leading American climbers during the past few years, has left Zermatt for Amsterdam to join as chief guide to the Dutch expedition, which is leaving shortly for Bombay. The expedition will be divided into two sections. While the scientists will remain around the snow-line with their base at Kashmir, the alpinists will attack unclimbed peaks of the Himalayas, including Mount Everest.

FINANCIAL needs of the Bureau of Mines of the Department of Commerce to enable a broader field of research were emphasized before the Senate Committee on Mines and Mining on February 15 by the director of the bureau, Mr. Scott Turner. The importance of the industry for which additional aid is asked was illustrated by Mr. Turner, who testified that gross mineral production in the United States in 1928 aggregated $5,400,000,000 as compared with $12,253,000,000 for agricultural products in the fiscal year 1928.

THE J. T. Baker Company, eastern division, has established a research fellowship in analytical chemistry of the value of $1,000 a year. A similar fellowship has been established by this company in the midwest and other sectional fellowships are contemplated. The committee of award is composed of Drs. N. Howell Furman, Princeton University, *chairman;* Philip E. Browning, Yale University, *secretary;* Gregory P. Baxter, Harvard University; E. M. Chamot, Cornell University; H. A. Fales, Columbia University.

EDWARD S. HARKNESS has made a gift of $150,000 to the Neurological Institute of New York City. The cost of completing and equipping the new building of the institute at the Medical Center has been $1,900,000, of which $300,000 remained to be raised when Mr. Harkness made his donation. The sum of $150,000 remains to be contributed before the opening of the center unit on full scale.

A GIFT of $480,000 for development of civil aviation in Chile has been made by Mr. Daniel Guggenheim.

AN insectary has recently been completed at Iowa State College, equipped with greenhouse facilities, screened out-door laboratory and underground laboratory for the study of subterranean insects. Among the studies which this new building is already making possible are researches on oil sprays and other insecticides, on the life history of stored grain insect pests, on the native corn borer, on onion pests and on truck garden and field pests.

UNIVERSITY AND EDUCATIONAL NOTES

THE University of California will receive a gift of approximately $140,000 from the estate of the late James Sutton, recorder of the institution for more than thirty-seven years. The will contains a provision that half of his estate shall go to the university, with no restrictions as to how it shall be used.

GIFTS of $2,000,000 from the General Education Board of New York and the Julius Rosenwald Fund of Chicago have been received by the Meharry Medical College, Nashville, for the establishment of an adequate school for the training of Negro physicians. A part of the project, to which alumni will contribute $200,000, will be a 120-bed hospital. There will be facilities for 200 students and departments of dentistry and pharmacy. The college was established in Nashville in 1876.

ASSEMBLYMAN JAMES R. ROBINSON, of Ithaca, has introduced a bill in the legislature providing $1,000,000 for the construction of a home economics building at Cornell University.

A BILL carrying an appropriation of $12,000,000 for the establishment of a national university, with an endowment fund of $60,000,000, as a memorial to George Washington, has been introduced in the House by Representative Guyer, Republican, of Kansas.

AT Stanford University, the following promotions to assistant professorships have been made: Albert Paul Krueger in bacteriology; George E. MacGinitie in zoology (Hopkins Marine Station); Victor Ernest Hall and John Field, 2d, in physiology; W. Bryan Duncan in electrical engineering, and John Kent Lewis in medicine.

DISCUSSION

BIOLOGICAL PUBLICATION IN AMERICA

ARE we not making a mistake in this country in the restrictions we have chosen or have allowed to be forced upon us in the publication of the results of biological research? We discourage the publication of comprehensive studies adequately illustrated and use our facilities for publication mostly for short papers with a minimum of pictorial illustration. It is not difficult to get one of our journals to publish a brief and scantly illustrated paper, but only very limited media are available for the presentation of monographic studies.

This policy tends toward the publication of research item by item, toward hasty publication of current work. Is it not a far sounder plan in general to hold back final publication of the several steps in the advancing research until one has obtained a somewhat broad grasp of the significance of many items and phases of the study, each seen in the light of the others?

The result is that some American biological research as published is not as maturely considered as it well might be. Many appearances may seem at first real which are shown to be false after more thorough consideration in the light of related phenomena. Hypotheses which seem to fit data at hand in early stages of an investigation are often, yes generally, shown by further study to require modification or very likely abandonment. We now encourage the rapid presentation of insufficiently considered results and place difficulty in the way of the student of sounder habit who chooses before publishing to ruminate over data gathered from a comprehensive study.

Our present tendency toward hasty publication is, to be sure, in line with the jazz spirit in art, literature and music, indeed in life itself, having at its root unwillingness to do prolonged and faithful work before seeking expression and advertisement. But can we afford in biological or any other science to follow unthinkingly a general plan of publication which tends toward unscholarly presentation of research?

There is a happy medium to be sought. Great delay in publication has its disadvantages and its dangers. An example of deplorable loss through delay in publication is seen in Professor Whitman's death before he had presented to the world the results of his many years of intense and ruminative study of pigeons, and of other subjects as well. Dr. Riddle has rescued much of this work and has thus placed biologists in deep debt to him. Yet, finely and sympathetically as this work has been done, we can not but miss Professor Whitman's own expression of his own thought with its individual flavor. Furthermore, in general, in cases in which final publication is reached, too long delay may not only deprive other workers of the chance to compare data but may deprive the delaying author of the benefit of criticism.

The formerly much used plan of preliminary notices secured many of the advantages of prompt publication, while not at all displacing later maturer presentation. Somewhat the same purposes are served by the ten- and fifteen-minute reports to the scientific societies and the published abstracts of these. Probably a somewhat more liberal allowance of space for the abstracts might in many cases let the author be content to delay final publication until a wider and more intensive study of the field has been had.

