

ARCHDEACON PRATT ON M. DELAUNAY'S EXPERIMENTS ON THE INTERNAL FLUIDITY OF THE EARTH.

SIR,—In the GEOLOGICAL MAGAZINE for September, you gave us a paper by Archdeacon Pratt, combating M. Delaunay's objection to Mr. Hopkins's method of reasoning from the precession of the equinoxes to the internal fluidity of the earth. There are some errors of inadvertence in that paper, which I do not point out, as no one is better able than the writer himself to discover them. We may agree, however, thus far with Archdeacon Pratt,—M. Delaunay's objection is not as conclusive as he himself seems to think. The principle of that object is indubitably true. M. Champagneur has proved it so by direct experiment; and it is (as appears to me) self-evident, *à priori*. If the tendency of the hard crust of the earth to shift on the internal fluid mass be sufficiently small, *relatively* to the degree of viscosity of the fluid, the crust must carry that viscous interior along with it in the changes of direction of its rotation. But is the relation such, in the case in question, as to make M. Delaunay's principle applicable? This question, I suppose, never can be answered. If the crust were even 1,000 miles thick, and if the fluidity of the interior were perfect, the pole of the crust would be slipping over the fluid interior at the rate of one inch in about twenty-five minutes (if the crust be as thin as some geologists have supposed, the rate of slipping would have to be nearly a third greater); and this shifting movement would occur all round the great circle parallel, at each moment, to that containing the celestial poles of the equator and the equinoctial points (taking the retrogressive movement of the earth's axis in its mean direction). Now, what amount of viscosity would be necessary to overcome the enormous moment of inertia, round its axis, of a globular mass 6,000 miles in diameter (or much more, as some would think), and start it afresh at every instant, in a new direction, at the above rate (or, greater), from a state of relative rest? And is the actual viscosity sufficient? Certain considerations would weigh for, and others against, M. Delaunay's opinion; but on which side of the scales the preponderance lies we cannot tell, from our ignorance of some of the conditions of the problem.

M. H. CLOSE.

NEWTOWN PARK, BLACKROCK, DUBLIN,

October 4, 1870.

THE LECTURE ON VOLCANOS.

SIR,—Upon my return to London I received the GEOLOGICAL MAGAZINE (for September), containing, page 440, a letter from Mr. Poulett Scrope, commenting upon my lecture on volcanos, which appeared in the July number; the following remarks in reply were, however, too late for last month's Magazine, as you informed me that the October number was then already in the press.

I have always looked upon Mr. Scrope's works on volcanos as being by far the best on the subject which we possess, whether they be considered from a philosophical or a descriptive point of view (and in the latter sense the author's experiences in the field render