direction. A new type of genetics course might be developed in which elementary principles, physiological genetics and the application of genetics to the human being would be emphasized.

Another important point was briefly mentioned but not discussed at the Woods Hole meeting: The frequent complaint of medical school instructors that the college fails most seriously in the formal education of the students. Their faculty of logical reasoning and of independent thinking are not sufficiently developed. They are not able to draw simple conclusions from premises. They have not acquired the ability to express themselves concisely in words or in writing. I believe that these criticisms are by and large justified. The fault lies in part with our teaching methods. We are apt to apply without discrimination the methods of elementary courses to the junior and senior level, where they do not belong. A number of colleges and universities have gone a long way towards improving this situation, but much remains to be done. It is suggested that a new seminar or discussion type of an advanced course be designed in which the formal lectures are reduced to a minimum. Instead, the students would be guided to discuss and evaluate phenomena observed in the laboratory or demonstrated by slides; to formulate conclusions and explanations; to suggest further experiments, and to present short reports. In this way, an atmosphere can be built up in which the emphasis is not on memorized facts, lecture notes, examinations and grades, but on the satisfaction derived from independent thinking and the insight into the scientific method. The subject matter of such a course would be of secondary importance. We have had excellent results along these lines in a summer course organized in conjunction with Washington University Medical School, in which problems of growth, experimental embryology and developmental genetics served as the basis for the discussions.

VIKTOR HAMBURGER

WASHINGTON UNIVERSITY,
ST. LOUIS

SUPPRESSION OF VITAL DATA

THE publication of the results of research is intended to inform the world, and above all the scientists engaged in parallel investigations, of the progress made; that prestige attaches to priority in publication is relatively a trivial consideration. A claim for priority should be explicit enough to show belated rivals whether their work is still sufficiently different in method from that of the first-comers to be worth completing. The scientist is not bound to broadcast his hopes for the future of the research, nor to commit himself in print to beliefs not fully secured by experiment; on the other hand, he is, surely, not entitled to suppress uncontroversial facts that are essential to understanding and appraisal of his paper. Thus Hutchings and others[1] must have known, but did not mention, the source from which they isolated a new *Lactobacillus casei* factor; and though synthesis is not always an unequivocal proof of chemical constitution, SubbaRow and others[2] must have known, but did not mention, at least the starting point and procedures selected for their synthesis of a compound apparently identical with the *L. casei* factor from liver. It is not to be supposed that it was considerations of national security that dictated this omission of vital information. The columns of SCIENCE should not be open to communications of this kind.

D. L. THOMSON
H. E. HOFF

MCGILL UNIVERSITY,
MONTREAL

THE YALE CYCADEOIDS

ONE hundred years ago the famous Buckland finely illustrated the Dinosaurs and other ancient reptiles of South England. Also well illustrated, were low and bulky accompanying petrified plants correctly inferred to have some relation to "sago palms." These, however, were not well understood and remained relatively unstudied, as had isolated types from the Carpathians and elsewhere in Europe.

The final and inescapable incentive to acute structural study of the sago-palm relatives or "fossil cycads" was yet to come from the vast assemblage of specimens which came into view in the Mesozoic Rim of the Black Hills of South Dakota and Wyoming from 1893 on. It was presently found that counting the more isolated finds the Hills were girdled by occurrences of the fossil cycads, with some vertical distribution in the latest Jurassic and lowermost Cretaceous. The Dinosaurians were also found present in vast array.

Such an array could not escape that acutely aggressive assembler of paleontologic evidence, O. C. Marsh, of Yale. He at once made extensive purchases from local fossil hunters about the Hills. And then, when the dinosaur *Barosaurus* was collected at Piedmont by Wieland as Marsh's student, the "cycads" took on an immense meaning. The acute study was begun. The collections were signally added to, so that now the Yale collection of fossil cycads perhaps equals all other such collections put together. Their study, as extended to the more severely scientific viewpoints, has led to the publication of splendidly illustrated quarto volumes as brought out with the aid of the Carnegie Institution of Washington. Also, collateral

[1] B. L. Hutchings and others, SCIENCE, 99: 371, 1944.
[2] Y. SubbaRow and others, SCIENCE, 102: 227, 1945.

study has been extended to Mexico and Patagonia, with moreover most careful elaboration of the likewise finely silicified but rare types of the Carpathians.

