

now propose to carry the get-together enthusiasm of the war over into peace times, to continue to foster the spirit of cooperation and to increase pathological efficiency by coordination of effort where such action is possible and desirable. It is clear that such a movement can not be forced, but must be allowed to grow under tactful management. The Society has therefore appointed an Advisory Board of six members to continue and foster the work initiated by the War Emergency Board. Can not the cooperative movement be extended to include other botanical workers? There are doubtless many botanists in the colleges and universities, especially those more or less isolated from botanical centers, who would gladly participate in cooperative projects. The problems are many, and there is no question but that pathologists will welcome most heartily the assistance of their botanical colleagues. It is probable that in many cases cooperation can be inaugurated most readily by conferences between individuals, especially on the part of workers in the same or adjacent regions, as the contiguity will ensure common interest in local problems, and will facilitate exchange of material and of ideas, and comparison of results. The Advisory Board will be glad to assist whenever possible by providing opportunities for cooperation and by facilitating the arrangements.

Botanists and pathologists are excellent complements of one another. In their closer union lies strength for the upbuilding of our common science in the momentous days which lie immediately before us. Of all the great nations of the earth we have suffered least from the ravages of the world war. We have felt its stimulus, but escaped its devastation. Hence the world is looking to America for leadership in many lines, and botany is one of these. We have the opportunity. We have the men. Have we the spirit? And can we supply the leadership? German domination is for the moment gone, but it will surely reassert itself if we are inactive. We must examine the bases on which German dominance in the field of botany has rested, and supply those factors which we now lack. We must write texts, compen-

diums and monographs to replace the German works which we are now using, and which we must continue to use indefinitely unless we ourselves write better ones. We must disseminate knowledge of botany amongst the people that we may receive the support which will enable compendiums to be written and research to be developed properly in both pure and applied fields. We must broaden our teaching of botanical subjects that we may produce not merely specialists, but the broad gauge men of wide perspective who shall be our leaders. We must stand together as botanists all, whatever our special field of endeavor may chance to be. If we do these things, and we can do them if we will, America will assume the commanding position in world botany.

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U. S. DEPARTMENT OF AGRICULTURE

THE ELEMENTARY COURSE IN ZOOLOGY—IS IT SATISFACTORY?

AMONG the problems presented to the National Research Council by the government was one conveyed in the request of the War Department for the preparation of outlines of courses adapted to the conditions of the proposed Students' Army Training Corps. Like other divisions, that of biology undertook the work assigned it and formulated a suggested course. This was not printed and distributed in time to come into use, so that this effort of the council was entirely abortive. Since, however, biology was one of the subjects listed by the War Department's Committee on Education and Special Training, elementary biological courses of an intensive character were given in many institutions. It was the desire of several divisions of the council to determine the value of the educational experiment presented by the unusual requirements of the government's program. But unfortunately the conditions of the experiment were so disturbed by delays in starting work, by the occurrence of the influenza epidemic, and finally by demobilization of the corps before the completion of the first term, that no estimate could be placed upon the value of the results obtained from the operation of the novel

courses thus introduced. This is the general opinion of those to whom a hasty request for information went.

Along with this condemnation of the Students' Army Training Corps fiasco, there were, however, many expressions of opinion relating to the elementary courses in botany and zoology, among which were a number showing a lively interest in new or modified elements of the course. So pronounced was the interest in the character of the primary biological courses thus displayed that the division of biology decided to extend the inquiry further and so other letters were sent out as opportunity offered. Owing to the difficulty of reaching all those interested by letter, it has finally seemed best to make public through *SCIENCE* a request for expression of opinion regarding the nature of the elementary course in zoology or biology.

The connection of such an investigation into the nature of the elementary courses to research, the main concern of the National Research Council, may not be entirely obvious to all. That a relation of a somewhat intimate nature does exist seemed indicated to the division of biology when its executive committee undertook a general survey of the field in laying plans for a reorganization of its work for times of peace. Unless there be students trained in zoology there is little chance of developing new investigators in the subject, and in this training the elementary course occupies a peculiarly significant and important place. It offers the first contact between student and subject and has much to do with the formation of future tastes and habits. It forms, moreover, the chief connection between the zoology department and the college as a whole, and offers the greatest opportunity for exerting the proper influence upon the school. There seems also to be general agreement that this course is the most difficult to plan and to execute.

