to me to preclude the possibility of its being other than a phenomenon of terrestrial meteorology. A few weeks ago, when the sky appeared almost cloudless, I observed a beautiful lunar halo, very much resembling the so-called corona, which I apprehend no one would attribute to anything but atmospheric moisture. Why, then, in the instance of a sky burdened with innumerable clouds, should we attribute the halo of light surrounding the solar disc to other than atmospheric causes, even though there should be something which might be mistaken for a coincidence in two distinct photographs of one or other of the rifts which were characteristic of that halo?

Manchester, May 26　　　　D. WINSTANLEY

Eozöon Canadense

PERMIT me to state that the presumed "important bearing" on the so-called "Eozöon Canadense," of the principal fact noticed in the communication entitled Palæozoic Crinoids, which appears in NATURE of May 25th, is discussed in a paper by Dr. Rowney and myself, contained in the forthcoming number of the Proceedings of the Royal Irish Academy, now on the eve of publication. The paper referred to is a reply to the articles by Drs. Dawson and Sterry Hunt, which appeared in the last (second) number of the Proceedings.

Glenoir, near Galway, May 29　　　　WILLIAM KING

WITHOUT going into the vexed question as to whether Eozöon Canadense is or is not of organic origin, I may be permitted to express some surprise at the new, and, to say the least of it, startling theory broached by Mr. Perry in last week's NATURE, of the vaporous formation of a certain limestone. The only facts brought forward in support of this view are, its occupying pockets, its foliations, and its conformation with irregularities of surface in the pre-existing rock. All these could be as well accounted for on the supposition of deposition from aqueous solution, without doing violence to the fact that carbonate of lime is not volatile at any temperature.　　　　E. T. H.

THE INEQUALITIES OF THE MOON'S MOTION

THE following is an abstract of the method of computing the inequalities in the motion of the moon which are due to the action of the planets, proposed by Prof. Newcomb in the paper presented to the Academy of Sciences of Paris on April 3.

When we consider the movements of the sun, moon, and earth, under the sole influence of their mutual attraction, the position of each of these three bodies in space will be given in terms of eighteen arbitrary constants, and of the time. The problems of the relative movement of the moon around the earth, and of the movement of the centre of gravity of the earth and moon around the sun, have been solved with a degree of approximation sufficient at least for the purposes of astronomy. Thus, we have the co-ordinates of any two bodies relatively to a third, or relatively to the centre of gravity of the system, in terms of twelve elements and of the time. It only remains to add the expressions for the uniform movement of the centre of gravity in a straight line, to have the general expressions for the co-ordinates of each body.

We have then only to consider the action of the planet to vary the eighteen elements according to the method of Lagrange, to have the movements of each of the three bodies under the influence of the attraction of the planet. Unfortunately, the expressions thus obtained are at first extremely complicated. We have to compute a coefficient corresponding to each combination of the elements taken two and two. The entire number of the coefficients is,

therefore, $\dfrac{17 \times 18}{2} = 153$. And each coefficient contains eighteen products of the partial differential coefficients of the co-ordinates of the three bodies relatively to the elements. These latter differential coefficients are so complex that the formation of any one product would be a considerable labour. The direct formation of the co-efficients required is therefore impossible. The paper in question is principally devoted to an explanation of the simplifications which may be introduced into the problem.

It is first shown that all the coefficients formed by combining any one of the six elements which fix the position of the centre of gravity with any of the twelve elements of the relative motion, vanish identically, while the combinations of those six elements with each other give only the principle of the conservation of the centre of gravity. This leaves only sixty-six combinations. It is then shown that, if the elements are divided into two classes, the first class being the mean longitudes, the longitudes of the perigees, and the longitudes of the nodes of the sun and moon, and the second the mean distances, eccentricities, and inclinations, the coefficients vanish whenever the two elements combined belong to the same class. The number of coefficients is thus reduced to thirty-six, and they are simply the differential coefficients of six functions of the elements of the second class. These functions are formed an extremely simple process when we have the rectangular co-ordinates expressed as functions of the elements and the time.

The remainder of the process is simply one of the development of a very complex perturbative function, and is of no especial interest.

THE HELIOTYPE PROCESS

AT one of the recent *soirées* of the Royal Society given by General Sabine at Burlington House, Messrs. Edwards and Kidd exhibited at work the new heliotype process, whereby photographic pictures can be very rapidly copied in by the aid of the printing-press. The process is very inexpensive, and so rapid that if one of the pages of NATURE were sent to the works, it could be