smattering of the more recent development of the science. Being thus completely furnished, he has entered the arena. The result is altogether what might have been expected. Inaccuracy of statement, meaningless definitions, sins of omission and of commission, abound. If anyone wishes to learn the rudiments of chemistry, let him eschew this catechism as he would poison.

M. M. P. M.

Summer Holidays in Brittany. By Thomas J. Hutchinson. With Map and Illustrations. (London: Sampson Low and Co., 1876.)

MR. HUTCHINSON is well known, among other things, for his researches among Peruvian antiquities, and therefore, to his tour in Brittany he brought a trained observation. He has managed to write a very pleasant book on rather a worn subject, a book which is likely to give its readers a desire to follow the author's example. Indeed it might form a very useful guide-book for the district traversed by Mr. Hutchinson, and would have the advantage of being much more pleasant reading than guide-books generally are. Mr. Hutchinson evidently made good use of his time when in Brittany, and to those who have not read much on the subject the book will furnish a great deal of information on the nature of the country, the characteristics and manners and customs of the people, the antiquities, historic and prehistoric, the ecclesiastical and political history, and many other interesting points. A very good map and some fair illustrations add to the value of the book.

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.*]

Colour of Flowers Grown in the Dark

IN NATURE, vol. xiii. p. 348, Mr. Thiselton Dyer gives an extract from Sachs's "Text-book of Botany" to the effect that no change is produced in the colour of flowers by growing them in the dark. This led to a letter from Mr. J. C. Costerus (vol. xiii. p. 427), calling attention to the results obtained by Askenasy, published in 1876, who found that some kinds were changed in colour, and some not changed. In the autumn of 1873 I made a number of experiments on this subject, and published a short account of them in the same year in the *Quarterly Journal of Science*, vol. iii. p. 474. I came to the same conclusion as Askenasy has come to, and was also able to establish some important generalisations. I will only mention a few special instances. I was unable to cause any change in the colour of the common Orange Lily (*Lilium aurantiacum*), whereas I found that a very considerable change was produced in the case of *Erysimum Peroffskianum* by only a moderate degree of darkness. This may perhaps be owing to the fact that the orange tint of these two kinds of flowers is due to entirely different substances. That of the lily is due to what I have called orange xanthophyll, whereas that of the other flower is due to a much less stable compound, giving an entirely different spectrum, met with also in the orange marigold, and therefore named by me *Calendula xanthine*. Comparing together the mixed colouring matters found in an equal weight of the petals, I found that the amount of the *Calendula xanthine* was only half as great in the petals grown in the dark, whereas the more yellow constituents were reduced only to three-quarters, so that the general colour was more yellow. I found that a similar change could be produced in the case of the marigold. If shaded when the flowers are somewhat grown, the total colour may be very considerably reduced without there being any material change in the ratios of the different colouring matters, whereas when grown in the dark from a very small bud, the ratios are changed, as in the case of *Erysimum*. Growing flowers in the dark seems to stop the normal development to a greater or less extent according to the nature of the colouring-matters, the effect being the greatest in the case of those substances which are the most easily decomposed. We thus find what appears at first sight to be a very unlikely result, viz., that those constituents which, when dissolved out from the petals, are the most easily discolorised by exposure to light, are formed in relatively greater amount when the flowers are grown in the light, which is easily explained if we assume that a higher vital power, depending on the presence of light, is necessary to overcome the more powerful chemical affinities of the less stable compounds.

H. C. SORBY

The Ash Seed Screw

MR. STEPHEN WILSON remarks, in his note on this subject (NATURE, vol. xiii., p. 428), "Why the seed generally becomes twisted as it dries is a very interesting question. But what seems to me the most remarkable fact about this phenomon is, that in every case, and in all trees alike, the thread of the screw is in one direction." He also alludes to the uniformity in the direction of torsion in the awns of two species of oat. Torsion of all kinds occurring in plants is usually assumed to be due to unequal longitudinal tension (see Sach's "Handbook," p. 770). In a paper read before the Linnean Society, March 16, I pointed out that the uniformity in the *direction* of the torsion cannot be thus accounted for; and a totally different explanation was given of the twisting and untwisting of the awns of certain fruits (*Avena elatior* among the number) when they are dried and moistened. It was shown that the power of torsion resides in the individual cells of which the awn is constructed, and that it is by their combined action that the awn, as a whole, becomes twisted in drying. It appeared to me extremely probable that the same explanation would hold good for the twisted wing of the ash fruit. I therefore boiled one in nitric acid and chlorate of potassium, by which means the woody tissue is separated into its constituent cells. These were then teazed out on a slip of glass and thoroughly dried over a lamp, and it was found that many of them had become twisted on their axes; and, which is important, that they were all *twisted in the same direction as the fruit itself*. This artificial drying represents the natural drying process which occurs during the ripening of the fruit. In both cases contraction and consequent torsion result from the loss of water, but in the natural process the cells not being free to twist independently, are compelled to combine in producing that torsion of the whole fruit which we are considering. It is interesting to find the same principle holding good in the case of the ash screw as in that of the awns of various Gramineæ and Geraniaceæ, and the twisted tails of the achenes in *Anemone montana*. Moreover, I strongly suspect that the principle of the torsion of an organ being dependent on the twisting of its constituent cells is capable of wider extension, so as to embrace the torsion of the stems of twining plants, &c. This subject I hope immediately to investigate.

FRANCIS DARWIN

P.S.—The samara of the sycamore is a more efficient parachute than that of the ash, but the wing has no appreciable twist, and there is no uniformity in the direction of rotation assumed as the fruits fall to the ground.

Down, Beckenham, April 4

The Animal of Millepora

IT is a remarkable fact that during all the discussions on the late L. Agassiz's statements regarding the animal of Millepora some very careful drawings of it have been in the possession of Major-General Nelson, R.E. They were done by himself during his residence at Bermuda at the time when he was writing that communication to the Geological Society on the reefs and general structure of the islands which has made *Lieut. Nelson, R.E.*, a name of mark.

In common with most naturalists, I had expected that soon after the *Challenger* reached Bermuda, we should have had a satisfactory description of this very interesting polyp, so that the truth, or the contrary, of Agassiz's description could be tested. But it was not until July in last year that any communication relating to the subject was sent off from the *Challenger*, the paper being read on Nov. 25, 1875, at the Royal Society. Mr. Moseley noticed therein that the examination of Millepora is beset with serious difficulties, he, however, states that there are large and small polyps, and that both kinds have tentacles, and "they appear to be four in number, and compound." He observes: "they are simply retracted by means of muscular fibres which are arranged round the base of the cylindrical stomach