Nebraska Wesleyan states in a seminar course that "topics including botanical literature will be offered according to demand"; Oberlin College, "History and Classics of Botany"; Pittsburgh University, "Comprehensive Survey of Botany."

There were, however, 164 additional related courses offered by 139 of the 545 institutions. In the field of botanical literature, in addition to the 6 courses already mentioned, there were 13 courses covering recent or current literature offered in the form of colloquia, conferences, etc.; 4 courses in the literature of foreign journals and 13 in problems or assigned readings. Twenty-five courses were offered in the history of botany, and one covered modern or contemporary botany and another history of early botany.

In the closely related field of the literature of biology, there were 4 courses under that name; 23 courses covering recent and current literature in seminars, colloquia, conferences; 2 of foreign biological literature; and 8 in biological literature problems. History of biology boasts 38 courses, the largest number, with 19 additional courses covering special histories or theories of biology.

Then there were 11 miscellaneous courses related to the literature of botany, covering such subject-matter as the literature of the sciences, of horticulture, zoology, entomology, or history of inductive sciences, science, agriculture, forestry, life and applied botany. It is interesting to note that only one course is offered in the preparation of biological manuscripts for publication and that one by Lingnan University; also a course in botanical illustration for publication by Washington State College.

While some errors in classification may have crept into this condensed distribution of 170 courses, due to the indefinite nature of the information in certain catalogues, it nevertheless shows that the value of the historical and literary approach to the mastery of the biological sciences has wide acceptance. But this need appears in some measure to be met in only about 25 per cent. (139 out of 545) of the universities and colleges for their advanced students. It seems that this approach should be more widely introduced and not reserved for graduate students only. Certainly the undergraduate, who rarely becomes an advanced student in a biologic subject, should be introduced to the biographic method. Exposure to an occasional superbly illustrated botanical classic may leave a profound impression on a pliant mind. Furthermore, the development of a thought which leads to a demonstrated fact contains more human interest and abiding qualities than a mere dry statement in a drier text.

ELSA HORN

KANSAS STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE

ON THE AUDIBILITY OF THE AURORA BOREALIS

THE proposition of the audibility of the aurora borealis has been the subject of considerable speculation and much doubt. Some scientists have claimed with much positiveness that the aurora emits no audible sounds and that the beams of light or electrical waves, such as they may choose to call them, do not come close enough to the earth's surface to be audible, even if any sound were emitted. In my own mind there can be no doubt left as to the audibility of certain types of aurora, for I have heard them under conditions when no other sound could have been interpreted as such, for no other sounds were present.

From the Eskimos I first learned that the aurora could be heard and, like most people, was rather skeptical about it, believing that their statements were based to a great extent on their superstitions. I was told by some of the older Eskimos that when the aurora displays become audible they are able to imitate the sound by whistling in such manner that the beams of light will be attracted or drawn down to them. This, of course, is purely superstition. However, it does bring out the fact that the Eskimos were frequently able to hear the aurora.

The following is my own personal experience which convinced me that the aurora borealis was actually audible. In the winter of 1925–1926 I was engaged in making a drive of reindeer across the mountain range bordering the Arctic coast north of Cape Prince of Wales on Bering Strait. One night during this drive found me traveling by starlight across the divide at the head of Nuluk River. This divide has an elevation of approximately two thousand feet. It was two o'clock in the morning when my native driver and I broke camp in order to overtake the reindeer herd ahead of us. As we climbed with our dog team to the summit of the divide we were both spellbound and astounded by the magnificent display of aurora, the most wonderful display I have ever witnessed during my eight years of life among the Eskimos.