The preliminary approach to the Yale cycad study was perforce macroscopic, as arranged by Marsh with Lester F. Ward. That meant an arbitrary naming of species. But that was no less the severely practical line of approach. As Ward well said, the cycadeoid series was to the plant life of the Mesozoic what the dinosaurs were in that animal world.

The closer study of the cycads, with the initial help and advice of Marsh and Ward, was nextly carried forward by Wieland, attention being given to both structure and further collection in the field. By 1906, the first quarto on the American Fossil Cycads was brought out. Then, that fine paleobotanist of all time, D. H. Scott, said, "The brilliant elucidation of the American Fossil Cycads by Dr. Wieland at Yale has for the first time brought the origin of the modern types of flowering plants within the range of scientific discussion." A new chapter had been added to the paleontologic texts.

Moreover, the work has gone on in the laboratory and the field, but with many difficult and varied tasks yet ahead. Change within Yale has resulted in removal and restorage of the tons of material, following the dismantling of the old Peabody Museum, four times. The great collections are safe, but far from clearly in view for either purposes of study or exhibition. The related studies of Mesozoic floras indicated as severely needed have about lapsed.

In for the present closing these brief notations, two pleasant interludes must be recorded. By accident in 1927 following a detour in the Black Hills it was learned that a large once flowering type had been found in the "Mesaverde" series of the San Juan basin of New Mexico. This was the sixth such type from the known world. Aggressive examination of the new field of occurrence followed in the summers of 1928 and 1929. This surpassed expectation. Two tons of the new types were secured and have been freely cut and preliminarily described under the new generic name *Monanthesia* or once flowering. Several distinct species are present, and the descriptive memoir with free illustration is now well forward. An addition to Yale collections and to the great subject of cycadeoid study of a fascinating interest is here seen. There followed the November, 1935, collection of one ton of *in situ* specimens on the front mesa of the Fossil Cycad National Monument. Work afield is never safely to be neglected, is ever fully as important as laboratory study.

The 1935 Fossil Cycad National Monument collection is now stored at Yale for safe keeping, against the day of return for exhibit in the museum yet to be erected on the frontal mesa of the Monument.

The plans for bringing to the fore the immense educational value of the F C N M have been freely discussed in print, and are slowly reaching clear understanding. In few words, the Monument is a contribution from the Carnegie Institution and Yale dedicated to the cause of science through the centuries to come. The Bureau of National Parks and Monuments has in course come into a great responsibility. For the Monument marks the finest cycadeoid locality yet found on the globe and must be held sacred, intact and free from theft or trespass as an educational point of both international interest and surpassing value. The closest analogue yet remains hidden in the Galician Carpathians.

G. R. WIELAND

YALE UNIVERSITY

SCIENTIFIC BOOKS

GENETICS

Genetics. By EDGAR ALTENBURG. xii + 452 pp. Illustrated. New York: Henry Holt and Company. 1945. $3.20.

THE publication of a new text-book in genetics is a rather rare event. Several good texts are available, and the market in terms of number of students is limited if compared with that of books on general biology, college physics or similar introductory topics. The purpose of a college course in genetics is less well defined than that of many other courses. Some of the advances in genetics have so far outrun possible practical applications that they are of less immediate preprofessional use than, for instance, the facts of chordate anatomy to the student planning to enter a medical school, or physical chemistry to the future chemist. Nor is a course in genetics a generally recognized prerequisite for advanced work in fields other than genetics itself. Primarily then, a course in genetics is offered because this science has become a basic branch of biology, one about which the student should be informed.

Altenburg's book serves this purpose admirably. The author states in his preface that in preparing the manuscript he constantly asked himself, "Could I understand this if I were the student?" The text bears witness to this self-questioning of an experienced teacher. While a great many aspects of genetics are covered within 452 pages, the treatment is never too condensed, and singles out skilfully for detailed discussion many points of special importance or of potential difficulty. Consequently, the