this season, clear weather prevails, and thus there is much more hope of good observations of the eclipse. As to pressure observations, they would be most interesting at some distance from the coast.

A. WOEIKOF

St. Petersburg, January 24/February 5

Parallel Roads

THE following, from an old note-book, may be of interest in connection with this subject:—

I observed, in 1881, the formation of parallel roads on a small scale still in progress in a small plain about 3 miles long and 1 broad, marked in maps of Iceland as a lake, Sandklettavátn (lat. 64° 21'). This was surrounded on three sides by mountains, and the fourth was closed by a lava-stream. The plain is a perfect level of dark sandy mud without a vestige of vegetation, and is evidently a shallow lake for the greater part of the year. The shore is regularly terraced, the terraces being 2 or 3 feet apart. I thought at the time that the water must be dammed back regularly during the winter to a certain height, but that this height has diminished at three successive periods owing to fresh channels being found through the lava at lower elevations. In Goddalir there is a most instructive example of the formation of river-terraces. Above the broad valley there are two groups, over 1000 feet deep, terminating in a vast glacier or ice-cap. These seem to have been filled in solid with moraine, the remains of which still cling to the sides at all elevations. The eastern one evidently became cleared out first, with the result that an enormous mass of gravel was spread over the whole width of the valley below. The western one next started a torrent of its own, which cut down the level for some distance on its own side to 30 or 40 feet lower. Finally, both torrents united, and their greater transporting power again cut down the level some 30 feet, with the result that there are now two level terraces and the basis of a third.

J. STARKIE GARDNER

Colours in Clouds

THE coloured fringes to, and in, clouds I long ago found to be very common, but I had no idea that there was any novelty, as there would seem to be, in this fact.

When the sun is setting behind a bank of clouds and there are high cumulo-strati or strati, these will almost always, I believe, be found coloured, at the proper distance from the sun, if viewed through a suitable dark glass. The edges of the dark cloud will often be so too. I believe these colours are always present; hidden by the brightness of the cloud which shows them, and the glare of the lower air. The former is removed by the dark glass, the latter by the interposition of the bank.

The tint I believe depends on the density of the cloud where it is formed. But it seems more probable that the real cause is that the particles (of ice?) are larger and more numerous where the cloud is more dense, and that, if their size were increased independently of the density we should have exceptional cases.

I have seen these fringes to bright edges of dense cumulus, but I must own that I never was quite satisfied that I was not seeing two strata of cloud. The colours are very beautiful, and often so strong that it is difficult to realise that the dark glass has only removed a concealing glare.

J. F. TENNANT

Ealing, January 29

Movement of Telegraph-Wires

I HAVE frequently noticed the peculiar movement of telegraph-wires noticed by your correspondent. For some time I took it to be an ordinary case of vibration, but it presented so many peculiar features that I was induced to examine it more closely. It frequently happens that when the temperature and dew-point of the air are at or about the freezing-point, and the sky is clear, the wires are chilled by radiation, and hoar-frost is deposited upon them. With an almost imperceptible wind the hoar-frost collects almost wholly upon one side of the wire in the form of a wing, producing a torsional strain. The weight of the hoar-frost, as compared with the weight of line, is so small that their common centre of gravity is almost coincident with the centre of the wire. When in this condition, if a light wind acts upon the frozen wing, it imparts a reciprocating rotary motion to the wire. Each time the vibration brings the plane of the protuberance in a line with the eye, the wire almost disappears from

sight, while when it is at right angles to that line it flashes suddenly into view. If looked at from such a point that the wing of hoar-frost moves backwards and forwards behind the black wire, the effect is very much more marked.

R. MOUNTFORD DEELEY

Mill Hill, Derby, February 2

The Deltas of Glacial Rivers

AN interesting fact connected with the Lake of Geneva has recently been brought to light by M. Hörnlimann, who is now preparing a hydrographical chart of the Lemman basin. From the point where the Rhone enters the lake, to a distance of more than 6 kilometres, the river-water, which is denser than the lake-water, follows a trench in the alluvial deposits which is from 500 to 800 metres wide, and which, even beyond St. Gingolph, where the depth exceeds 200 metres, is 10 metres deep. A precisely similar groove has been observed at the mouth of the Rhine in the Lake of Constance, with a depth of 70 metres and a width of 600 metres; and similar though less deep grooves are found opposite to the old mouths of the Rhone and the Rhine in the two lakes. The greater density of the river-water is owing to its lower temperature and to the vast quantity of sediment suspended in it. The deltas of glacial rivers flowing into lakes differ, then, in a remarkable manner from the deltas of most rivers flowing into the sea; the water of these rivers, being less dense than that of the sea, spreads over the surface, and thus helps to form bars.

