

the papers themselves, which might be added as foot-notes, or incorporated in the text; and perhaps more distinction might be drawn between the longer researches, or more valuable memoirs of the year, and mere passing scientific observations. However, it is easier to criticise than to compile a work like the one before us. Our readers will form some idea of the comprehensive nature of this "annual record" by the following summary of its table of contents:—Astronomy, together with reports of the American observatories, contributed by Mr. Holden, of the United States Naval Observatory, Washington. Physics of the globe, followed by general physics, written by Prof. Barber, who also contributes the next section on chemistry. Mineralogy by Dr. Dana, and geology by Dr. Sterry Hunt. Hydrography and geography follow, the geography of North America being specially full. Microscopy, anthropology, zoology, and botany are contributed by able men in each department. Agriculture, engineering, technology, and industrial statistics are less full, and some of the abstracts given in technology would, we think, have found a better place under the head of physics, such, for example, as the telephone, phonograph, &c.

The observatory reports are a feature of the present volume, information being given concerning the *personnel* of each observatory, its principal instruments, the subjects of special observation during the past year, and those to be taken up during the coming year, and lastly the principal publications emanating from each observatory during the past year.

The bibliography at the end of the annual, giving the list of works on science published during 1877, seems most thoroughly and ably done, and so also is the index to the whole volume, and the concise and useful necrology of scientific workers. W. F. B.

*Choice and Chance.* An Elementary Treatise on Permutations, Combinations, and Probability. With 300 exercises. By W. A. Whitworth, M.A. Third edition, revised and enlarged. (Deighton, Bell and Co., Cambridge.)

WE have all three editions before us, and so are able to mark the growth of this work, which has been very considerable. The number of pages in the last edition is ten less than that of the second edition, but the volume is much thicker, and much of the matter is in smaller type. The work had already attained the position of a standard one on the subjects of which it treats, and it maintains and even improves its position in the present edition. Here, even in the elementary parts are to be found many propositions of great utility which are not to be met with, so far as we know, in any form elsewhere. We do not mean to say that they are not known to mathematicians, but writers have not introduced them into the text-books. Besides chapters on Permutations and Combinations, we have a chapter on *Distribution*, that is the separation of a series of elements into a series of classes, and one on *Derangements* (if a series of elements have been arranged, or if they have a proper order of their own, and we place them in some other order, we *derange* them). Under the head of *chance* we have a full treatment of that part of Probability which usually finds a place in algebraical treatises. Remarks "On the Disadvantages of Gambling," which formed an appendix to the last edition, here forms part of a chapter which also has a few paragraphs to show that insurance is the reverse of gambling, and discusses the effect of the repetition first of a fair wager, secondly of a wager at odds, thirdly of a fair wager on a scale proportioned to the speculator's means, the general case of a lottery with prizes of different value, and closes with a fairly exhaustive account of the Petersburg Problem. The novelty of this edition is a chapter on the geometrical representation of chances. We shall hope to see this chapter considerably enlarged

in a future edition. The whole treatment may be said to assume nothing but what a well-primed algebraical student should be able to master. What is much wanted is a general treatise on the subject of Probability for English students. Mr. Todhunter's history of the theory down to the time of Laplace is a most interesting and able one, but it does not fill up the gap. In this branch, as in many others, we are dependent upon French writers, and still must have recourse to the works of Laplace, Poisson, and Liagre.

*Pine Plantations on the Sand-Wastes of France.* Compiled by John Croumbie Brown, LL.D., &c., &c. (Edinburgh: Oliver and Boyd. London: Simpkin Marshall and Co., 1878.)

THE subject of the reclamation of sand-wastes by the planting of coniferous trees or of grasses, shrubs, or other plants is one always of much importance. The extension of pine plantations has a two-fold interest over and above the primary cause of planting, namely, that arising from the general improvement in the appearance of the country, as the plants make growth and develop themselves into goodly forms, and that which is more utilitarian, but withal equally important—in the production of timber. Anything that can be done towards reducing the desolation of these French sand-wastes is a point gained not only, as Dr. Brown points out, for the benefit of France herself, but as indicating that what has been accomplished there may also legitimately be expected elsewhere, "not necessarily by the same means, but by means as appropriate, if they can be discovered." As will be seen from the title, the book does not claim originality, it professes to be a compilation, and the copious extracts, with the usual inverted commas, extending often over continuous pages makes this announcement unnecessary. Nevertheless a good work has been done in bringing together in a convenient form a great deal of valuable matter, scattered about in various books inaccessible for the most part to readers for whom the present work is intended, and amongst whom it will, no doubt, chiefly circulate; containing as it does detailed information on every branch of coniferous culture, from a consideration of the soils most suitable to satisfactory culture, to the collecting of the resin, and other economic products, and the diseases and injurious influences to which the plants are subject.

From the range of country under consideration, it will be understood that the pines treated of are limited to very few species, such as *Pinus sylvestris*, *P. maritima*, and *P. pinaster*. J. R. J.

*La Morfologia vegetale.* Esposta da T. Caruel. (Pisa, 1878.)

A NEW text-book of vegetable morphology, characterised by freshness both in the mode of treatment and in the illustrations, is an acquisition to botanical literature, even though written in a language which is unfortunately not familiar to most English readers. Prof. Caruel starts with the primary classification of all vegetable structures into the thallus, which displays no external differentiation, and the cormus, consisting of a central stipes (caulome), to which are attached appendages (phyllomes) more or less differing from the stipes. Under the head of the thallus he then discusses propaguli (of Muscineæ), conidia, sporidia (including zoospores), sporules (or spores, properly so-called), the pollen, and phytozoa (or spermatozooids). The general description of the cormus leads to an account of the various special forms which it assumes, viz., to the morphology of flowering plants and vascular cryptogams; and to the various modes of the reproduction of cormophytes by a process of impregnation, that is, the union of the contents of two dissimilar cells. Finally, Prof. Caruel discusses the various subjects connected with the genesis of species, and concludes with the