

*Elementary Practical Chemistry and Qualitative Analysis.*

By Frank Clowes, D.Sc. Lond., and J. Bernard Coleman, A.R.C.Sc. Pp. xvi + 224. (London: J. and A. Churchill, 1896.)

THIS book, which is founded on Prof. Clowes' larger "Practical Chemistry and Qualitative Analysis" is intended for the use of general students and of technical students in schools and colleges who are desirous of acquiring a general elementary knowledge of chemistry, and who propose to acquire this knowledge in the only true way, viz. by themselves performing experiments in a laboratory. For such students the book furnishes an admirable guide. The first eighty pages contain excellent instructions as to the preparation and use of apparatus, the methods of carrying out ordinary chemical operations, and the modes of demonstrating the properties of common gases and liquids. The remainder of the book is occupied with a course of qualitative analysis, which treats first, at considerable length, of the reactions for metals and for acid-radicles, and then of the actual analysis of simple and complex substances. There is, further, an appendix of useful tables and a good index.

The hand of the experienced and careful teacher is manifest throughout. The importance attached to cleanliness, neatness, and system in the rules given for working; the directions for the verification of the statements made, and for the keeping of the student's notebook; the precautions indicated as necessary for success in certain experiments, the careful attention to detail, and the emphasis given just where it is needed, show that the authors have knowledge not only of chemistry, but also of the "general and technical student," who, if he will observe the instructions, and work fairly through the book, cannot fail to acquire a real knowledge of his subject.

For boys and girls at school, we ourselves should recommend a course on somewhat different lines, starting, for instance, with air rather than with oxygen, following generally a historical sequence, taking the various chemical operations not *en bloc*, but as required in the course, and relegating qualitative analysis to a comparatively subordinate place. But taking things as they are, and accepting as a fact the existing requirements of various public examining bodies, this little work should prove widely useful as a carefully-arranged, clear, and accurate text-book.

*Entomological Notes for the Young Collector.* By William A. Morley. Pp. viii + 129. (London: Elliot Stock, 1896.)

THIS is a little book of the most popular kind, written with the intention of rendering the collecting of butterflies and moths easy to the youngest of beginners. It is illustrated by eight pages of figures representing apparatus, setting, &c., and the text is divided into twelve chapters, corresponding to the months of the year, each including a lesson on apparatus, collecting, rearing, &c., and a list of some of the principal *Lepidoptera* which appear in each month. The book may be useful to those for whom it is intended; and we congratulate the author on his good judgment in advising his readers to learn the Latin names, and to forget the English. Here and there a little revision would be useful; thus Entomology is defined as "that branch of natural history which bears special reference to four-winged insects known as butterflies and moths" (no other insects being even mentioned in the book); Cambridgeshire is the only locality given for *Papilio machaon* and *Vanessa antiopa*; *Lycena artaxerxes* is said to be "generally distributed in England"; of *L. corydon*, we read "On chalk cliffs, common"; and moths which come to sugar are said, as a rule, not to come to light.

W. F. K.

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## LETTERS TO THE EDITOR.

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## The Utility of Specific Characters.

IT is dangerous for a mere mortal to take part in the strife of the gods, or for "gyrating"<sup>1</sup> mathematicians to join battle with biologists. But as the enthusiasm of Prof. Weldon for his subject has so largely perturbed my normal gyrations, that I have devoted many months to the statistical theory of evolution, perhaps I may be permitted a word or two on the subject of the present controversy.

To demonstrate that natural selection, whether secular or periodic, is actually taking place in any species, and to measure its amount, is in the present state of our knowledge one of the grandest pieces of work that could be done. It would achieve for the Darwinian theory what Hertz achieved for the Maxwellian theory of light. At present no one has gone further in the direction of this demonstration than Prof. Weldon, and I am inclined to think with Mr. Thiselton-Dyer—and I take it in opposition to Prof. Lankester—that such a demonstration can only be achieved by the statistical method. If, however, we are to obtain a really solid result of that method, then the mathematical theory, and the logic used, must both be beyond suspicion. Now in any demonstration of the existence of natural selection two points must be borne in mind:

(a) A selective death-rate must be actually demonstrated. This is a problem for fine statistical theory.

(b) The correlation between organ and death-rate must be shown in itself to be not fortuitous. The character must have been selected because it is useful. This I take to be Prof. Lankester's point.

I propose to say a few words as to both (a) and (b).

It appears to me that both Prof. Lankester and Mr. Thiselton-Dyer allow that a selective death-rate has been established in the report on *Carcinas menas* of 1894-5. This view I take to be entirely erroneous, and I so expressed myself to Prof. Weldon and several members of the Committee before the *Report* was published. What Prof. Weldon demonstrates is this—that if crabs chanced to grow in a particular manner, then there would be a relation between death-rate and the size of a certain frontal ratio. What is quite certain is that at the time the *Report* was published, nobody knew how crabs grew; and I very much doubt whether Prof. Weldon, after his laborious two years' study of the growth of crabs, would now uphold the hypotheses he then adopted, e.g.:

(i.) That size could be taken as a safe measure of age.

(ii.) That young crabs of the same frontal ratio do not "scatter" as they grow older.

(iii.) That the amount of growth of crabs of any given frontal ratio is entirely independent of that ratio.

Yet if these—to me very improbable—hypotheses be not accepted, the supposed demonstration of a selective death-rate in *Carcinas menas* falls completely to the ground. The very hypothetical character of the conclusions of the *Report* of 1894-5, appears by his letter of August 26 to be now very fully recognised by Prof. Weldon himself. I am not, however, sure that it has been generally recognised. When the law of growth of crabs has been accurately ascertained, then I am convinced that it will require much more complex analysis than that of the *Report* to ascertain whether a selective death-rate does or does not exist. I should not have said so much on this first point did I not believe that next to blindly rejecting natural selection, the most dangerous course open to biologists is to accept a proof of its existence which is sure one day to be demonstrated as fallacious by one of the many opponents of Darwinism.

On the second point, surely Prof. Lankester is entirely in the right? It is not sufficient to show that there is a correlation between a certain frontal ratio and death-rate in order to assert that the frontal ratio is a cause of death-rate. Very probably it may be, but the demonstration is not logically complete, or at any rate a definition of cause has been adopted which does not appear

<sup>1</sup> The term is due to Prof. Lankester, who thus described us—I think it was to Mr. Thiselton-Dyer—in the early days of the Teaching University movement.