

entrapped in the growing solid, and the gas not having time entirely to make its escape. In the case of many of these open cracks it would seem that the freezing took place so rapidly when it once began, that the air could not be all expelled, but the air-bubbles were lengthened out in their endeavour to set themselves free, and preserved in the form of very delicate tubes, pointing from the crack walls on either side slightly downwards and towards the centre, where solidification would last take place (Fig. 5). Along the central line of the crack occurred another series of perpendicular tubes caused by the elongation of the bubbles in the only direction then

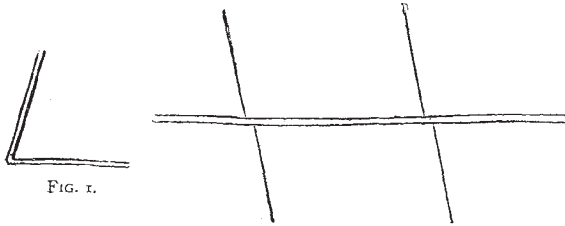


FIG. 1.

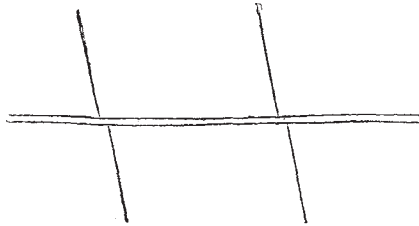


FIG. 2.

possible to them. Nothing could exceed the beautiful regularity of structure thus caused. In a few instances there was a double series of such an appearance as is represented in Fig. 5, the crack having again opened, apparently, along the same line, and a similar structure to the former having been produced. In this connection it is interesting to note the seemingly frequent evidence of fracture recurring along the same lines, especially if the explanation given above of the vertically-veined cracks be the correct one.

The drawn-out air-bubbles were also particularly beautiful around the stones and rocks in the shallow water at the edge of Derwentwater. Much of the very smooth ice which covered the lake on the morning of Wednesday, the 23rd of December, had been formed under a very sharp and sudden frost, the thermometer in a sheltered position registering 18° of frost. The ice would first form around the stones in shallow water, and form more quickly there than out in the open, where there were no marked centres of crystallisation; hence the number of bubbles entrapped were greatest around the stones and rocks close to the surface, at the lake-edge;

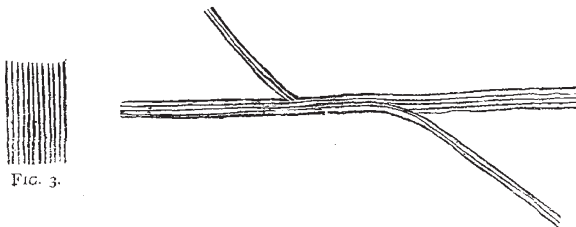


FIG. 3.

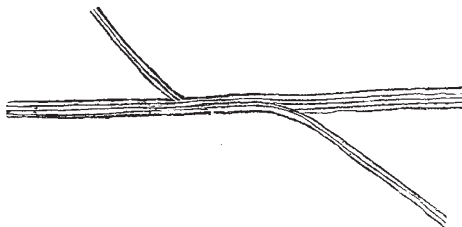


FIG. 4.

and the bubbles, trying to escape downwards as soon as the upper layer of ice was formed, became beautifully drawn out and fringed the stone most delicately. I have occasionally observed a somewhat similar lengthening of gas or liquid cavities when examining thin slices of such rocks under the microscope as have undergone solidification under tension in one given direction.

Before closing these few remarks, allusion may be made to two other effects noticed during the late frost. One of these is the precise analogy between the deposits of ice often formed on a rocky slope, or by constant dripping from above, and the deposits of carbonate of lime formed in caverns. The trickle of a thin stream of water over a rocky slope, such as may be seen in many parts of the Clapham

Cave, deposits a wrinkled wavy layer of carbonate of lime, and over it the water seems ever to keep up a rhythmic flow. Upon rocks near the summit of Honister Pass I noticed during the late frost an icy sheet precisely similar, and with the same pulsating streamlet flowing over, while, hard by, there were sheets of icy stalactite and stalagmite only to be distinguished from those of limestone caverns by their greater clearness.

