

## OUR BOOK SHELF.

*Étude chimique du Glycogène chez les Champignons et les levures.* Par Dr. G. Clautriau, Assistant à l'Institut botanique, Université de Bruxelles. (Hayez, 1895.)

THE absence of starch from the tissues of the fungi has been generally considered as correlated with their inability to form carbohydrate food material from the  $\text{CO}_2$  of the atmosphere, and for a long time it was considered that such carbonaceous reserve materials as they possessed existed only, or at any rate chiefly, in the form of fatty or oily bodies. Within comparatively recent years it has been shown by Errera and other observers that this does not represent the whole of the facts, and that though starch is absent, a very nearly allied body, glycogen, replaces it. The work under notice is a record of some very careful researches, carried out at the Botanical Institute at Brussels, to ascertain the true nature of this glycogen, and whether it is identical or no with the glycogen found in the liver and muscles of many animals.

The chief obstacle in the investigation is due to the peculiar nature of the vegetable organism. Apart from the question of extracting a material like glycogen from a tissue in which cell membranes form a very prominent feature, there remains the difficulty that very many of the decomposition products of cellulose are dissolved by the same solvent, and form mucilaginous material which it is extremely difficult to separate later from the extract of the fungi. The author of the book has with very great pains elaborated a method which enables him to prepare the glycogen in a pure state, and without a very great loss of material. The details of his process are too long to narrate in full; they may be briefly indicated by saying that the fungus is dried at a sufficiently high temperature to destroy the enzyme which is present with the carbohydrate, and reduced to powder by various means. The powder is repeatedly extracted with dilute caustic potash solution till no more glycogen is dissolved. The mucilaginous matter is got rid of by causing an inert inorganic precipitate to be formed in the solution which carries down the mucilage, but leaves the glycogen in solution. The latter is then purified, by treatment which is very fully detailed.

The glycogen has been thus prepared from many species of fungi, including *Boletus*, *Amanita*, *Phallus* and others, also from several yeasts.

Prepared thus, and examined side by side with the animal product obtained from the liver of the rabbit, the two appear to be identical. The solutions are faintly opalescent, and deflect the plane of polarisation to the same extent in the two cases. Both yield maltose when acted on by saliva, and dextrose when boiled for some time with weak mineral acids. Their percentage composition is the same, corresponding, according to the author, to the formula  $6(\text{C}_6\text{H}_{10}\text{O}_5) + \text{H}_2\text{O}$ .

The latter portion of the work is devoted to an examination of the chemical and physical properties of glycogen, particularly its relation to iodine, with which it gives a characteristic brown colouration.

Dr. Clautriau is to be congratulated on making a valuable contribution to our knowledge of the carbohydrate metabolism of the group of plants with which he has been engaged.

*Popular Telescopic Astronomy.* By A. Fowler, A.R.C.S., F.R.A.S. Pp. vi + 77. (London: George Philip and Son, 1896.)

ASTRONOMY has no direct bearing upon industry, therefore it is neglected in this utilitarian age. Technical education is made to include such subjects as political economy, problems of poverty, and great painters; but the authorities which decide what is or is not technical knowledge, draw a line at celestial science. The

result is that astronomy is more studied for its own sake than any other science. But by merely reading popular astronomical literature, it is not possible to obtain a truly scientific knowledge of the heavenly bodies; personal observation of the varying aspects of the midnight sky, and of the chief characteristics of celestial objects is essential practical work compared with which book learning is as nothing. Two obstacles have hitherto prevented a wide enjoyment of the beauties of celestial scenery—first, the prohibitive prices which opticians charge for even small telescopes; and secondly, the absence of small and trustworthy guides to the heavens, suitable for those who have no idea what to seek and where to look. There are several most valuable works for the initiated amateur, but few are of a kind that the unexperienced observer finds intelligible. Mr. Fowler's little book removes both the obstacles referred to. In the words of the sub-title, it is a book showing "how to make a 2-inch telescope, and what to see with it," and very admirably is the promise of the title-page fulfilled. The telescope described is made by each student in the course of Astronomical Physics at the Royal College of Science, South Kensington. By following out the instructions given, a serviceable instrument can be constructed, capable of bringing into view a multitude of stars and sights beyond the range of the unaided vision. There can be no doubt that whoever makes his own telescope, not only performs thereby a valuable exercise in optics, but he is not likely to make such foolish mistakes as the astronomical tyro who procures his polished instrument from the opticians, and looks upon it as akin to a box of tricks.

Two chapters of the book are taken up with the details of the construction of the telescope, and hints on the practical use of it. Then come descriptions of star seasons, accompanied by four maps showing the chief constellations; and the remaining seven chapters are devoted to observations of the sun, moon, planets, comets, stars, double stars, star-clusters, and nebulae. The whole of the work explained can be easily understood and readily performed. The book is practicable as well as practical; every instruction in it can be carried out, every observation described bears the impress of experience. Astronomy will gain more by the publication of this little volume than by the issue of a score of works of a descriptive character.

*Anleitung zur Molekulargewichtsbestimmung.* Von Dr. Gotthold Fuchs. (Leipzig: Wilhelm Engelmann, 1895.)

THIS little book of 41 pages is specially written as a laboratory guide to the methods of determining molecular weights from observations of the freezing-point and boiling-point of solutions made by means of the Beckmann pieces of apparatus. It contains short historical accounts of the theory of the two methods, and descriptions of the apparatus, including the latest modifications, and the modes of making the observations. Lists of data for calculating results when using different solvents, and numerous examples of the kind of values obtained, taken from Beckmann's papers, are also included. The author is careful to direct attention to the anomalies likely to be met with, and has succeeded in writing a trustworthy account of the present condition of these two widely used methods.

J. W. R.

*Recettes de l'Électricien.* By É. Hospitalier. Pp. vi + 352. (Paris: G. Masson, 1895.)

AN electrician's pocket-book, full of workshop receipts, and containing numerous hints of use in electrical laboratories. In the selection of the receipts, the author has exercised discretion, and in their arrangement he shows that he understands exactly the requirements of electrical artificers and engineers.