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.

cross in the second microscope when they would have been added or *vice versa.* Since the cross lies farther to the left and lower down than any point within the cover glass, any incorrect value for the final coordinates (x″, y″) on account of the scales running in opposite directions will give a point entirely outside the cover glass. Hence the mistake will be immediately evident and easily remedied.

The accuracy of the method depends upon the precision with which the mechanical stages are made and graduated and upon the care with which the coordinates are read and recorded. Except for a few petrographic stages graduated to 0.01 mm, standard mechanical stages, either "built in" or attachable, are graduated to 0.1 mm and can be readily estimated to 0.05 mm. This means that an object can be located within a square 0.05 mm on a side, which, considering the fact that the field of view of a 1.8 mm objective and 10x ocular is 0.2 mm in diameter, is satisfactory even for a very small object. It would help considerably if all microscope manufacturers adopted a uniform system in the graduation of mechanical stages. The two largest manufacturers of microscopes in this country follow the same system for the horizontal movements of their stages, but have the numbers increasing in opposite directions on the vertical movements. The best method would be to have the stages graduated so as to read 0–80 mm from left to right on the horizontal movement and 80–130 from bottom to top on the vertical movement. This would place all the coordinates in the first quadrant, giving positive values. Any other arrangement introduces negative numbers for at least one of the coordinates.

This method has been used by the writer over a period of years and found to be entirely satisfactory. Objects located eleven years ago can be found quickly to-day. Furthermore, the slides, with the necessary data, may be sent to any one having a graduated mechanical stage on his microscope with the assurance that he will find the objects easily by the application of the above method.

K. E. LOHMAN

U. S. GEOLOGICAL SURVEY

AVOIDANCE OF EMULSIFICATION IN DEFATTING OPERATIONS

IN previous work on the fatty oil of digitalis seed[1] difficulty had been experienced in the separation of the fatty oil from the alcoholic concentrate because of the permanence of emulsion formed in shaking the hydroalcoholic extract with petroleum ether. Hence, it was suggested to one of us to try an adaptation of the method long used to remove alkaloids by means of ether or chloroform from solutions with which these alkaloidal solvents are immiscible. Reference is had to the method of allowing these solvents to bubble through the liquid from which the alkaloid is to be removed. The large quantity of concentrated tincture seemed to render the conventional long narrow tube impracticable; hence, a percolator was substituted therefor. To the surprise of the operator, the petroleum ether, when passed into the bottom of the percolator, did not bubble through the hydro-alcoholic fatty extract, but the bubbles quickly blended with the extract it was intended to defat. The result was a solution, though not clear at first. Upon the further addition of petroleum ether a sort of emulsoid resulted. Another surprise was in store when, after the continued addition of petroleum ether, the apparent diphase separated into two layers, the clear petroleum ether solution rising to the top without a trace of emulsification. The addition of petroleum ether which, after the breaking up of the emulsoid, bubbled through the hydro-alcoholic layer of extract was continued until the latter was completely defatted.

In order to ascertain whether this technique is applicable to a wider range of plant products, it was applied to the defatting of a concentrated alcoholic extract of linseed with a high fatty oil content. It was also applied to the removal of the non-saponifiable matter with ether from the aqueous soap solution of milkweed oil. In both instances it proved equally successful. Thinking that the method may prove useful to others who have been annoyed by obstinate emulsions in the defatting of hydro-alcoholic extracts, it is herewith described to be tried out if they see fit.

Fig. 1 shows the set-up before it is placed in operation. Aspirator bottle, A, is filled with petroleum ether. Percolator, P, contains the hydro-alcoholic extract to be defatted, introduced from separatory funnel, D; the amount of hydro-alcoholic extract that can advantageously be defatted in one operation varies with the fat content. It may be best not to fill the percolator more than one third. Screw cock S controls the flow of petroleum ether. Screw cock S_1 enables the draining of the percolator after defatting has taken place. Flask F is used to collect any excess petroleum ether containing fat removed from the alcoholic extract. The washed hydro-alcoholic extract is drained from the bottom of the percolator into flask F_1. After its removal the upper layer of petroleum ether containing dissolved fatty oil can likewise be removed by this means. Separatory funnel D is used to recharge the percolator with fresh hydro-alcoholic concentrate. Tube, T, functions as a syphon removing any excess of fat-containing petroleum ether. It is necessary that cork C fit as tightly as possible; hence it should, if necessary, be sealed with a suitable agent.

As already pointed out, it may prove advantageous not to fill the percolator more than one third. When

[1] S. H. Culter, *Am. Jour. Pharm.*, 102: 545, 1930.