SCIENCE

VOL. LVIII JULY 27, 1923 No. 1491

CONTENTS

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKeen Cattell and published every Friday by

THE SCIENCE PRESS

Lancaster, Pa. Garrison, N. Y.

New York City: Grand Central Terminal.

Annual Subscription, $6.00. Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

Application made for transfer of entry as second-class matter to the Post Office at Lancaster, Pa.

THE EDUCATIONAL VALUE OF A UNIVERSITY NATURAL HISTORY MUSEUM[1]

IN President Rea's address before the 1920 meeting of the museums association it is stated that 38 per cent. of the 600 museums of the United States are supported by colleges and universities, and that of this number but five expended $1,000 or more in the year 1910. It is also stated that of this 38 per cent. the great majority are uncared for or ill cared for. With a few notable exceptions this statement is true of the natural history museums of 90 per cent. of the colleges and universities.

The reason for this deplorable condition is not hard to find. A generation or two ago the study of natural history, or "natural theology," centered about collections of natural history material—corals, shells, fossils, minerals, birds, etc.—and taxonomy was considered the *summum bonum* of science. As time passed, the wonderful discoveries in genetics, in evolution, in experimental biology, gradually superseded the previous systematic studies, museum specimens were used less and less, and finally, in many colleges, ceased altogether. The museums were nominally under the charge of a professor of zoology or geology, who gave little time to the care of the material. The collections in these colleges have thus gradually gone from bad to worse, and in many cases the perishable material is now of little or no value.

An instance is recalled that in one museum in a large university a collection of kangaroos had been received and stored in a room on the upper floor of a building, where they remained for a number of years. When examined it was found that moth larvae had eaten away the bases of the hairs and the whole back came off like a blanket when touched. This entire collection was thus completely ruined because of lack of funds to provide a tight case and some one to care for the material. In another university a valuable collection of insects had to be destroyed because of its infestation with dermestes. These examples could probably be duplicated many times.

What, then, is the remedy for this distressing condition which renders so large a percentage of our university and college museums ineffectual and a re-

[1] Contribution from the Museum of Natural History, University of Illinois, No. 30. Read before the American Association of Museums, May, 1922.

proach to the profession? The remedy seems plain—the organization of a separate museum department under the charge of a trained curator in every university and college. Is this possible? I think it is, largely. It is a question of convincing the administrative officers that such a step would materially advance the value of the college in its undergraduate as well as its graduate work. This missionary work must largely be carried on by the American Association of Museums. Think what a powerful impetus would be given to the museum movement if 75 per cent. of the 38 per cent. now ineffective could become effective departments of the institutions in which they now but occupy room probably needed for class rooms.

The problem that first presents itself to one seeking to energize these old museums is, "How can I convince the president or trustees that the museum is of vital importance?" For the question put at once to the enthusiastic museum supporter will be, "Of what value is this material to the curriculum of this college?" And this is but a fair question which we ourselves must answer convincingly. Are the methods in use in the modern public museum of value also in a purely educational institution like the college?

Having had a wide experience of some twenty-odd years as curator of a public museum in a large city and also an experience of some seven years in two universities, the writer feels that he can speak with some degree of authority on this subject. With some modifications, made necessary by the change from a public museum to a university museum, the methods in use in a modern public museum are admirably adapted, even necessary, for use in a college museum, large or small. I wish, in the few moments at my disposal, to indicate concretely how a university museum should develop in order that it may be of value and importance to an educational institution of this kind.

These are the days in which visual education is being preached far and wide. The museum has been a pioneer in the field of visual education, and the big city museum is to-day the best single factor in education through the eye. There is scarcely a subject taught in a college that can not be very materially aided or rendered clearer by a carefully planned and executed exhibit. Sir Edward Flower's epigram that the value of museum exhibits depends largely on the method of their exhibition and the use made of them for the purpose of education is so fundamental that it should be considered one of the basic laws of museum administration.

In order that I may be specific let me outline a few exhibits that are or might be in almost daily use in undergraduate classes. A course in systematic zoology is rendered intelligible only by reference to a well-organized synoptic collection, arranged to show the leading types of the animal kingdom from simple to complex organisms, with an abundance of descriptive labels outlining in more or less simple language the general characters that distinguish one group from another, interesting notes on evolution, distribution or economic use. Maps, diagrams and other illustrative matter should be liberally used. The subjects of evolution, distribution and development can be admirably illustrated by museum exhibits.

Ecology, the modern natural history, can be made both interesting and intelligible by habitat groups, which need not be expensive to be effective. The invertebrates lend themselves more readily to the preparation of habitat characteristics because more profoundly affected by external conditions, and many small vertebrates can be added, so that fundamental principles can be expounded at less expense than by the large and more expensive habitat groups. The group idea is admirably adapted for the presentation of problems in agriculture. These may be of a monographic character, showing, for example, the principal insects affecting corn, grass, fruit, etc. Three such groups at the University of Illinois—corn insects, apple insects, insects in winter—have been found of value to entomology students as well as to the farmers and agriculturists who take short courses in the college of agriculture. A case of local birds is an organic part of a course in ornithology, and during the time of the course students may be seen studying the specimens at different times every day. This exhibit is an integral part of the university curriculum.

