Laboratory Exercises in Botany. By Prof. Edson S. Bastin, A.M. (Philadelphia: W. B. Saunders, 1895.)

FOR a laboratory manual this book is of great extent, for it includes more than 500 octavo pages, with no less than 87 plates. Yet it is more remarkable for what is omitted than for what is contained in it.

The first half of the book is devoted to organography, and consists of descriptions of the gross structure of a number of types of flowering plants, fully illustrated in the first 37 plates. This part of the book seems to us decidedly well done.

The second half, with 50 plates, is on vegetable histology. Strange to say, it deals simply and solely with the *vegetative* structure of phanerogams and vascular cryptogams. This branch of the subject is illustrated in great detail, and the anatomical work is sound, if not quite up to the highest modern standard.

Not a word, however, is said as to reproduction, development, or life-history. The words *pollen-tube*, *ovule*, *embryo-sac*, *archegonium*, *antheridium*, and *growing-point*, are sought in vain in the index, nor have we found any reference to them in the text, except that ovules are of course mentioned in the descriptive part. In fact, just those subjects which are most important in a scientific course of laboratory work are entirely passed over. The utter absence of any account of the lower cryptogams is also astonishing, for there is no indication that a second volume may be looked for.

The author is professor at a pharmaceutical college, and this fact may help to account for the extraordinary unevenness with which he has treated his subject. Students of pharmacy in America are no doubt required to have some acquaintance with the external characters of the higher plants, and some anatomical training may also be expected of them, with a view to the identification of drugs. Beyond this it would appear that their botanical education is not meant to go. The author has expended great pains on his work, but its manifest one-sidedness renders it quite valueless as a scientific guide to laboratory botany. Students of pharmacy in England are happily accustomed to a very different system of botanical teaching. D. H. S.

The Source and Mode of Solar Energy. By I. W. Heysinger, M.A., M.D. (Philadelphia: J. B. Lippincott and Co., 1895.)

ON the strength of an acquaintance with popular astronomical literature, in many cases not up to date, the author of this work offers a theory which he states to be capable of interpreting all the phenomena presented to us in the heavens. Briefly, we are asked to believe that all interstellar space is filled with attenuated water vapour, and that this vapour is decomposed into its constituents by the electricity generated by the movements of planetary bodies; the oxygen remains on the planets, while the hydrogen goes to maintain the incandescence of the central suns. The author deals very ingeniously with many of the apparent difficulties, such, for example, as the absence of an atmosphere from the moon; but his anxiety to leave nothing unexplained, has occasionally demanded other assumptions, and led to self-contradictions. Thus, in regard to comets, it is necessary to suppose, from the repulsion of the tails, that when they enter our system, they do not behave electrically as planets do, but like suns, and so they should have hydrogen atmospheres; on the other hand, since carbon is assumed to be a "planetary" element (p. 69), they should not contain carbon. This is in complete contradiction with the facts. The author is so much behind the times in spectroscopic matters as to imagine that nebulæ abound in free nitrogen, and possibly oxygen, and that free nitrogen and hydrogen are characteristic of comets. It would serve no good purpose to discuss a theory based on such misconceptions.

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 intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Huxley Memorial.

I TRUST you will allow me through the medium of your columns to make it known that at the meeting of the Provisional Committee, which was held at the rooms of the Royal Society on Tuesday afternoon, it was announced that a large number of acceptances had already been received to the invitation which was issued a few days ago to a number of gentlemen to serve on the General Committee which it had been decided to form to inaugurate a National Memorial to the late Right Hon. T. H. Huxley, F.R.S.

A list of the Committee will shortly be published.

Owing to the lateness of the season, it has been decided to defer until after the autumn recess the meeting of the General Committee, at which the proposals of the Provisional Committee with regard to the form which the National Memorial shall take may be discussed and decided.

With a view of assisting the Provisional Committee in arriving at some general ideas on the subject, it is suggested that those who propose to contribute to the fund might be willing to inform the Treasurer of the probable amount of their subscriptions.

Subscriptions will be received and acknowledged by advertisement in *The Times* by the Treasurer, Sir John Lubbock.

J. D. HOOKER,
July 30. Chairman of the Provisional Committee.

The Kinetic Theory of Gases.

WE shall all agree with Dr. Boltzmann's views as expressed in NATURE of July 4, that if in a system of elastic sphere molecules the free paths be very long, and if at the same time the system be of unlimited extent, condition A will always be satisfied. The system will go on till it attains Nirvana in the Maxwell-Boltzmann distribution.

It is only for a finite system that it appeared to me that occasional disturbances from the outside were necessary to produce this result. I agree with Mr. Bryan that contact with the refrigerator or with the reservoir, such as is supposed to take place in thermodynamics, is for this purpose a disturbance.

But it is this very length of free path, and condition A which follows from it, that restricts our kinetic theory to the limiting case of a rare gas.

We have, as I maintain, to abandon condition A altogether if we wish to present our theory in a form applicable to dense media. We must consider, not single spheres, but groups of spheres to begin with. Given that there are at this instant n spheres, and no more within a spherical space S, but nothing is known of their position within S, what is the chance that their component velocities shall at this instant be

$u_1 \ldots u_1 + du_1 \quad \ldots \quad \ldots \quad \ldots \quad w_n \ldots w_n + dw_n$?

I assume that chance to be

$$Ce^{-h\mathrm{Q}}du_1 \ldots dw_n,$$

in which $\mathrm{Q} = a\Sigma(u^2 + v^2 + w^2) + b\Sigma\Sigma(uu' + vv' + ww')$, the summation including the n spheres and every pair of them. The coefficient b excludes condition A.

But whatever be the values of a and b, this distribution of velocities remains undisturbed by collisions. And by suitably choosing a and b, we can satisfy all other necessary conditions.

The same thing can be done for two sets of spheres of unequal masses m and m'. In that case we must put Q in the form

$$\mathrm{Q} = a\Sigma(u^2 + v^2 + w^2) + a'\Sigma(u'^2 + v'^2 + w'^2) + b\Sigma\Sigma(u_p u_q + v_p v_q + w_p w_q) + b'\Sigma\Sigma(u'_p u'_q + v'_p v'_q + w'_p w'_q) + \beta\Sigma\Sigma(uu' + vv' + ww'),$$

in which the accents ′ refer to the m' set, and $\Sigma\Sigma u_p u_q$, &c., means summation over all pairs of spheres m, &c.

Here we have five coefficients, a, b, a', b', β. But the condition for permanence, notwithstanding collisions between m and m', requires

$$2am' - 2a'm + \beta(m' - m) = 0$$

$$b = \frac{m}{m'}\beta \qquad b' = \frac{m'}{m}\beta,$$