PROFESSOR H. V. WILSON: 'The Organization of the Ovum.'

PROFESSOR COLLIER COBB: 'Autophytographs.'

A. S. WHEELER,
Recording Secretary.

DISCUSSION AND CORRESPONDENCE.

A PLEA FOR INCREASED REVIEWING OF SCIENTIFIC LITERATURE.

IT has seemed to the writer that more attention should be given to reviewing current literature in zoology, and I am told that the need is greater in some other sciences. It is not necessary to dwell upon the small number of universities in which the library facilities may be called good, upon the fact that our students are slow to gain a ready knowledge of the three or four foreign languages in which appears an increasing volume of scientific literature, or upon the heavy duties in teaching and administration with which our staffs of instruction are burdened. These conditions make reviews of literature especially useful to American men of science. There are, however, more fundamental reasons why the scientific body should pay more (and more serious) attention to reviewing its recent work. The first is that scientific efforts are very manifold and diverse and the output is very great and increasing. Beyond a certain limit, without an increase in the unifying forces, these efforts are bound to become discrete and diffuse. I believe that this limit has been reached. That the same belief is held in Europe is perhaps to be inferred from the great increase in reviewing in the last few years in Germany.

A second reason is that the review should be an important means for the training of investigators, and for leading students to become investigators. This function of the review has, I believe, not been sufficiently recognized, and it is this which especially interests us in America. By reviews the writer does not mean abstracts, which seek to furnish information by a short and easy method. Reliance on abstracts impoverishes and blunts the mind and is dangerous to the true spirit of investigation. Reviews which are essentially abstracts of isolated papers are of doubtful value. Because isolated, they do not aid the student in gaining a broad and fundamental understanding of the field; because abstracts, they can not be relied upon by the investigator; and they are longer than necessary to serve as a guide to the literature.

There are two ways in which reports or reviews may serve a useful purpose: first, as an annotated bibliography or guide; second, as a comprehensive presentation of the work done in a given field. These two legitimate kinds of reviews are quite distinct in their form and purpose. The annotated bibliography is useful to the specialist and instructor. For those who have not a large library at their disposal a mere list of titles is insufficient. It is necessary in addition to have certain information about a paper in order to know whether it is important for one's immediate purpose. It is greatly to the credit of Mr. Field that some of this information has been included in the Zurich bibliography. Fuller information is given in several journals of the *Centralblatt* type in Germany. In America in a special field the same kind of work is being done by the *Journal of Comparative Neurology and Psychology* through the joint efforts of its collaborators. Whether other journals might not well undertake similar work in their fields may, perhaps, better be discussed by others. In no journal with which I am acquainted are the reviews uniform in character or restricted to the kind of information here suggested. To make my meaning clear I may enumerate what, in my opinion, should be included in these brief reviews. Besides the author, title, date and place of publication, number of pages, figures and plates, and price of a book, there should be stated: (1) the material and methods, (2) the subjects treated, (3) the general purpose aimed at or end attained and (4) the reviewer's judgment as to the adequacy of the methods and the reliability of the results, in cases where the paper can be definitely characterized. Such reviews might occupy from six to twenty lines and when printed over the reviewer's signature would constitute a valuable guide for the advanced student and instructor.

The second form of review is useful to the instructor and should be especially valuable

to the student who is pursuing his first piece of investigation or who is about to choose his subject. Probably no one thing would bring greater or surer return in the way of the advancement of science than an adequate means of introducing students to the original literature of their respective subjects and helping them to appreciate the historical perspective and the current tendencies of thought. This can not be done by reviews of isolated papers, nor to any great extent in courses of instruction. It can be done where a large enough number of students come together in a journal club or seminar, but best of all by the historical and critical review. The student is usually left to gain a practical knowledge of the literature in connection with his first piece of research, and thus suffers in two ways. First, a large amount of time is consumed in learning how to handle and judge the literature, which could be saved *in part* by an acquaintance with specimens of critical treatment. Second, he has not time in this way to gain a knowledge of many subjects. If he had at command before beginning research critical reviews of the several branches of his science he would certainly be able to choose a line of research more wisely, and would be in a better position to follow up the literature of fields other than his own. With our present method of instruction such reviews could very well serve as text or reference books to accompany lectures. They could be more accurate and better brought up to date than present text-books and would serve the purpose better for all except elementary students. Such reviews should aim to give the development and present status of the subject treated by means of a summary and criticism of the literature. The wide knowledge and judicial attitude necessary require that they be written by men who have completed more than one considerable piece of investigation and have had successful experience in teaching.