Another feature of great beauty was the effect of the bright sunshine on the icy crystals scattered broadcast over the snow of Skiddaw. Looking slightly away from the sun at a certain angle, and inclining one's head so as to look along the ground, there appeared scattered in boundless profusion thousands of brightly coloured gems, blue and green being the most marked colours, but many a ruby lying interspersed with these mountain emeralds. Assuredly Skiddaw top never showed to greater advantage than during those cloudless wintry days of the Christmas and following week; and it seems a marvellous pity that of the thousands who visit this favoured spot during the hot days of summer or the wet ones of autumn, so few should ever return to see their majestic friends

“Clothed in white samite, mystic, wonderful.”

It may interest some to learn that something analogous to a Swiss glacier was once observed among our Cumberland mountains. Beneath the summit of Dale Head, 2,500 feet high, is an old copper mine, and many years since two miners entered the old workings in the month of June to obtain some mineralogical specimens. Great was their surprise to find the level, but a short way in, full of snow and ice. The mountain-slope is there very steep, but with many a hollow and rugged fissure in which the snow lies long, and doubtless it had found its way from above into the old level, as well as having been blown in at the mouth. The trickling of tiny streams among this snow, and the alternations of frost and thaw so frequent upon the mountain sides, must have produced an icy mass, which would be long ere it melted, and thus a natural ice-house was well supplied with ice far into the summer. The winter previous had, I believe, been a very snowy one, and it is not likely that the phenomenon is of very frequent recurrence.

J. CLIFTON WARD

SCIENCE AT BANBURY

AT the opening of a new Literary and Philosophical Society at Banbury the other day, Mr. B. Samuelson, M.P., gave an inaugural address in which he touched on various topics connected with the progress of science and scientific culture. We regret that our space prevents us from giving Mr. Samuelson's address at length; the following extracts, however, we believe, will interest our readers:—

“There have, doubtless, been times when the pursuit of learning was carried on with as much ardour, when as great sacrifices were made for the discovery of truth, or when there was at least an equal toleration for differences of opinion, as in our generation; but I think it may safely be asserted that at no period since the revival of letters in the fifteenth and sixteenth centuries have these conditions, essential as they are to the success of our objects, co-existed to the same extent as in our day. It may not be one of the least useful and interesting subjects of inquiry for our society how this favourable conjuncture has arisen. Probably it will be found to be one, and if so, certainly not one of the least important, of the results of the great material changes which have their origin in the substitution—begun in the age of Watt, and still in course of development—of machinery for manual labour. At any rate we may congratulate ourselves that the experience of the present age proves the dogma to be fallacious which

asserts that material wealth is necessarily associated with the decadence of intellectual vigour, or of the sense of moral responsibility. What the Roman poet said of the Augustan time, 'Aetas parentum peior avis tulit nos nequiores, mox daturos progeniem vitiosiore,' cannot with truth be said of our age and country. . . .

"Our funds will of necessity be limited at first, and it will hardly be in our power for some time to come to procure for our subscribers regular courses of lectures either in literature or science. Nor, indeed, do I think that the ordinary popular lectures are on the whole of any permanent value beyond the intellectual excitement which they produce. Their tendency in too many instances is rather to discourage than to promote study. When we have witnessed the brilliant experiments and listened to the luminous expositions of a Tyndall on light or magnetism, we are too apt to imagine we have carried away the solid instruction in those sciences which is in fact only to be acquired by close and persevering application. And this applies equally to literature, as those amongst us who were charmed by the acute criticism and pungent satire of Thackeray in his day will scarcely fail to admit. I believe that we should do more good by having, in each of our sessions, one or two lectures by eminent men, setting forth the objects and boundaries of some great branch of literature or of science, and the best method of cultivating it. Such lectures would do as much as popular courses to awaken the interest of those hitherto unacquainted with the subject treated, and would stimulate them to private study; whilst they would be of greater value to those who have already some familiarity with it by enabling them to keep abreast of the most advanced knowledge of the day and directing them to lines of inquiry by following which they themselves may possibly extend its boundaries. . . .

"As an example of how little the theory of force is apprehended even in its most rudimentary form, by persons who have received a liberal education, I may mention the case of a landowner and member of one of the learned professions, who not long since consulted me about his barn machinery. He suggested water as the motive power, and, when I asked him how he would obtain the necessary fall, gravely proposed to raise the water from a canal at the foot of his homestead, by the very machinery which that water was to set in motion.

