clearness. The present volume falls in no respect below the level of those which have preceded it. Among the writers of scientific articles are Prof. James Geikie, who deals with the triassic system and with volcanoes; Prof. Knott, who expounds the principles of thermodynamics; Dr. R. W. Philip, who writes of tubercle; and Sir F. Bramwell, who has a paper on water-supply.

Arthur Young's Tour in Ireland (1776-79). Edited, with Introduction and Notes, by A. W. Hutton. Two vols. (London: G. Bell and Sons, 1892.)

THIS reprint will be of real service to all who study the evolution of economic conditions in Ireland, and much of it ought also to excite and maintain the interest of the general reader. Arthur Young, as every one knows, was a remarkably accurate observer of such things as travellers have opportunities of noting, and his book on Ireland is in its own way hardly less valuable than his more celebrated work on France. The work was first published in 1780, in the course of which two English editions and one Irish edition were issued. Since that time it has not until now been reprinted as a whole. Mr. Hutton has done his work as editor admirably, and a most useful bibliography has been prepared by Mr. J. P. Anderson.

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 intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Some Lake Basins in France.

A FEW weeks since M. Delabecque, Ingénieur des Ponts et Chaussées at Thonon, kindly presented me with a copy of a work issued under his superintendence and to a great extent executed by himself,¹ to which I should be glad to call the attention of students of physiography. M. Delabecque, commissioned by the French Government, has made a series of soundings of ten lakes in France, near the Alpine region, and this Atlas records the results of his work. Contour-lines, in most cases 5 metres apart, indicate the forms of the lake-basins; the use of varying tints in blue makes these more distinct. Chief among the lakes included is the Léman, in the survey of which, as only one shore is French territory, the Swiss engineers have cooperated. A copy of this on a reduced scale, and without colours, appeared in Prof. Forel's book, "Le Lac Léman" (see NATURE, Nov. 3, 1892). Next in importance come the lakes of Annecy and of Bourget; the remainder are situated either in the French Jura or on the margin of the outer limestone zone of the Alps, a little south of the Rhone.

Excluding the Lake of Geneva, which was noticed in the article just mentioned, these lakes are especially interesting for their bearing on the difficult problem of the origin of lake-basins. Except the Lac de Bourget, none of these can be said to lie in a great mountain valley, or on the probable track of a great glacier. If then their basins have been excavated by glaciers, we might fairly expect the Alps and Jura to be "spattered" with lakes, for no appeal can be made to exceptional circumstances; while if the contours of their beds present resemblances to those of the larger Alpine lakes, such as the Lake of Geneva, the same explanation ought to apply in the main to both groups.

Without a reproduction of the charts it is impossible to give more than a rough idea of the evidence which they afford, but the following statements may be helpful. As a general rule the lakes deepen as they broaden, the deepest water being commonly found in the widest part. If in the course of the lake the shores markedly approach so as to form a kind of "narrow," this corresponds with a submerged neck or "col," which sepa-

rates the bed into two basins, rising perhaps 10 metres or more above their general level. Not seldom the bed of a lake consists of a linear series, three to six in number, of shallow basins, so that a contour line, drawn along the axis of the lake, undulates up and down with an "amplitude" of from perhaps 3 to 5 metres. A rather long, blunt-ended oval is the prevalent form of these lakes, but to this there are exceptions. So far as can be ascertained the contours of the land above the water-line are reproduced beneath it. For instance, under the steep slopes of the Mont du Chat the bed of the Lac de Bourget plunges abruptly down to a depth of over 120 m. (its greatest depth being about 145 m.).

Of the Jura lakes, the Lac de St. Point (848.95 m. above the sea) is rather more than 6 kilometres long, the general width being rather less than one-tenth of this; a considerable part of its floor is 30 to 35 metres deep, and its greatest depth is about 42 metres. It contains no less than 6 basins, parted by "cols" about half-a-dozen metres above their lowest parts. This lake is on the course of the Doubs, and lies parallel with the general strike of the Jura, i.e. from N.E. to S.W. The Lac de Brenets on the same river, nearly 100 metres lower down, is a narrow, winding lake, roughly 150 metres wide and perhaps 8 or 9 times as long. At its upper end is a sharply projecting, rather shallow bay, but the channel of the Doubs can be traced clearly through this, deepening gradually from 5 to nearly 27 metres and the whole lake is evidently only an enlargement of the river.

