purely sporting articles, we may confidently state that, in spite of a certain number of errors and shortcomings, like those mentioned above, the "Encyclopædia of Sport" supplies in the main exactly the kind of information on natural history subjects the sportsman is likely to require. R. L.

THE PROPAGATION OF EARTHQUAKE WAVES.[1]

"DOS PALABRAS," or "two little words," has a much more friendly sound than the abrupt word "preface." "Preface," standing by itself, is suggestive of a snappy military command, something like "halt" or "quick march," whilst "Dos Palabras" is the kindly invitation of a writer to the public, asking them to read his work. In the "Dos Palabras" we are told that the ordinary person only thinks about earthquake prediction and that which is utilitarian, whilst the principal object of the seismologist is to extend human knowledge about the interior of our planet.

This memoir, which was presented to the American International Congress of Science held in Buenos Ayres in 1910, although dealing especially with the propagation of earthquake waves, gives in an introduction of forty-two pages a rapid review of many problems with which modern seismology deals. From the velocity with which earthquake waves are propagated through our world, we have already learned something new about the constitution of its interior. The conclusions arrived at by these velocities as bearing upon the rigidity of our world, together with investigations made by Lord Kelvin and others on the same subject, are briefly mentioned. References are made to the investigations of Prof. Ricco which indicate a relationship between the value of gravity and the seismic and volcanic phenomena of a district. But the more general relationship between the abnormal movements of magnetic needles, earthquake disturbances, and the value of g in localities characterised by the presence of volcanic rocks, has been overlooked.

Sunspots, unusual movements in bodies of water, the times at which geysers erupt, barisal guns, microphonic disturbances, abnormal earth currents and other phenomena, are pointed to as subjects which should arrest the attention.

Unexpected side issues in the daily work of a seismologist—as, for example, the effect of tidal load, the transpiration of vegetation, which is always wrinkling the face of our globe, the emotional effects produced by earthquakes upon man, their effects on the behaviour of certain animals, and the exploitation of many other byways—have been overlooked. These, however, have nothing to do with Dr. Negri's chief subject, which occupies the next seventy-three pages of his publication. This entirely deals with the velocity with which earthquake motion is propagated. He starts out with the assumption that in a teleseismic record we frequently see many phases, P_1, P_2, &c., and that there are as many corresponding velocities which are distinguished as V_1, V_2, &c. He derived this idea from the publications of Dr. Ōmori. With this assumption V_1 has a velocity of about 12·5 kilometres per second, V_8 would be about 2 kilometres per second, and V_{20}, if there is such a value, would be less than 0·5 per second, *i.e.* if all these phases of earthquake motion started from an origin at the same time. We fear that many seismologists will not readily accept this hypothesis, and to explain the rising and falling in amplitude and changes in period exhibited in teleseismic writings will require some other assumption. P_1, P_2, P_3, and their corresponding velocities, are explicable by the existence of three types of waves, but the lengthening of the caudal appendage of a megaseism as it travels into and sometimes beyond its quadrantal region is a phenomenon about which many explanations have been offered, but the one to be accepted does not appear so far to have been decided on.

In his conclusion to this section, Dr. Negri says that the relation of $\frac{V_1}{V_2}$, $\frac{V_1}{V_{3\frac{1}{2}}}$ (*sic*), $\frac{V_1}{V_6}$, &c., represents a series in increasing arithmetical progression. All that the majority of seismologists at present recognise is that in round numbers V_1 equals 12 kilometres, V_2 equals about 6 kilometres, and V_3 about 3 kilometres per second, and we fear that they are not yet in a position to accept values which might correspond to P_{20} or P_{40}. In an appendix the author shows that his acquaintance with modern seismology is rather one-sided. He gives a bibliography of 176 books and papers, nearly all of which are in the Italian or Spanish language. Japan is credited with thirteen papers, England with five, whilst two or three are in French. The first exhibition of seismological instruments, we are told, was represented by a section in the International Exhibition of 1900 in Paris. The exceedingly popular exhibition of earthquake instruments held in Tokio twenty years earlier is not even mentioned. The author concludes his memoir by two queries: Why do not all the students of seismology in South America combine? Why does not the national authority do something to bring about this union, which would be for the good and progress of science in general? It is my prophecy, says Dr. Negri, that these desires will very soon become realised. JOHN MILNE.

[1] "Velocidad de Propagición de las Ondas Sismicas." By Dr. G. Negri. Traducción de Alfredo Torcelli. Pp. 143. (La Plata: Observatoria Astronomico, 1911.)

PROF. GEORGE CHRYSTAL.

THE lamented death of Prof. George Chrystal, of Edinburgh University, removes an outstanding personality in academic and educational circles. Aberdeen and Cambridge claim him as a distinguished alumnus. In 1875 he was bracketed with Prof. Burnside as Second Wrangler and First Smith's Prizeman. Even then he showed his leaning towards applied rather than pure mathematics; for Prof. Tait, who was one of the examiners, used to say that Chrystal excelled all the others in the way in which he solved physical problems.

After two years as professor of mathematics in St. Andrews University, Prof. Chrystal in November, 1879, began his life's work as occupier of the like chair in Edinburgh. The nature of his work compelled him to give his best mind to the teaching of mathematics and the training of the mathematical teacher. In those days every student of arts had to graduate in the same seven subjects. There were no options. Even the comparatively mild problem-solving mathematics of the old school, of which Kelland had been a shining light, had made many a man of classical and philosophical attainments tremble as he entered the examination hall and sat down to tackle the algebra or the Euclidean geometry paper. But the first year of Chrystal's professoriate struck terror to their hearts. Keen, rapid, logical, full of suggestions as to higher fields of mathematical delights, Chrystal transformed the whole atmosphere of the class-room. Eagerly the mathematical minds followed his fascinating lead; despondingly and despairingly those not so gifted fell hopelessly behind, faintly perceiving, if at all, the finely knit sequence