

cation and the mainspring of creative life. At any rate, it is that which the people themselves are asking for, but it is the principle which at the moment is threatened with submersion.

Pure and applied science, the author insists, should not be divorced in the schools, and he has some warnings to give science teachers of the danger of "science laboratory courses," where experiments are mainly designed to verify a law, to demonstrate a fact, to determine the value of a physical constant, or merely to measure something. He is all for allowing theories to wait on practical investigations, and most teachers will now agree.

Two criticisms may be offered. The author, with all his belief in the application of science, does not go the whole way and advocate boldly the teaching of applied science in the school. He would find that such a science course would lead in the early stages at school to the elementary (so-called) scientific theories and to mathematical developments. He seems still content to "illustrate" theory by "practical applications"—which, we submit, is illogical and derogatory. However, the method of illustration is dominant to-day—except where needs must, some science may be taught with a vocational "bias," which seems unnatural, crooked, and non-creative.

Even more serious is the author's silence on what is, after all, the most vital thing in scientific education—the growth and development of the "science outlook" on life—the gospel of science.

AVIATION ENGINES.

Aviation Engines: Design, Construction, Operation, and Repair. By 1st Lieut. V. W. Pagé. Pp. 589. (London: Crosby Lockwood and Son, 1918.) Price 15s. net.

THE author expresses the desire in his preface that this book shall prove of use to men in the aviation section of the U.S. Signal Corps and to students who wish to become aviators or aviation mechanics. The subject is obviously one beset with difficulties and restrictions at the present time; not only is practice changing with bewildering rapidity, but much of the information which it would be most useful to impart it is now impossible to print in any book purchasable by the public. These limitations must in fairness be borne in mind when a book on this subject is reviewed, but there are sections of it to which such considerations do not apply, and which can properly be judged on their merits—as it happens, it is in these sections that the main defects of the book are found to lie.

Lieut. Pagé sets out to provide "a complete practical treatise outlining clearly the elements" of the subject, together with sections on the design, construction, operation, and repair of aviation engines. We do not think, however, that the elements have been either clearly or accurately outlined; on p. 21 work is measured on a time basis, and is identified with power; again, on p. 25, momentum is identified with torque, and on the same page pressure, force, and power are

all treated as interchangeable terms. Such confusion must spell disaster to any student desiring to acquire a right knowledge of "the elements," and it is scarcely too much to say that the theoretical section of the book would be best omitted by those who approach the subject for the first time.

The practical part of the book is very much more satisfactory, but overweighted with such irrelevant details as the use and care of files, the use and care of taps and dies, and a section on micrometer calipers and their use. Such details as these are better confined to books on workshop processes, as they are common to all engineering construction. The author has, we notice from certain advertisements included in the volume, already written books—altogether some four or five thousand pages—on such subjects as the modern gasoline automobile; the location of Ford engine troubles made easy; motorcycles, their construction, management, and repair; and like works, and must, we should have thought, have noticed the impossibility of combining reasonable bulk with inclusion of workshop processes. This condition of practical repletion extends also to the discussion, on p. 201, of "why lubrication is necessary," since we find that "proper lubricity of all parts of the mechanism is a very essential factor, upon which the durability and successful operation of the motor-car power plant depends." As this applies equally to the aviation engine (about which the book is written), it is not understood why a reference to the motor-car is required; if this sentence, and certain of its successors, are taken from some book on car engines, it would have been better to edit them in the process.

The book is of interest—and of use—to those who are experienced enough not to be misled by the inexact theory, and can select what is useful from what is not; but as a book for students or young airmen of any sort we much prefer the "Aero-Engines" of Mr. Burls, which is so much in use in our own Flying Service.

H. E. W.

OUR BOOKSHELF.

A Check List of North American Amphibians and Reptiles. By L. Stejneger and T. Barbour. Pp. iv + 125. (Cambridge, Mass.: Harvard University Press, 1917.) Price 10s. 6d. net.

THIS is the third list of the kind issued in America, the earlier being by Cope (1875) and by Yarrow (1882). In the meantime, two monographs have been published by the Smithsonian Institution, viz. Cope's "North American Batrachia" (1889) and the same author's "Crocodylians, Lizards, and Snakes of North America" (1900), which, as Dr. Barbour observes in the Introduction, "are frequently erratic and inaccurate." There was great need of a fresh stock-taking of this rich herpetological fauna, so many striking forms having been added since the publication of Cope's monographs, such as, for instance, *Typhlomolge rathbuni* (Texas), *Ranodon olympicus* (Washington), *Batrachoseps*