G. H. W.

MAHWA FLOWERS

ATTENTION has been publicly drawn of late to "Mahwa Flowers"—the corollas of *Bassia latifolia*—as a cheap source of cane-sugar. This species of *Bassia* is a tree attaining to a height of 40 to 60 feet, and common in many parts of India, especially in Central Hindustan. It has oblong leaves of firm texture, from 5 to 6 inches long; these fall in February, March, or April, and are succeeded in March or April by the flowers. These last for two or three weeks and then begin to fall. The falls take place at night, and continue sometimes for a fortnight. The fruits, which resemble a small apple, ripen in three months; the seeds, one to four in number, yield an edible oil by pressure. It should be added that the trees are self-sown, and that they flourish in very poor and stony soil.

When the Mahwa tree is in bud, the ground beneath it is cleared of weeds, sometimes by burning. A single tree may yield as much as six to eight maunds¹ of flowers; even thirty maunds have been asserted to have been collected from one tree. These flowers have a luscious but peculiar taste when fresh; when dry they resemble in flavour inferior figs. They form a very important addition to the food of the poorer classes in those districts where the tree abounds, particularly in the neighbourhood of woodlands and jungles. They are specially useful in economising cereals in seasons of famine and drought. They are sometimes eaten fresh, but more commonly sundried, and are usually consumed with rice and the lesser millets, or with seeds of various kinds, and leaves. It is said that a man, his wife, and three children may be supported for one month on two maunds of Mahwa flowers.²

It is not, however, as a direct article of food, nor as a material for the preparation of a rough spirit by fermentation (a very common use of these flowers) that Mahwa blossoms are now recommended. It has been affirmed that they may be employed as an abundant and very cheap source of cane-sugar. In the *Morning Post* of October 15, 1885, appeared an article on this subject, in which it was stated that, "If the Mahwa flowers be available in sufficient quantities for the sugar-makers of Europe, there can be no question that the days of the

¹ A Bengal maund equals 82½ lbs. avoirdupois.

² For an interesting account of the Mahwa tree and its products, see a paper by E. Lockwood in the *Journal* of the Linnean Society ("Botany"), vol. xvii. pp. 87-90.

beetroot are over, and sugar-cane will go the way of all discarded products." This prediction depends, however, upon another condition besides that of the abundance of the flowers. If the sugar they contain be wholly or chiefly cane-sugar, that is, "sucrose," then the argument is not without weight. But the nature of the saccharine matter of the Mahwa does not appear to have been ascertained. MM. Riche and Rémont (*Journ. de Pharm. et Chimie*, 1880, p. 215) stated that the air-dried flowers contain 60 per cent. of fermentable sugar, of which about one-seventh is crystallisable. The material available for analysis in Europe consists, of course, of the dried flowers. These may have suffered some change beyond the mere loss of water, but the evidence they afford on chemical examination is not favourable to the view that they are likely to compete with sugar-beet or sugar-cane as a source of cane-sugar. Here is the result of an analysis of a sample of Mahwa flowers (from the Kew Museum) in their air-dried condition:—

	In 100 parts
Cane-sugar	3.2
Invert-sugar	52.6
Other matters soluble in water	7.2
Cellulose	2.4
Albuminoids	2.2
Ash	4.8
Water lost at 100° C.	15.0
Undetermined	12.6

The flowers analysed had a slight smell of fermented saccharine matter and a distinct acid reaction. But it is not at all probable that they could have contained any large proportion of cane-sugar even when quite fresh, and that 15/16ths of that sugar had been inverted during the process of desiccation. We cannot argue from analogy in this case. For while the nectar of many flowers contains no sugar except sucrose, invert-sugar occurs in some blossoms, as well as in many other parts of plants. Even the unripe and growing stems of the sugar-cane and of many grasses contain much invert-sugar. It must, however, on the other hand, be remembered that cut sugar-canes imported into this country contain a large amount of invert-sugar, and that if they be kept a week only after the harvest the invert-sugar naturally present in the juice shows a marked increase and the cane-sugar a corresponding diminution. On the whole, then, so far as the materials at my disposal enable me to judge, I believe that the saccharine matter of fresh Mahwa flowers will be found to consist mainly of dextrose and levulose, and that consequently they will not be available as a material for the economic production of sucrose.