But where could he find publication for such a comprehensive paper as would finally result? Universities, local academies of science, the Carnegie Institution, some government agencies and some, like the Smithsonian Institution and the National Academy of Science, with government affiliation, publish long papers, but in general their presses are open only, or at least chiefly, to authors associated with the several institutions. They do something, enough to be really helpful, but not nearly enough to meet the need, not at all enough to relieve and change the present unfortunate trend toward brief and rapid publication in place of comprehensive monographic treatment.

Two other considerations seem to deserve emphasis: pictorial illustration, and profit by publishers upon scientific papers. Editors of our journals object to many illustrations. They cost more per square inch than does text. The tendency, therefore, is in favor of expressing an idea in words and against its expression in a picture. This is exactly wrong. Verbal presentation is less vivid, less accurate and less adequate than pictures for most descriptive phases of a subject. Give twenty competent artists a verbal description of a landscape, elaborate and accurate so far as it goes, and ask them to paint the landscape. The lack of agreement in the resulting pictures will be a fair index of the unsatisfactory character of verbal description without pictures in biological publication.

A word as to cost and financial profit. If the author receives little or usually no money for his research labors, why in the publication of the research is it appropriate to pay any money profit to a publisher? It would seem that all publications of scientific research should be sold at cost, no one, author or publisher, making any financial profit. The purchasers are largely research workers whose research labor is a gift to science. If there is to be any financial profit in publication of scientific research it might be given to the authors more appropriately than to the publishers. Probably complete divorcing of publication of scientific research from financial profit to any one, author or publisher, would prove most satisfactory, freeing the readers of research results from financial contribution above cost of publication and leaving all flavor of money reward out of the minds of those who do the research.

Small endowments or guarantee funds for such publication at cost would be needed as a safeguard against deficit. If the scientific societies might each have such a small publication fund, with enough in addition to pay for adequate clerical help to the

editors, most papers of ordinary character could be taken care of.

If the emphasis upon publication chiefly of brief papers were changed in favor of putting out more considered papers by each author at longer intervals, the total length of all the published papers would probably considerably decrease, for comparisons of an author's earlier data with those gathered later could be published once for all in the comprehensive paper rather than made item by item in the publication of a series of papers each making a minor contribution. There would be some saving also by eliminating a good bit of modification or withdrawal of earlier statements.

But there would still remain some papers whose greater length or abundant illustration or unusually expensive illustration would require publication apart from the regular journals. It is extremely difficult now to find publication for such papers, although they include a goodly proportion of our most valuable studies.

The whole subject of biological publication is now being considered. In this study there should be held in mind the influence which the character of the facilities for publication has upon the development of the science. American biology has suffered appreciably from a wrong influence in this matter, and is due to suffer still further unless the present trend is changed.

MAYNARD M. METCALF

WOODS HOLE, MASS.,
SEPTEMBER 14, 1928

EVOLUTION

THE essential features of the new concept of evolution recently proposed may be stated in a few words. It is rather a harmonizing of previous theories than a new idea; but parts of it are wholly new.

While the idea of linear evolution involving a time element is in general quite valid within restricted groups, as for instance in the vertebrates where it is well illustrated by the horses, yet it must undergo a certain modification, for gaps are found in all these evolutionary lines, and many of these gaps appear to be real—that is, they were never, so far as we have been able to learn, bridged by so-called missing links. To take a concrete example, it is quite obvious that the gap between cats and dogs is broad, and it remains broad throughout the fossil record. Cats never became dogs, nor dogs cats; but both are carnivorous mammals.

Between the backboned animals and the invertebrates the gaps are very wide, and those peculiar types which are intermediate between them are widely different from either.

Between the various invertebrate groups, as the arthropods, echinoderms, nemerteans, and so forth, the gaps are still wider. Indeed, so broad are the gaps between these various types of lower animals that they can not be arranged in any sort of evolutionary line. But they do seem to fit perfectly well into a somewhat complicated figure,[1] showing each to have affinities with several others, not merely with a single one.

The gaps between the various invertebrate phyla go back quite unchanged to the very earliest fossils that are adequately known, those of Cambrian time.

It is undoubtedly true that the Cambrian is much nearer to the present time than it is to the far distant past when life on earth began, so that conditions in the Cambrian are not necessarily those at the time of the origin of life.

But the complexity of the intricate interrelationships between the various phyla at the present day suggests an evolutionary picture of quite a different sort from that indicated by the interrelationships of the forms included within each phylum.

While the developmental lines included within the phyla as we know them (as, for instance, the line tracing the horses from the generalized pygmy type of the Eocene to the large highly specialized types of the present day) involve a time element, the evolutionary scheme by which the phyla themselves are interconnected (see reference cited above) does not. So it is assumed that in so far as the phyla or major groups of animals are concerned life from the very first presented the same essential features that it does to-day.

With this hypothesis both the conditions in the Cambrian and the subsequent changes from horizon to horizon in the time between the Cambrian and the present are in agreement.

AUSTIN H. CLARK

U. S. NATIONAL MUSEUM

AMIA FROM THE CRETACEOUS

A YEAR ago I received from Edward M. Kindle, paleontologist of Canada, a number of small fragments of the skull of a little fish, found in evaporated Cretaceous ponds in Alberta, Canada. Among these fragments were no traces of skeleton or fins. These I described in the *Canadian Field Naturalist,* under the name of *Kindleia fragosa.* I was mistaken in regarding these as a Cichlid fish. It appears to belong to the group of Amiids.

I have the following valuable note from Dr. Errol I. White, now in charge of the recent fossils in the

[1] *Journ.* Washington Acad. Sci., Vol. 13, No. 7, April 4, 1923, pp. 129–138.