"It is probable that one or more of our distinguished members, on whose support we have to congratulate ourselves, will have the kindness to give us instruction of the highest grade in their special subjects; but there is probably not one of us who could not, by working steadily at some subject in which he takes an interest, and by a simple relation of the result of his studies and observations, contribute to our entertainment as well as add to our knowledge. It is one of the advantages of residence in the country, that it affords so many opportunities for the study of the natural history of animated life. The example of Sir John Lubbock's exquisite monograph on the fructification of flowers, composed in his leisure moments by a man immersed in public and private business, as well as occupied by the special pursuits to which he owes his scientific reputation, shows how much may be done in this way. . . .

"Our holiday tours also, whether at home or abroad, if we note carefully and relate simply what we have seen, will give us endless subjects for papers on ethnology, social and political economy, and archæology. . . .

"The establishment of a Museum is one of the objects contemplated by the gentlemen to whom we are indebted for the existence of our society, and there can be no doubt of the value of such an institution, even if it should not attempt anything beyond the collection of miscellaneous objects illustrative of natural history, and of that of our race and country. I remember well that when I was a child, the sight of a provincial collection of armour, of

coins, and of other objects of daily use belonging to a period so recent as that of the Commonwealth and the Restoration, first enabled me to form a conception of history as of a reality instead of a dream."

THE EDINBURGH BOTANICAL SOCIETY*

THE Botanical Society of Edinburgh numbers more than 500 members. Moreover, the Botanical Class of the University of Edinburgh is the largest in the three kingdoms; the number of pupils which attended it in the year 1874 was 354. We might reasonably expect, therefore, to find in the "Transactions" of the Society some evidence of the existence, in an environment apparently so favourable, of a flourishing school of botanical investigation. After, however, examining the present number with some care, it is impossible to avoid feeling considerable disappointment. To speak the truth, a great part of its contents might have been sufficiently gratifying to those concerned if printed in some local periodical, but they are quite unworthy of that more formal and wider circulation which they necessarily aim at by their present mode of publication. The valedictory address of the president, Mr. J. M'Nab, is mainly occupied with a discussion (but *apart* from any meteorological data) of the deterioration of the climate of Scotland, which it is well known he believes to have taken place. Amongst other facts which he adduces in support of it, is the present scarcity in Scotland of mushrooms! He takes occasion to point out that though the British climate is unsuitable for many plants such as *Rhododendron arboreum*, their hybridised descendants are able to represent them in our gardens. It is, however, by no means certain that *Bryanthus erectus* is, as the president stated, a hybrid between *Menziesia empetriformis* and *Rhodothamnus chamaecistus*; on the contrary, it appears to be identical with a form of the former species.—Mr. A. S. Wilson continues his remarks on *Lolium temulentum*, the seeds of which have long been believed to be poisonous, and an exception to the general rule amongst grasses. The poisonous qualities of *Lolium temulentum* are attributed, no doubt correctly, to the ergot, with which it is often infected. After separating the ergotised grains, Mr. Wilson made cakes of darnel meal, which he ate without experiencing any ill effects. It is mentioned *inter alia* (p. 49) that the first Swedish turnips raised in Britain were grown at Perth, in 1772, from seed sent by Linnæus. Rather unexpectedly in a botanical publication we come further on upon an account of a dredging expedition, headed by Prof. Carus, in Lamlash Bay.—Mr. J. F. Duthie gives a long account of botanical excursions near the Baths of Lucca; except as an extract from the journal of an ardent collecting botanist, it has no points of interest.

Mr. A. S. Wilson writes on the fertilisation of cereals, in which he holds, against most authorities, that wheat, barley, and oats are not wind-fertilised, but are self-fertilised before the anthers are expanded. In rye, on the other hand, his experiments led him to the belief that 56 per cent. of the florets are fertilised by the agency of the wind. There are some things in his paper to which exception might be taken. Thus (p. 95), speaking of the embryo (ovule?) of rye, he says it "may more properly be regarded as a cellular mass capable of evolving fifty embryos, one of which takes the lead in the ovary," &c. Mr. M'Nab, in a paper on "Climatal Changes in Scotland," reiterates his view already alluded to; while the annual temperature remains the same, he believes the summers to be cooler.

Dr. Stewart's list of the principal trees and shrubs of Northern India takes up nearly forty pages. It is a posthumous publication, and its precise usefulness is by

* Transactions and Proceedings of the Botanical Society of Edinburgh vol. xii. part 1.