Further work is being done on the inheritance of this taste deficiency, its linkage relations and its physiology, and these results will be reported in detail in the near future.

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GETTING THE STUDENT TO USE HIS OWN INTELLECT

PROFESSOR WILLIAM A. RILEY in his timely address as chairman of the Section of Zoology of the American Association for the Advancement of Science reverts to the advice given by Huxley in 1869 that, "if the great benefits of scientific training are sought, it is essential that such training should be real; that is to say, that the mind of the scholar should be brought into direct relation with the fact, that he should not merely be told a thing but made to see by the use of his own intellect and ability that the thing is so, and not otherwise."

In discussing the relation of this advice to the present educational situation Professor Riley incidentally raises a question without answering it. The question is how far laboratory work as now carried on in secondary schools and colleges is essential to the purpose of inducing students to use their own intellects. This topic has recently aroused a good deal of interest among teachers of science and is one which deserves serious consideration.

The usual way of conducting laboratory work is to put into the hands of the student a laboratory manual or sheet of directions which he must follow in order to produce the expected result. Subsequently he reads an assignment in a text-book and listens to a lecture. If this is the best possible way to get the student to do his own thinking it fully justifies the expenditure of money, space and time needed for the equipment of the laboratory and the conduct of laboratory courses. If it is not the best way and classroom demonstrations, lectures and text-books will serve equally well, then the expenditure is not justified.

Possibly the question might be answered conclusively if the same kind of subject-matter were presented to two classes equal in numbers, age and intellect but working according to the two different methods and at the end of a definite period tested with regard to their ability to solve problems involving application of what they had learned. Failing such evidence there may yet be some profit in discussing the probable relative advantages and disadvantages of the two methods in the light of experience both educational and practical.

In actual life more than one kind of thinking is needed. The successful chauffeur or cook must be able to see relations between concrete, material things and swiftly draw the correct conclusions. To me the probabilities are in favor of this ability being developed and strengthened more effectively if the chauffeur or cook actually drives a car or prepares a meal than if he simply watches a demonstration or hears an explanation. A combination of the two methods would be still more effective. Similarly if, in teaching science, we as educators wish to develop and strengthen the habit of thinking with the aim of producing particular effects on concrete material, a combination of individual laboratory experience with demonstration and explanation is advantageous. If children are being taught botany with the object of becoming better gardeners or farmers there is a real advantage in individual observation and experimentation with seeds and seedlings over demonstration with charts and models. A future practical chemist will benefit more by handling apparatus and reagents than by watching some one else do the same thing.

When the educational problem is less definite, when science is being taught not with the immediate aim of training for a specific occupation but of developing general mental powers, of establishing a scientific attitude, of giving practice in dealing with abstract as well as concrete ideas and of enabling the student to understand everyday happenings, what are the advantages, if any, of individual laboratory work? Will, for example, powers of observation and comparison be developed better if each student is supplied with specimens of plants or animals and asked to make a list of similarities and differences or if the teacher points them out on a chart or model? Which will leave a more lasting impression of the fact that heat causes gases to expand, for the children to make bubbles rise through water themselves or to watch the teacher do it?

The answer seems obvious. The secret of the greater effectiveness of individual laboratory work lies in the increased motivation. Most young people love to be active and to bring about results by their own efforts. Interest is greatly enhanced if the problem is sufficiently simple for them to devise their own method of solving it. This has the additional advantage of helping to establish the habit of self-reliance.

I believe it is a fact that some laboratory courses do not stimulate initiative and interest and I believe that this is because the laboratory directions make no appeal to the student. They are carried out simply as a matter of routine in order to prepare for the lecture or quiz which is to follow. In other words, the chief consideration has been the logical development of subject-matter rather than the stimulation of the student's initiative and powers. The reverse process is better suited to encourage independent thinking. When the student's interest and initiative have been aroused he can the more readily be led to realize the necessity of logical arrangement of ideas.

Since pupils differ widely in ability to absorb and to utilize knowledge and also in the kind of lives they will lead after leaving school and college, the real success and value of any method will depend on its adaptation to the personality of the pupil. The ancient method of professorial lecturing and student note-taking is noticeably lacking in objectivity and individualization. The opposite extreme of detailed and minute laboratory study of specimens and processes achieves great objectivity at the expense of perspective and broad understanding. It fosters habits of mental short-sightedness. A middle course is indicated, individual laboratory work suited to the student, supplemented by reading, demonstrations and discussion in which the student has an opportunity to take part.

The question has its economical aspect also. When a limited sum of money is apportioned to departments of science an obligation exists to expend it advantageously. Duplication of simple, inexpensive apparatus easily manipulated by the students and the purchase of single pieces of more complex apparatus for purposes of demonstration would seem best.

The entire abandonment of individual laboratory work would surely be antagonistic to the purpose of mental development. Research is unnecessary to prove that point. Investigation to determine beneficial modifications of present laboratory practice in order that it may be better adapted to the interests and needs of the students would be more to the point.

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POSITIVE GAS PRESSURE IN POPLAR

IN line with a recent article in SCIENCE entitled, "Positive Gas and Water Pressure in Oaks," by C. A. Abell and C. R. Hursh (SCIENCE, 1895, p. 449), I am reminded of three cases of positive gas pressure, all in large trees of *Populus tacamahaca* Miller (*P. balsamifera* L.) in a recent summer in northern Michigan. In all three cases there was a distinct hiss as soon as the instrument borer went in about 2–3 cm, which continued during most of the rest of the boring. The pressure was not sufficient to force the core out of the increment borer and could be heard only in the vicinity of the tree. One of these trees, which was 40.6 cm in diameter, was cut down. This tree was sound throughout and bled very actively from the stump.

Hundreds of borings on the two aspens (*Populus tremuloides* Michx. and *Populus grandidentata* Michx.) in no case were accompanied by any evidence of positive pressure.

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SOCIETIES AND ACADEMIES

THE NORTH CAROLINA ACADEMY OF SCIENCE

THE thirtieth annual meeting of the North Carolina Academy of Science was held at State College, Raleigh, N. C., on May 8 and 9. Papers were presented before the general section of the academy on Friday morning and afternoon. On Friday evening the retiring president, W. F. Prouty, professor of geology in the University of North Carolina, gave the presidential address on "The Origin of Folded Mountains." On Saturday morning the academy met in the following sections: general section, chemistry section, mathematics section and physics section. Eighty papers and twenty-four exhibits were on the program. (Abstracts of most of these and complete papers of several will appear in an early number of the *Journal of the Elisha Mitchell Scientific Society*.)

Resolutions of respect were passed in honor of two deceased members, William Cain, Kenan professor emeritus of mathematics in the University of North Carolina, and John William Nowell, professor of chemistry in Wake Forest College.

The executive committee reported the election of thirty-four new members during the year, and the reinstatement of eight former members. One hundred and eighty-six registered at the meeting.

Walter Burke Davis, a student of the Greensboro Senior High School, was declared the winner of the high-school science prize, a silver loving-cup, for the best essay submitted by a high-school student. (Essays for 1931 were confined to the fields of biology and geography.)

The officers elected for the year 1931–32 were:

GENERAL ACADEMY

President, F. A. Wolf, Duke University.

Vice-president, W. E. Speas, Wake Forest College.

Secretary-treasurer, H. R. Totten, University of North Carolina.

Executive Committee, the above officers; Bert Cunningham, Duke University; W. L. Porter, Davidson College; F. W. Sherwood, N. C. Agricultural Experiment Station.

Representative to the A. A. A. S., H. R. Totten, University of North Carolina.