The subalpine lakes are no less interesting, and their testimony generally agrees with that summarised above. Want of space forbids us to mention more than the lake of Annecy. This is deepest (about 65 m.) in its northern and widest part (nearest to the effluent). The sub-aqueous contours on the western side are interrupted, to within about 10 metres from the bottom of the lake, by a prominence, just like a drowned hilly spur. The shallowest soundings over this, near its northern (outer) part, are only 3.3 metres, and the ground falls rapidly down from 5 to 55 metres. On its northern or "lee" side (assuming a glacier to have followed the course of the water) is a submerged valley over 40 metres deep. The Lake of Annecy exhibits another very singular feature. Near its northern end the bed deepens very rapidly from 30 to 80 metres; this funnel-shaped cavity is less than 200 metres in diameter, and is probably a submerged swallow hole. These notes may, it is hoped, suffice to indicate the importance of this work. The gratitude of students is due to M. Delabecque for supplying them with a valuable group of facts, the collection of which must have entailed great labour. These, however, appear to me not to lend themselves very readily to the support of the glacial excavation hypothesis; but to be more favourable to that which regards the larger Alpine lakes as mainly formed by movements of the earth's crust after the erosion of the valleys in which they lie. T. G. BONNEY.

Dust Photographs.

IN Mr. Croft's paper on "Breath Figures," printed in NATURE for December 22 of last year (pp. 187, 188) he states:—"Two cases have been reported to me where blinds with embossed letters have left a latent image on the window near which they lay." The statement is not quite clear as I do not understand whether the letters were in contact with the glass or not.

Perhaps it may be interesting to place on record an observation of my own, made a few years ago, which struck me at the time as curious, but which I have not been able to verify since.

At the stations of the District Railway there is a useful arrangement by which passengers are informed of the destination of the next train. It consists of a shallow box with glass sides into which by a mechanical contrivance boards are let down on which the names of the stations are painted in white letters on a blue ground. The board with the words 'INNER CIRCLE' is most frequently exposed. At night the box is (or was) illuminated obliquely on either side by a tolerably powerful lamp.

One night I was waiting for the train at the Victoria Station. There was some dislocation in the service; the destination of the next train was uncertain and the box was empty. On glancing at it somewhat sideways I was however astonished to see the words 'INNER CIRCLE' on the glass side of the box in quite clear dark letters on a pale illuminated ground. I drew the attention of one of the platform officials to it. He saw it with perfect distinctness, and seemed to think he had

¹ "Atlas des Lacs Français, Ministère des Travaux Publics." No publisher's name appears on the sheets, but I am informed by M. Delabecque that the Atlas can be obtained at Georg's Library, Geneva.

noticed it before. Of course when the apparatus is in full working order there is little opportunity for doing so.

The only explanation I could think of was:—(i) that the light of the lamp had produced some molecular change in the paint coating the notice board; (ii) that this had affected differently the blue and the white paint; (iii) that the same cause had set up some differential electrical condition of the board and the glass; (iv) that a bombardment of particles of the blue paint had taken place on to the glass to which they had adhered; and that (v) the particles so adhering, by dispersing the light, produced the effect of the pale illuminated ground while the spaces occupied by the letters being relatively clean stood out dark.

Royal Gardens, Kew,

W. T. THISELTON-DYER.

February 1.

MR. W. B. CROFT's paper on Breath-Figures in your issue of December 22 reminded me of some curious impressions of monumental brasses which are to be seen on the walls of Canterbury Cathedral. When I saw these impressions a few years ago, it occurred to me that they might have been produced by mere contact, the brass plates having possibly been hung for many years against the walls, in secluded corners, at a time when the Reformers would not let them remain in their proper matrices on the church floor. I had forgotten the particulars of these figures, but Dr. Sheppard, of Canterbury, has kindly sent me the following notes by favour of Canon Fremantle:—"A number of impressions of brasses are in the basement (which is open to the air) under Henry IV.'s chantry in the Cathedral. A very good impression is on the western column of the crypt of Trinity Chapel. . . . On the walls appear the shapes of the effigies. Sometimes the stone is unstained all over the area of the figure, and surrounded by a broad dark smudge; and sometimes the case is reversed, and the figure is the exact negative of the former kind; that is to say, the area of the figure is indicated by an uniform dark tint, whilst the surrounding stone is unstained." Dr. Sheppard suggests "that an exact pattern seems to have been made in paper and then fixed to the wall whilst it was brushed over with linseed oil. But this does not account for the white effigies on a dark ground."

I would commend these impressions to the notice of those interested in the subject. It may be that, though some were made intentionally, others are the result of simple contact.

F. J. ALLEN.

Mason College, Birmingham, February 4.

Fossil Plants as Tests of Climate.