Because of these facts, and for the reason that the research council has the broadest interest in the relation of science to human welfare, it seems very properly one of its concerns to discover the kinds of elementary

courses in science best adapted to serve as the first step in the preparation of scientific investigators and as the means for exerting the strongest and best influence upon the general college student.

Unless it be assumed that any kind of elementary course is satisfactory there must be some forms of it best adapted to meet the common needs of college students. That such is the feeling of many teachers is evidenced by the numerous attempts to formulate standardized beginning courses. Most of these have failed in their prime object because of emphasis upon nonessentials, although they have served a good purpose in stimulating discussion. The lesson seems to be written clear that if any large good is to be served by reopening this discussion there must be consideration of broad principles and an avoidance of unessential details. It seems a matter of no great moment whether the amoeba is studied at the beginning or at the end of the course, or at all. The amount of time devoted to any one type is not of great general concern but is a point which must be decided according to circumstances. To what extent, however, are the determining conditions of the course common to all institutions and how much allowance must be made for local conditions? Are there fundamental elements of a broad introduction to biology which necessitates the use of both plant and animal material or may the subject be presented adequately using either alone?

After satisfactory conclusions have been reached with regard to the general principles which should guide the construction of the introductory course, there are of course numerous practical questions which have a large bearing upon the success of its operation. How much time should be given it? Should the application of the student be consecutive or interrupted? How much of lecture, laboratory, conference and quiz work should there be? What use should be made of drawing and modelling? Should the work be given in the form of problems? How many forms of animals should be studied, etc.?

In order to arrive at any valid conclusions

regarding the problem raised by this investigation it would seem most appropriate to consider it in the light of any other scientific problem and to apply to its solution the scientific method. There should be no place for prejudice or for inertia. A rigid determination of the facts is called for, as a basis for conclusions. Such generalities as "the course should give a broad introduction to the subject" or "the course should give a look in on the subject" or "the course should cover the ground" do not contribute much to a reasonable practise. Only a clear analysis of the conditions inherent in the subject, of its interdependence upon other subjects in the curriculum, of the character of students to be taught, and of the instructor's part can lead to conclusions of value.

There are, accordingly, certain fundamentals which seem to demand attention. The first of those is the purpose for which the course is given. Is it primarily concerned in presenting the content, aims, methods or applications of the subject? Or is it possible in one course to include all these equally? Again, what form of presentation is the course to have—is absorption, verification or discovery on the part of the student to be emphasized? In considering the character of the course it would seem necessary also to have in mind the reason for its inclusion in the college curriculum as one of a series of more or less required subjects. Does it find a place here because of a certain informational value which recommends it to every liberally educated man, or is there something peculiar or distinctive about its methods or viewpoint which is absent, or less well represented, in other types of subjects?

It is true that no subject stands alone and that it is therefore impossible to make a complete and satisfactory determination of a course without taking into consideration, not only its interrelations within the curriculum, but also the varied material circumstances of the institution in which it is given. These considerations should not however prevent the fullest analysis of the problem or delay unduly the execution of such steps as are practicable

for the improvement of the work. The influence of a thoroughly scientific practise in one department of a college can not fail to manifest itself to some degree in others and might lead to a much needed survey of the whole problem of college instruction. From the statements so far received it is apparent that there is lacking among biologists any general agreement upon the nature of the elementary biological courses and upon the reasons for their inclusion in the preparation of the liberally educated man. Such a situation would seem to be hardly commendable for any subject, and especially not for biology which deals with materials and processes in which purpose is so evident.* It is possibly due to this lack of definite purpose and practise that biological subjects do not occupy the place in the curriculum which the best interests of the college students would require.

If there can be a full expression of opinion on these questions, after careful consideration, it may be possible to arrive at some general conclusion that should guide the operation of elementary biological courses. In this event it would then be possible to decide upon practical details with much less trouble, and with more profit. It is hoped that there will be such a general interest in this subject that a consensus of opinion upon at least the major elements of theory and practise may be reached. In order partly to guide such a consideration there will be published a number of typical outlines of courses already received upon which criticisms are invited. These suggestions and any other discussions upon the subject of zoological courses may be addressed to

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National Research Council*

WASHINGTON, D. C.

WALLACE CLEMENT WARE SABINE¹

OUR colleague, Wallace Clement Ware Sabine, was born in Richwood, Ohio, June 13,

¹ Minute on the life and services of Professor Sabine placed upon the records of the Faculty of Arts and Sciences at the meeting of March 18, 1919.