

Of the subject-titles in this volume, the largest is Labor, under which, in 150 pages, a very complete library is catalogued of some 1500 books and 10,000 articles, well arranged under many headings. Under Kidney, the student will probably be content to find references to about 400 books and 2500 articles.

It is easy to show the vast extent of the work attempted and executed; that there are absolutely no inaccuracies in the result is hardly possible, difficult as it may be to find them. The references in this volume certainly stand many tests, and most of those who have made frequent use of the previous six volumes in practical work have acquired a confidence in their accuracy which is very rare in dealing with such an immense mass of varied languages and types and abbreviations so thickly interspersed with figures.

Both the Library and the Index-Catalogue are brought fully up to date. The volume is presented to the Surgeon-General of the U.S. Army in a letter of preface dated June 1, 1886, and it contains the books and periodical references practically complete up to the end of 1885. If any comparatively modern subject is examined, *e.g.* kairine, we find nothing said or known of it before 1882, and yet 120 references, taking us over all the published literature of the subject, down to the end of 1885.

This seventh volume includes the entries from Insignarès to Leghorn. It is likely to be the middle volume of this encyclopædic work; and certainly if Mr. Billings is able to publish his last and concluding volume in 1892 no one who has any interest in the progress of knowledge will hesitate to congratulate him and his colleagues even more heartily, if it be possible, than at present.

A. T. MYERS

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Sounding a Crater, Fusion-Points, Pyrometers, and Seismometers

THE account given by Prof. John Milne of his ascents and attempts at sounding the crater of Asama Yama is exceedingly interesting, and I can thoroughly sympathise with him in the difficulties he encountered, having been exposed to them on many occasions, and not always coming off so victoriously. He and Mr. Dun, however, have been forestalled by the late Robert Mallet. When I came to Naples some eight years since, I found in one of the store-rooms of the geological department of the Naples University a quantity of apparatus which I soon made out the use of.

It appears that Mallet had this apparatus made especially for the purpose of measuring the temperature and studying the gases and the lava itself within the mouth of the volcano Vesuvius. On his arrival in Naples the state of the mountain did not permit of the experiments being carried on, and the whole of the materials were left in charge of Prof. Guiscardi, who could give no other information than the above. By carefully studying the apparatus I was soon able to understand Mallet's intentions and the mechanism he intended to employ. There are two drums of small wire cable—one for traversing the crater to hold a pulley over the "bocca," and the other for letting down the weight and crucible. The crucible is of cast iron with a bayonet-jointed cover, and is, no doubt, intended to contain substances of

different fusibilities. The apparatus is, however, an improvement on that used in Japan, in that the sounding-rope is insulated and there is an electrical bell and battery so arranged that when the crucible enters the lava it makes an earth-contact and rings the bell. There are other pieces of apparatus that I could not get at, but I think they are intended for chemical researches.

From these facts it will be seen that Prof. J. Milne has been forestalled as far as the method is concerned, but no experiments were ever carried out, either by Mallet on account of failing health, or by those in whose hands the apparatus fell. I made application to be allowed to use the apparatus, but for various reasons was unable to.

Before leaving this subject, may I appeal to your readers for a list of substances the fusion-point of which is known, and all of which would be above a dull red heat? I should like to have as complete a series as possible, so as to obtain results confined within narrow limits. Also any suggestions as to the best form of pyrometer that might be forced into and held in a stream of flowing lava, and that would not be injured by the breaking off of the rocky crust on its removal.

May I be permitted to make a few observations on the question lately raised about the authorship of certain seismographs? Not long since I described in your pages certain instruments that I considered as likely to be useful in such violent earthquakes as shake Ischia from time to time. With the exception of two, no claim was made to originality of principle, and yet I received through your pages a severe scolding from Prof. Ewing. Now if we really go into the literature of the subject we shall find the horizontal pendulum is not the invention of Prof. Ewing, but his present form of seismograph is one of the best applications of such a contrivance for measuring the horizontal component of an earth-wave, and I think he is justified in calling it *his seismograph* in so far as the present model goes. If we did not allow so much, no man using a vertical pendulum, however well contrived and modified, could call such *his*. At any rate I shall leave Prof. Milne, Prof. Ewing, and Mr. Gray to fight their own battle, but Prof. Ewing has fallen into the very same error of which he not long since accused me.

Naples, December 20

H. J. JOHNSTON-LAVIS

The Recent Earthquakes

MAY I ask to be allowed to call attention to some points in relation to the two earthquakes mentioned in your issues of December 9, p. 127 ("Volcanic Eruption in Niua-Fu, Friendly Islands"), and December 16, p. 157 ("Earthquake at Sea"). As regards the first, it is stated that "The whole island has been in a disturbed state for some three months and a half, the dates of the principal disturbances coinciding remarkably with those which are going on in other parts of the world—earthquakes on June 8 and 11, which, I think, are the dates of the first New Zealand outbreaks. . . . This is, of course, not wonderful; but the final catastrophe here took place on August 31, which, we understand, was the exact date of the recent American earthquake. It was preceded for twenty-four hours by earthquakes, and went on for ten days."

Assuming the synchronism of the Tonga eruption and earthquakes with those of the North Island of New Zealand, there is this very interesting relation between the two localities, that they both lie very near to a great circle which I may designate as the "West Coast of Africa Great Circle." This passes through, or near, the following points:—

Cape of Good Hope to St. Helena Bay; mouth of River Orange; Walfish Bay; Cape Martha; Cape Lopez Gonzalez; Bonny River; Algerian coast, near Nemours; south-east coast of Spain, near Almanzora; north coast of Spain (3° 25' W. long.); west coast of Ireland (Loop Head); southern point of Iceland (near Westmanna Island); north-west point of Iceland; Greenland, Cape York; Melville Island (south coast and point of); Bering Island; Cape Dalhousie and coast-line of Liverpool Bay; Alaska, Montagu Island; Tonga Island (half a degree to west of Tonga Tabu); New Zealand, north-east point of North Island; passes between Adelle Land and South Victoria Land; Enderby's Land. It may be remarked that several of these localities are noted for disturbances both volcanic and seismic.

As regards the "earthquake at sea" mentioned in your number of the 16th inst., the position where it was felt is given as N. lat. 19° 21', and W. long. 64° 22'; this gives a point about 93 miles north-east of Porto Rico. The interest in this