Great beams of light shot up from the northern horizon as if a battery of gigantic searchlights were searching the arctic landscape. In front of these beams and throughout the whole length of the northern horizon great waves of iridescent light traveled from west to east like gigantic draperies before the stage of nature's amphitheater. Great folds or waves, ever changing in color, traveled one after another across the horizon and from behind them streamed the powerful beams of white light. These beams of light could be seen passing directly over our heads, and when one chanced to come over the divide it appeared to be not more than a hundred feet above

the surface. The spectacle was so awe inspiring that the dog team was stopped and I sat upon the sled for more than an hour absorbing the marvelous beauty of this most unusual display. As we sat upon the sled and the great beams passed directly over our heads they emitted a distinctly audible sound which resembled the crackling of steam escaping from a small jet. Possibly the sound would bear a closer resemblance to the cracking sound produced by spraying fine jets of water on a very hot surface of metal. Each streamer or beam of light passed overhead with a rather accurate uniformity of duration. By count it was estimated to require six to eight seconds for a projected beam to pass, while the continuous beam would often emit the sound for a minute or more. This particular display was so brilliant that traces could easily be seen long after daylight.

CLARK M. GARBER

PROFESSOR EINSTEIN AND THE INSTITUTE FOR ADVANCED STUDY

THE statement in your issue of August 18 that Professor Albert Einstein will "spend the *winter half-year* conducting his scientific work at the Institute for Advanced Study" will not be understood in this country, inasmuch as the terminology, "winter half-year," is, as far as I know, not employed in America. The academic year of the Institute for Advanced Study starts at the beginning of October and ends at the beginning of May with an intermission at Christmas. It covers therefore autumn, winter and a part of the spring. On account of a previous commitment to the University of Oxford, Professor Einstein's arrangement with the institute permits him to terminate his work annually at Princeton a fortnight earlier than his associates.

ABRAHAM FLEXNER

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD FOR PERMANENTLY RECORDING THE LOCATIONS OF OBJECTS ON MICROSCOPE SLIDES[1]

MICROSCOPISTS have often felt the need for a method of locating objects on a slide so that they might be found quickly at any time on any microscope. The Maltwood finder, used many years ago, was a step in this direction, but was somewhat awkward to use, particularly if many objects were to be located, and was unsatisfactory when they were very small. Since nearly all modern research microscopes are fitted with graduated mechanical stages, the method of locating objects on a slide by recording their coordinates has become increasingly popular. As ordinarily applied it is open to the following objections:

(1) Objects located with one objective are difficult to find if another objective is used on a revolving nosepiece.

(2) Any shifting of the position of the optic axis with reference to the coordinate system of the mechanical stage likewise shifts the position of all objects recorded in terms of this coordinate system with respect to the optic axis. This shifting may be caused by a faulty revolving nosepiece, by unscrewing and replacing an objective, by an accidental decentering of a centerable revolving stage, or by an accidental decentering of a centerable objective changer.

(3) Objects located on one microscope can not be found easily and definitely when a different microscope is used.

The first two objections can be overcome by employing centerable objective changers, keeping them accurately centered by frequent checking and by frequently checking the centering of the revolving stage. The method here described offers a means of overcoming the third objection.

After a slide has been labeled and numbered, a small cross is made on it with a writing diamond about 2 mm outside the lower left-hand corner of the cover glass. A filing card is provided (4 by 6 inches is a convenient size) for each slide which bears the same serial number and other data pertaining to the slide. On this card the coordinates of objects of interest are recorded as well as the coordinates of the cross. The objects and the cross are thus permanently recorded in terms of the same rectangular coordinate system. By subtracting the coordinates of the cross from those of the objects, the cross becomes the origin of a system of rectangular coordinates, and the differences become the (x', y') of each object. If the slide is placed upon the mechanical stage of another microscope, the coordinates of the cross become a new origin of a second rectangular coordinate system. Adding the above differences (x', y') to the coordinates of this new origin gives the coordinates of the point (x'', y'') on the second microscope. By setting the mechanical stage to these coordinates (x'', y'') the object is found easily.

Difficulty may be experienced when one or both of the scales on one microscope run in opposite directions from those on the other microscope. In this event the differences (x', y') are treated in an opposite manner to the way they would be if the respective scales increased in the same direction; that is, the differences (x', y') are subtracted from the coordinates of the

[1] Published by permission of the director of the U. S. Geological Survey.