Granting the value of such reviews, two objections will doubtless be made. First, such work is already being done in Germany and we profit by it. Second, it is very difficult for an American university man with his manifold duties to accomplish such a piece of work as a historical review. Few men will be found willing to devote such time as they have to this in preference to investigation. With regard to the first objection, it would also be true to say that this work is being done in Germany and we lose by it. By this I mean that a great deal of good American work is either overlooked or misjudged by Europeans. Reviews written by capable Americans under favorable conditions would be more complete and better balanced and would be more useful to the American student. It should be remembered that the prospective or beginning investigator in our universities has yet to gain such facility in German that a Referat of a hundred or more pages shall be a delight to him. However, putting comparisons aside, there is room for reviewing in addition to that to be found in foreign languages, and I would not advocate the repetition in English of work which was already done in another language.

The second objection calls for a plan whereby we can secure such work by capable men under favorable conditions. Considering that critical work involving the organization of many details requires maturity of thought, a review of this kind must be the work of several months for an experienced investigator. A working year should be allowed in order that original investigation may be carried on at the same time. The best work would be done by men appointed each for a single review in his special field. The stipend should be liberal, say fifteen hundred dollars. The ground covered would be some well-defined field in one of the natural sciences. Whether such a review would be prepared each year in some field of each science or less often would be determined by the board who had the matter in charge. With regard to financial support and administration, the writer can only suggest possibilities. The first thought is that the Carnegie Institution might well do this work unless the terms of the foundation prevent. Or, a special endowment for this purpose might be given by some man interested in scientific progress. Or, the American Association for the Advancement of Science might secure a fund and appoint a board to carry on the work. Or, finally, since the uni-

versities are the chief means for the advancement of science and since the results would have direct relation to the work of instruction, a plan might be devised by which a number of universities would jointly provide for it.

In conclusion, if this be thought worthy of further discussion, let the motive of the writer's suggestion be clear. It is the advancement of science in America by means of organized reviewing of current literature as an aid in the development of the future investigator. This may be regarded by some as in the nature of 'coddling' which would lead into scientific work those who are unfit and who would not succeed. No one is less inclined than the writer to give undue encouragement to students. On the other hand it is an open question whether science is not now losing fit persons for want of some such introduction to the workshop. It is not desired that the literature should be brought down to the level of the average student. The reviews should be written for the serious man who is seeking his proper place and the opportunity to do work.

J. B. JOHNSTON.

NAPLES,
November 29, 1904.

THE ORIGIN OF CYCLONES, TORNADOES AND COLD WAVES.

TO THE EDITOR OF SCIENCE: As it seems still to be held that the origin of cyclones, tornadoes and cold waves is matter of debate I beg to offer a résumé of an article on that subject contributed some twenty years ago to the *Educational Courant* of Louisville, Ky., and which at the time received somewhat extensive notice.

The contention of that article was that cyclones arise exclusively over tropical islands. It is quite obvious that the movement of the atmosphere over every island that has a sea-breeze as well as above every local fire, must be cyclonic. The vast majority of such cyclonic movements disappear with the reversal of the breeze which occurs at night. But now and then, under particularly favoring conditions, it happens that over a tropical island the cyclonic movement gains such force as to enable it to ascend to a great altitude, and this results in such concentration of vapor and consequent evolution of heat as to supply a new force for the continuation of the movement.

Now the trade winds on their equatorial border describe a loop, while passing from the southwesterly movement below to the northeasterly above, in such way that the wind in those situations may be very swift at considerable altitudes over regions of calm below.

Say one of the daily cyclones described arises over one of the Cape Verde Islands off the coast of Africa, or over one of the Windward islands, and let the conditions be such that when the cyclonic movement attains a considerable height it is caught in the loop of the trade winds moving to the westward. It will be carried to the west along the southern border of the loop, the strength of the southerly flow of the trade winds being sufficient to prevent the upper return or northerly flow from carrying it to the north. But in the course of its journey it enters a region where friction due to the continental mainland has largely interfered with the trade winds, and which interference has resulted in a weak movement of the trade winds of the surface as compared with the return winds above—this retardation after the cyclone has turned and begun its journey to the eastward. There must then be some close connection between them; a connection that would suggest the relation of cause and effect. But how can the low produce the high and its resulting cold wave. If we take into consideration the three facts that the cyclone itself is moving eastward at the rate of 20 or more miles an hour; that at the same time it is revolving contra-clockwise so that its northern segment has a potential westward movement of thirty or forty miles per hour; and, third, that there is a constant eastward movement of the upper strata of the atmosphere at a rate of perhaps seventy-five miles per hour—the situation becomes much simplified.

The periphery of the cyclonic mass on its northern side, moving as it does to the west, meets the air of the constant eastward current and backs or dams it up, thus producing