I have to thank Mr. W. T. Thiselton Dyer, C.M.G., Director of the Royal Gardens, Kew, for drawing my attention to this subject, and for a supply of the material on which I have worked.

A. H. CHURCH

THE UNIVERSITY EXTENSION MOVEMENT¹

THIS "movement" is one of the most significant of the present day, and provides a most useful step in that ladder of learning which it is desirable to see reaching from the elementary school up to the University degree.

Under the University Extension system, knowledge of the highest character is offered by its acknowledged possessors to all classes alike, yet with the very popular qualities of cheapness and attractiveness. The contents of this paper fall naturally into two heads: first, the advantages offered and the objects aimed at by those engaged in the work; and, secondly, hints and instructions as to the methods by which the work may be suc-

cessfully carried on. Mr. Moulton vigorously urges the former, and has ten years' experience in the latter.

The ideal aimed at is, that a University education should be placed within the reach of any "person" in any grade of society, and that large bodies of students all over the country should be attached to the University as associates, of whom, if few ever became full members, yet any might do so, and all have started on the road. The Universities have set themselves to meet the wants of classes who have been long debarred from such privileges; and an ample page of knowledge will be spread before the eyes of all whom partial education may lead to seek it yet further.

The desire has long been felt both among middle and lower classes. The old Literary and Philosophical Society on behalf of the one, and the old Mechanics' Institute of the other, were both anxious attempts to do, by voluntary effort and amateur work, what the University now offers to undertake as a special business, by means of an itinerant system of authorised teachers taken from their most highly-trained and successful graduates. Under the eye of the Syndicate, and not making popularity their end, they will have a power at their back and a guarantee of their quality and of its permanency which the old lecturers could never give.

The great difference, accordingly, from the single desultory lectures given at the old institutions is the thoroughness of the instruction aimed at under this new system rising by stages to the full studies of the University. No subject is undertaken in a set of less than twelve lectures; notes are expected to be taken, the books recommended by the lecturer are expected to be read, and a class is held before or after the next lecture to incite and help the students. An examination takes place at the end of the course requiring a higher standard than the ordinary college examination, and not a lower one on account of the student's difficulties, for such students are allowed eventually to take a University degree, and it is correctly felt that it would be exceedingly mischievous in any way to lower the standard now required for that. This may seem a high one for candidates often consisting of a large proportion of working men, but nevertheless, in many cases where comparison could be made with young men resident at college, the former have proved to have the advantage over the latter. This again is not incredible; persons attending these lectures are drawn from all classes alike, yet all are volunteers, who have felt their want and chosen their subject—the best soil for any seed of knowledge to fall upon. It is not the upper classes only who are found to appreciate higher education, but it has proved to be a cause which can rouse passionate effort among working men placed in the most unfavourable conditions.

The Universities thoroughly sympathise with the demand in these days for knowledge in the lines of science and of modern history. There is perfect freedom from holding up classics and ancient languages, and abstruse mathematics as the *summum bonum*. The principal supporters of the movement are clearly divided into favourers of science, and favourers of literature and art, and an effort is made to thoroughly meet either demand. Indeed, nothing is more striking in reading this publication than the elasticity with which the University sets itself to fit its syllabus of subjects, and its arrangements for teaching them, to the various wants of the different bodies who wish to avail themselves thereof—whether colleges, philosophical societies and institutes, free libraries, subscription libraries, or special societies or companies for the purpose. Instances are given of the lectures being carried on by all these various bodies, and to all who would make use of this means of increasing knowledge, practical advice is here given upon matters down to those of the smallest range, and we may quote the following experiences:—

Ladies more than gentlemen are glad of the educa-

¹ "The University Extension Movement." By R. G. Moulton, M.A. With an Introduction by Prof. Stuart, M.P. (London: Bemrose and Sons, 1886.)