we are staying in Canea, leaving home early in the morning. He presented the bird to one of the children in the house, and it was put in a cage and hung at the window, where it seemed likely to be contented, losing its fright after a few hours. Late in the afternoon an old bird was noticed fluttering about the cage apparently trying to get at the little one, and the young bird on its appearance became frantic to get out to the old one. It was evidently the mother of the young one, as the recognition was too cordial to have been owing to the interest of a strange bird; and when my daughter opened the cage, as she did after a little, they both flew off rapidly in the direction of Zukaleriá. It is impossible that the old bird should have followed the gardener, as we should have seen it earlier in the day.

Canea, Crete, June 27. W. J. STILLMAN.

Seismology in Italy.

I HAVE only lately seen Dr. Johnston-Lavis's article in NATURE (vol. xxxix. p. 329), on the present state of seismology in Italy. I have read it with much interest, and with the greatest satisfaction, because it deals with the most recent works due to the new and serious impulse given to the study by the Government during the last five years. I thank the author for having noticed one of my writings, "Sulla sistemazione delle osservazioni geodinamiche regolari." There is little—hardly anything—absolutely new in this work, because in writing it I desired only to sum up the deliberations of the Royal Geodynamical Commission, to which I had the honour to belong. I also brought together in it all that was really serious and positive in other works, with the intention of dispelling the confusion which unhappily prevailed when this scientific branch was in the power of dilettantism, which had the prerogative of the long-winded style, the charlatanism, and the seismic magic, of which the author of the article justly complains. In a word, I wished to set forth a proper programme, with the ideas which the Commission conceived, and which continue to form the principle of the deliberations of the directing Council for Meteorology and Geodynamics, in which the Commission has been merged On this serious and well-determined principle the service is continued in the island of Ischia as elsewhere.

In accordance with the just ideas of your correspondent, I must nevertheless make one remark on the subjects which relate more especially to the studies carried on in the island of Ischia; namely, that there is really something of novelty in some of the other writings of mine included in the volume that contains the work commented on.

One of these writings consisted of the theoretical relation I presented in response to the demand of the Royal Geodynamical Commission in the sittings of June 1886. The approval of this work by the Commission contributed to the adoption, for the study of the form of seismic movements, of the mechanical principle of three components adapted to a steady point. This principle was studied, and put into execution, by the mechanicians Brassart of the Central Office of Meteorology and Geodynamics; and while it has tended to simplify completely the methods used in the observation of earthquakes, and to bring to an end the innumerable imperfections of former times, it is not even yet well understood by men of the old school.

Three of my works relate to the variations observed in the temperature of the thermal springs at Porto d'Ischia. A rigorously mathematical analysis has revealed a hydrostatical law in relation to changes in the level of the sea. Later studies which I undertook upon the diagrams of a registering thermometer, and which the Director, Prof. Tacchini, presented to the Accademia dei Lincei on October 7, 1888, proved the influence exerted by the horary state of the tide, while previously some isolated observations had made way for hypotheses of another nature.

Another of my works expounds a new principle for rendering astatic—or nearly so—in a horizontal direction, the steady point in seismographs, and gives a mathematical demonstration of it. Upon this principle, which I conceived in 1886, is apparently based the construction of an instrument by Prof. Ames (see the *American Journal of Science*, February 1888, p. 106); but the fact that he has made the suspension with four threads, instead of three, suffices to prove that he has not formed a precise idea of my original principle, and that he has much less considered it necessary to procure for himself the mathematical proof of it. Some months before the publication of Mr. Ames's work I took care to bring out prominently, on p. 266 of the volume referred to, the error to which one would expose oneself in this way.

Of the ten writings by me in the volume, these are the works to which I attach some importance; and I take the liberty of directing to them the attention of your readers, in the hope of making known the beginnings of the success which is to be achieved through the action of the Italian Government. For the rest, the history of this enterprise is set forth in the abstract of the sittings which forms the introduction of the volume.

GIULIO GRABLOVITZ,
Director of the Osservatorio Geodinamico
di Casamicciola.

Saxicava Borings and Valves in a Boulder Clay Erratic.

WHEN examining a few weeks ago the boulders in the workings of the New Ferry Brick and Tile Company, Cheshire, with Mr. Harnett Harrisson, we discovered a boulder having superficially a scoriaceous appearance, which on examination proved to be of limestone, and perforated with Saxicava and other borings. After careful washing several of the burrows were found to be occupied by the shells of the animal that had made them, both valves complete. The washings that came out of the burrows after careful reduction by pouring off the clay water I found to consist of well-rounded grains of quartz intermixed with a few microscopic drift pebbles and small shell fragments. Some of them were very much rounded and waterworn. Several broken spines of Echinus also occurred.

The stone was taken from a heap picked out of the boulder clay previous to passing it through the machine. There is no doubt as to its origin, as one side is strongly planed and striated in the direction of the longer axis. The extreme measurements are $6\frac{1}{2}'' \times 4\frac{1}{2}'' \times 2\frac{3}{4}''$; weight, 3 lbs. 10 oz. The Saxicava burrows are placed so as to give the idea that the stone had lain on the glaciated side when most of them were made, as they get nearly horizontal towards the glaciated bottom. The termination of one burrow, however, occurs on the planed face. There are also other worm-like burrows which occur on the glaciated face, and one of them has been cut longitudinally for a length of an inch by the plane of glaciation.

It is now about eighteen years since I commenced a study of the glacial deposits of the north-west of England, but have never found a similar example with the burrows occupied, although the low-level boulder clay in which it occurs is almost universally more or less full of shell fragments. The bearing of the discovery on the origin of the low-level boulder clay is obvious.

The history of the stone appears to have been this. It had its origin in the Carboniferous limestone of the north; it has then been rounded into a boulder, has lain upon a shore, and become the seat of operations of molluscan and other burrowers. Afterwards it has been frozen into coast-ice, glaciated by attrition on a pebbly or rocky shore through tidal movement, has been again released from the ice grip, spent another time on the shore resting on its glaciated face, during which period it became perforated with the Saxicava burrows now occupied by the remains of the animal. While still on the shore, fragments of shells of other Mollusca got washed into the occupied and unoccupied perforations, and finally it was again frozen into coast-ice, floated off, and dropped into the bed of the low-level boulder clay sea, where it remained undisturbed until the pick of the brickmaker disinterred it. The boulder clay in which it occurs is plastic, and contains comparatively few stones, and there are no sand seams to be seen in the present face, though I believe they occur at a greater depth below the bottom of the pit.

The special interest of this example lies in the proof it affords of the marine origin of the low-level boulder clay of Cheshire and Lancashire. Some geologists contend that this clay is the bottom of the Irish Sea ploughed up by land ice, but the necessities of a theory that requires such an operation to have taken place in the past when there is an obvious and simple explanation at hand does not commend it to my mind. It is not even proved that such a ploughing up is possible; no examples are adduced where such a phenomenon is going on; it does not account for the structure of the beds of low-level boulder clay; and speaking from eighteen years of close investigation, there is no necessity in the nature of the case for resorting to such an extreme hypothesis.

The age of land ice preceded that of the low-level marine