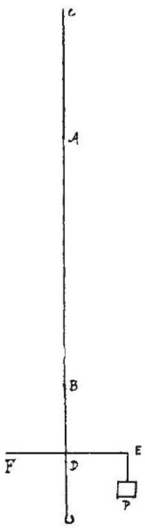
with such an acute sense of touch as to discriminate an elongation of a micron, it would be superfluous to think out any arrangement which would serve to demonstrate the minute change of length due to magnetisation. Since the elongation generally amounts to a few millionths of the total length of the magnetised wire, it is necessary to have an intricate apparatus in order to show that the ferromagnetic wire changes its length by magnetisation. The demonstration of magnetostriction to a large audience is thus a matter of no small difficulty.

After trying in vain several means of showing the magnetic change of length and the Wiedemann effect in a classroom, I finally succeeded in demonstrating them by using the capillary ripples formed on the surface of mercury. A ferromagnetic wire AB is soldered at both ends to brass or copper wires AC and BD. D is bent into a hook, so that the wire can be properly loaded by hanging weights from it. Another wire DE is soldered at right angles to BD and bent downwards. The extremity of the wire carries a small plate P, and dips at the centre of a circular or rectangular mercury trough. AB is hung vertically in the axis of a magnetising coil, which should be much longer than the wire AB. By passing an alternate or intermittent current of known frequency fine capillary ripples are formed, which can be easily projected on the ceiling by placing a glass plate, inclined at 45° to the vertical, over the trough, and illuminating the trough by passing the sunbeam or electric light horizontally on the glass plate. By adjusting the weights, it can be easily demonstrated that for a current of given frequency the elongation or contraction generally reaches a maximum. It may be doubted if the maximum is not due to the coincidence of the frequency with that due to the period of the elastic vibration of the wire; repeated experiments show that this is by no means the case.



Next place the magnetising coil horizontally, and stretch the wire horizontally by attaching to D a flexible string, which is slid over a pulley and pulled by the weights. The portion of the wire EP is bent downwards, and P dipped in a mercury trough. The other end, F, of the wire ED is dipped in a mercury pool, and an intermittent or alternate current of known frequency passed through the wire FDBAC. On magnetising the wire longitudinally by a steady current, fine capillary ripples are seen in the trough, which can be projected as before mentioned.

As both effects are greater in nickel than in iron, better results are obtained with the former wire.

H. NAGAOKA.

Physical Laboratory, Imperial University, Tokyo, February 2.

Earth Structure.

FROM Mr. Charles J. J. Fox's letter in NATURE of March 10, it is not wonderful to learn that Prof. Milne emphasises the demand for some theory which shall explain pulsatory movements by which large tracts have been alternately raised and lowered. Prof. Milne has seen too much of seismic phenomena not to do so. But with our limited knowledge of the earth's interior, it is still a matter of pure conjecture in what order the globe solidified from being a mass of heated vapours, and quite open to suppose that after the heaviest took the lowest place, a hollow was formed, and the crust became a cooling shell, with a layer of radium—about the heaviest of metals—underneath to remain a perpetual generator of subterranean heat. This state of things may be taken as the starting point; for it was not until the crust hardened into shape that the problem for which Prof. Milne demands some effort at a solution came into existence, and it is curiously enough propounded by the picture which happens to be on the opposite page of NATURE—"overfolding in Upper Carboniferous limestone"—to account for which there are geologists who would require oscillations between land and sea continued for an indefinable length of time.

It is easy to make a model range of strata in plastic clays and apply lateral pressure crunching them into similar foldings, while to stand before the real rock and coldly reason out what actually happened is another matter. Indeed, the present writer could make nothing that was not self-contradictory out of such contorted strata, especially when exposed on a very large scale, as occurs near Singapore, for instance, until on visiting one of the large (and active) craters in Java, a mile in diameter and with vertical faces 1000 feet high, the whole mystery at once became clear. For it was evident that a volcano (including fissures in the term) can erupt strata of every kind of material, red sandstone, conglomerates and shales, simulating those of aqueous deposition, and in all sorts of thicknesses from many feet to a few inches, the material being propelled for thousands of feet into the air, and perhaps all in the course of a few days of activity. Vesuvius, Etna, and even Hawaii can show nothing resembling the astounding volcanic formations in Java.

The most capricious vertical and lateral movements are to be associated with volcanic action, but in the main it is successive deposition on uneven ground that manifestly causes the curvings which are to be so often noticed in exposed sections, and are typically delineated in the picture on p. 439. Adoption of this theory, drawn from what is to be seen round Java craters on a scale nowhere else matched, does no doubt introduce some modern views into established geology, particularly in the element of time and as to the origin of much of our coal.

It is, however, widely allowed that there was a phase of great terrestrial instability just before the appearance of mammals, and equally certain that the vast ejections of successive periods varied in composition so as to give their special mineral character to the Silurian, Devonian, Carboniferous and later formations as classified by geologists. We can form only the faintest picture of the agitations on the surface of the globe in those days; of the tranquil intervals during which palms and forests grew, roamed in by animals, while shells were cast up on innumerable beaches; and then of their sudden submergence under beds of volcanic ejections following in rapid succession, and reducing all life to fossils. Now that the earth has quieted down, the process is only faintly indicated by what has occurred in historic times, as, for instance, in the consternation produced among the residents by the ejection of only a single covering of volcanic mud over many square miles of country at the eruption of Tarawera, in New Zealand, which the writer saw as a grey unctuous mass, evenly coating the surface of the landscape 18 inches thick six weeks after the eruption. Admission of the volcanic hypothesis, though it does not explain pulsatory movements on a continental area as yet, enables the origin of contorted strata met with so frequently in the British Islands and abroad to be recognised at a glance, as well as that of whole series of the stratified rocks.

A. T. F.

London, March 15.

Spawning of the Plaice.

IN continuation of the letter you published last week (March 17), I can now supply some information as to spawning in the open sea.

Mr. Andrew Scott, resident naturalist at the Piel (Lancashire) hatchery, who is now examining all our tow-nettings taken in the Irish Sea, reports to me that the first plaice eggs this year appear in a gathering taken by our fisheries steamer on February 2 at $1\frac{1}{2}$ miles south-west by south of Patches buoy, off Aberystwyth; that the next occurrence was on February 10, 6 miles west of Morecambe Bay lightship; and then again on February 18 at 6 miles north-west of the Liverpool north-west lightship. Plaice eggs have been present in every gathering since that date off both the Welsh and the Lancashire coasts. The Port Erin tow-nettings later than January have not yet been examined in detail.

It is evident, then, that the plaice in the Irish Sea started spawning about a month earlier than those in our two hatcheries. It would be interesting to have the dates for the North Sea and the English Channel.

Liverpool, March 22. W. A. HERDMAN