ductions. Air is supposed to be a frictionless fluid, and it needs some little care to distinguish between deductions from theory and experiment. With the assumptions clearly stated the chapters would be sound.

The applications of principles and tables to designs will be quite easily understood and appreciated, the calculations involving only the most elementary knowledge of algebra, and the guiding principles being quite trustworthy.

Laboratory apparatus does not make an impressive portion of the book, the notes given being of very general interest only, and in most cases insufficient to give any practical guidance to students new to experimental aërodynamics.

The remainder of the book is then occupied by descriptions of the successful flying machines and engines. As before, when the author was dealing with established data, the work is good, and as complete as is possible at the present time, the items of further interest being difficult to obtain.

The book is well worth reading by anyone starting on a study of aëronautics, as, in spite of its simple and elementary character, it is a fairly complete survey of the more trustworthy existing knowledge and practice.

(2) It is exceedingly difficult to appreciate the point of view of the author of this book. The mechanical principles involved are curiously contorted, and a brand new theory of lift is put forward which the author confesses may be defective. The theory is then justified by the remark that if modified as indicated "such a theory could not give any determinate data."

Many of the calculations are nevertheless right, and, in fact, are usually so on the assumptions adopted.

Passing over minor points, we find on p. 17 that velocity and acceleration have come to mean so much the same thing to the author, that the reader is told that if V be the vertical velocity of a weight W, which is moved by pushing an inclined plane under it, the vertical force on the plane when moving with constant forward velocity is greater than the force when the plane is at rest by $\frac{WV}{g}$. By sacrificing consistency, however, the author gets back to better dynamical principles when dealing with fluids.

In order to make the mass of fluid dealt with determinate, various arbitrary and improbable assumptions are made, and considering everything, the consequent numerical results are remarkably good. A wholesome respect for records of flights enables the author to extract multiplying factors to replace defects of theory.

On p. 23 is given an *a priori* proof that a "partial vacuum cannot be produced in the neighbourhood of an aëroplane in an open atmosphere. In view of experimental evidence that "partial" vacua are extremely important, an *a priori* proof is absolutely worthless. The argument is, however, consistent with a general attitude of doubt as to the value of experiments on models, the law of relative motion, and the resources of scientific inquiry not being fully appreciated. (Pp. 62–3, &c.)

The very difficult problem of obtaining automatic stability is dismissed in five lines as a simple problem having many simple solutions.

To anyone beginning the serious study of flight this book would appear to be a dangerous introduction. L. BAIRSTOW.

OUR BOOK SHELF.

School of Agriculture, Cambridge. A Course of Practical Work in Agricultural Chemistry for Senior Students. By Prof. T. B. Wood. Pp. 56. (Cambridge: University Press, 1911.) Price 2*s.* 6*d.* net.

IN this modest booklet Prof. Wood sets out the practical exercises through which his students are expected to work during their course in the Cambridge School of Agriculture. It will be studied with interest by teachers of agricultural chemistry in other colleges, who have not as yet any very extensive text-book literature at their disposal. Further, many of them will be anxious to learn as much as possible of the secret of Prof. Wood's success, and to see the details of the course he has evolved since he has been responsible for the teaching of agricultural chemistry at Cambridge.

The exercises set are mainly analytical. Right from the outset the student has to use the accepted method, working it out in all its details; there are no short class-room methods such as would have to be discarded later. Much time is thus saved, for the student has nothing to unlearn when he leaves college and has to attack actual problems in a technical laboratory. The system is only possible, of course, when the student has already had a certain amount of experience of chemical work before turning to agricultural chemistry, but this ought always to be the case.

Where methods are so conventional as they necessarily are in agricultural chemistry, there is little room for originality, but Prof. Wood is not entirely hampered by custom, and has not hesitated to give newer methods where any advantage is to be gained. Thus he uses Neubauer's method for determining the potash and phosphoric acid in soils, which for some reason or other is not commonly used in England in spite of its accuracy and rapidity. He also describes the volumetric method of determining phosphoric acid, in addition to the ordinary gravimetric method. Other exercises include short studies of clay, sand, and humus, the retention of manures by soil, and experiments on oils and proteins. Sufficient detail is everywhere given to enable the student to work on his own account, but there is nothing superfluous, and the whole forty sections go into fifty pages. Altogether the book can be cordially recommended for advanced students, and also for the growing class of men who have to carry out agricultural examinations and analyses but do not want to purchase the large costly manuals. Most of the routine work of an agricultural laboratory is described. E. J. R.

Physical Geography for Schools. By B. Smith. Pp. viii + 190. (London: A. and C. Black, 1911.) Price 3*s.* 6*d.*

"WE have," wrote W. D. Cooley in 1875, "numerous treatises on physical geography which are in reality merely outlines of geology," and he attributed them to the influence of the ardent geologists of half a century earlier who had ennobled the rudiments of geography connected with their own pursuits with the title of physical geography.