IN continuation of my recent letter, permit me to call attention to a communication on the bread fruit trees in North America, by Mr. F. H. Knowlton, of the National Museum, Washington, U.S., which appears in your American contemporary *Science* for January 13. The forty living species of *Artocarpus* are all confined to tropical Asia and the Malay Archipelago. *A. incisa*, the true bread fruit tree, and one or two others, are largely cultivated in the tropics. They are small or medium-sized trees with a milky juice, large leathery leaves, and monœcious flowers. The female flowers are long club-shaped spikes, which uniting form one large mass known as the "bread fruit," the interior containing a pulp when ripe like new bread.

The first fossil bread fruit was discovered in boulder county Colorado in late cretaceous rock, and was named by the late Prof. Le Lesquereux *Myrica* (?) *Lessigiana*, other fragments he called *Aralia pungens*. The subsequent researches, or more perfect specimens of Dr. A. S. Nathorst, proved these to belong to one species, *Artocarpus Lessigiana*. Dr. Nathorst is the discoverer of another species closely allied to *A. incisa*, which he calls *A. Dicksoni*, which he obtained from the cretaceous flora of Waigatt, West Greenland, which the previous labours of Profs. Heer and Nordenskiöld had shown to be of a tropical or sub-tropical character, containing as it does numerous species of ferns of the order Gleicheniales, and several species of cycas.

CHAS. E. DE RANCE.

H.M. Geological Survey, Alderley Edge, Manchester.

Lunar Rainbow in the Highlands.

THIS interesting phenomenon (a very unusual one in this latitude) was observed near here on the morning of the 3rd inst., about six a.m. The moon was two days past full, and was not

shining particularly brightly, being obscured, except at considerable intervals, by driving mist and light clouds. The bow, however, was exceedingly well marked, and formed a singularly beautiful object, stretching as it did completely across the north-western end of Loch Oich, glimmering against the dark background of the mountains, and sinking into the water on the southern shore of the loch. The general colour of the bow was yellow deepening into orange, several of the prismatic colours, however, being intermittently visible, especially a tinge of violet on the upper side.

O. S. B.

The Abbey, Fort-Augustus, N.B.

OPTICAL CONTINUITY.¹

KEENNESS of sight is measured by the angular distance apart of two dots when they can only just be distinguished as two, and do not become confused together. It is usually reckoned that the normal eye is just able or just unable to distinguish points that lie one minute of a degree asunder. Now, one minute of a degree is the angle subtended by two points, separated by the 300th part of an inch, when they are viewed at the ordinary reading distance of one foot from the eye. If, then, a row of fine dots touching one another, each as small as a bead of one 300th part of an inch in diameter, be arranged on the page of a book, they would appear to the ordinary reader to be an extremely fine and continuous line. If the dots be replaced by short cross strokes, the line would look broader, but its apparent continuity would not be affected. It is impossible to draw any line that shall commend itself to the eye as possessing more regularity than the image of a succession of dots or cross strokes, 300 to the inch, when viewed at the distance of a foot. Every design, however delicate, that can be drawn with a line of uniform thickness by the best machine or the most consummate artis, admits of being mimicked by the coarsest chain, when it is viewed at such a distance that the angular length of each of its links shall not exceed one minute of a degree. One of the apparently smoothest outlines in nature is that of the horizon of the sea during ordinary weather, although it is formed by waves. The slopes of *débris* down the sides of distant mountains appear to sweep in beautifully smooth curves, but on reaching those mountains and climbing up the *débris*, the path may be exceedingly rough.

The members of an audience sit at such various distances from the lecture table and screen, that it is not possible to illustrate as well as is desirable, the stages through which a row of dots appears to run into a continuous line, as the angular distance between the dots is lessened. I have, however, hung up chains and rows of beads of various degrees of coarseness. Some of these will appear as pure lines to all the audience; others, whose coarseness of structure is obvious to those who sit nearest, will seem to be pure lines when viewed from the furthest seats.

Although 300 dots to the inch are required to give the idea of perfect continuity at the distance of one foot, it will shortly be seen that a much smaller number suffices to suggest it.

The cyclostyle, which is an instrument used for multiple writing, makes about 140 dots to the inch. The style has a minute spur wheel or roller, instead of a point; the writing is made on stencil paper, whose surface is covered with a brittle glaze. This is perforated by the teeth of the spur wheel wherever they press against it. The half perforated sheet is then laid on writing paper, and an inked roller is worked over the glaze. The ink passes through the perforations and soaks through them on to the paper below; consequently the impression consists entirely of short and irregular cross bars or dots.

¹ Extract from a lecture on "The Just-Perceptible Difference," delivered before the Royal Institution on Friday, January 27, by Francis Galton, F.R.S.