Historical geology or paleontology can not be well understood by the undergraduate student without the aid of a well-organized stratigraphic collection in which he may see the actual organic remains described and figured in his text-book arranged in cases in proper relation to each geological period, beginning with the oldest, where he may follow the changes that have taken place during the long period of time since life first made its appearance on the earth. Here he may see a type of animal or plant rise, decline and become extinct, to be followed by another type, often quite different from the first type. In my own museum, half of a large hall is to be devoted to this subject next fall, because so urgently needed.

In modern geography, the museum can be of the utmost value, for here, by the use of models and specially prepared exhibits, the common things of life from all countries may be shown in such a manner as to indicate clearly the relation of various raw materials to present civilization. Thus cotton, steel, rope, paper, buttons, aluminum, petroleum and many other commodities may be graphically exhibited so that the different processes of manufacture may be indicated. Models of physiographic geology may also

be added and will aid in showing how a group of peoples have taken advantage of geographic conditions to aid their social and economic development. Ethnology is but a branch of geography, and by the aid of small groups and actual material the different races or tribes of a country may be made to live again in the imagination. To the college of commerce these exhibits will also prove of value.

The foregoing relates only to the material exhibited in the public halls—the undergraduate side of the museum. But there is another side which must be considered by a strong university—the research or graduate side. Such an institution should accumulate in an accessible manner large series of groups of animals, plants, geological material, etc., for the use of graduate students and for working scientists, both among the faculty and in outside institutions. In this department valuable collections that have formed the basis for formal papers may be carefully preserved for future study. Such material should be cared for by installation in compact drawer cases contained in study rooms away from the museum halls. These collections provide the scientific standing of a university museum.

The question will naturally be asked, Whether the average college can do this? I think it can. Many colleges, of course, are handicapped by lack of funds, and to these the establishment of an adequate museum would be impossible. But there are many colleges and universities in which this department can be established, or, if already established, made stronger. In many cases, public-spirited citizens of wealth would gladly help such a movement if the college museum could be open to the general public and its collections made attractive. I believe that such an arrangement could be made that if the college provided the room, the business men of the town or city would be very willing to bear a large part of the expense of administration of such an enterprise.

I have been asked at different times to indicate the kind of man that is best suited to successfully administer such a department, especially in a college of moderate resources. A curator for this department should, of course, be a man of good education (not necessarily with a doctorate), but above all he should be capable of using both head and hands, with inventive ability, resourceful, and with a pleasing address, working easily in cooperation with other departments. A few such men are available from the ranks of the public museums, but many may have to be especially trained to become college curators.

The items of expense are usually objected to when the subject of a new department is suggested. This need not be great. A good salary for the curator, plus $2,000 per year for development, will accomplish wonders if the curator is of the right sort. Much may be done on less, and greater results will follow larger resources. It would seem possible to establish the kind of museum outlined above in all our larger universities with a relatively small expenditure of money. It is being done at Illinois, and also in some other state universities, and should be in others.

My experience of five years at the University of Illinois has shown conclusively that a modern working museum is a highly desirable part of a large university and that the methods in use in our great public museums are in the main applicable to the needs of the university museum. Most universities are far removed from the large city museum and can not enjoy their privileges. In a university situated as is the University of Illinois, in a small community far removed from the great metropolis, such a place as a museum becomes of wide significance, providing not only material aid for the curriculum but also a place for healthful recreation where the entire student body may go and unconsciously gain knowledge of the great world about them, much of which will be second in importance only to the regular courses they may be taking. It is my purpose at the University of Illinois to show that a natural history museum can be one of the most potent factors in general education.

FRANK COLLINS BAKER
NATURAL HISTORY MUSEUM,
UNIVERSITY OF ILLINOIS

AMPHIOXUS FISHERIES NEAR THE UNIVERSITY OF AMOY, CHINA

THIS note is to announce the discovery of an apparently inexhaustible supply of amphioxus near the University of Amoy. The ease with which these zoologically important little animals are to be obtained here should make them available in practically unlimited quantities for students of biology the world over. It has been my privilege recently to visit the village of Liuwutien,[1] about six miles from the University of Amoy, the source of livelihood of whose inhabitants is the amphioxus fisheries, to make a preliminary investigation of the methods employed in their capture and, as a fitting climax, to partake of a luncheon, several dishes of which consisted in main or in part of amphioxus.

The term fisheries as applied to the capture of amphioxus will no doubt seem strange to zoologists, not so much because amphioxus is not a fish as because of the impression we tend to gather that it has not been found, hitherto at least, in sufficient numbers

[1] Lakotiam in the local dialect.