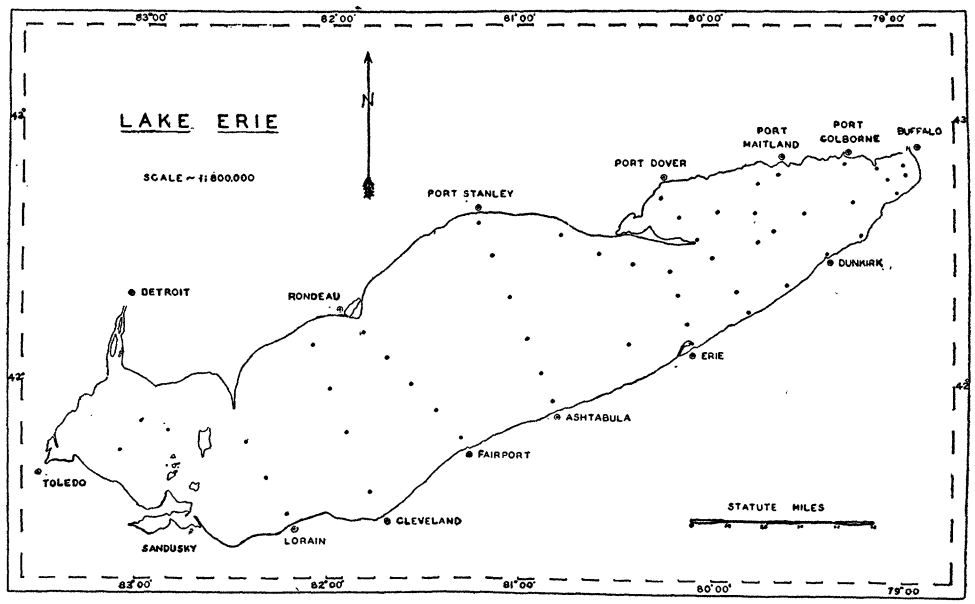
chemical and physical factors which bear an important relationship to the production of fish. For the successful operation of the program the steamer *Shearwater* was given by the U. S. Bureau of Fisheries, the maintenance of the vessel and salaries of the crew and several scientists generously financed by New York State and one or more specialists contributed by each of the other cooperating institutions.

Operations which were confined to the eastern portion of the lake during the preliminary survey in the season of 1928 were extended in the summer of 1929 to the entire lake. During the period from May to September in 1929 observations were made every month at a large number of selected stations which are shown on the map. These observations embraced



Map showing location of stations visited monthly by the U. S. *F. S. Shearwater*, summer of 1929

a variety of special studies such as the spawning and growth of young fish, the production of phyto- and zooplankton, the physical hydrography, the chemistry as an index to normal lake conditions and extent of pollution, the lake sediments, etc.

The staff of investigators consisted of the following:

Charles J. Fish, Buffalo Museum of Science, director.
Charles K. Green, U. S. Coast and Geodetic Survey, hydrographer.
Marie P. Fish, Buffalo Museum of Science, ichthyologist.
Charles B. Wilson, Westfield Normal School, macroplanktonologist.
Paul R. Burkholder, Buffalo Museum of Science, microplanktonologist.
Reginald H. Pegrum, University of Buffalo, geologist.
Casimir J. Munter, Ohio State University, chemist.
Arthur H. Louden, Queens College, scientific assistant.

"A Preliminary Report on the Cooperative Survey of Lake Erie" covering the results obtained in the season of 1928 has been published as a *Bulletin* of the Buffalo Society of Natural Sciences. This report includes a discussion of the program and itinerary, topography, hydrography, bacteriology, chemistry, microplankton, macroplankton and ichthyology. A complete report upon the various phases of the investigation together with summary and conclusions is now in preparation.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

DISPLAYING AND FILING MICROSCOPIC PREPARATIONS

THE method here described has been found most satisfactory after many years of experience with extensive series of demonstration material used in connection with courses in microscopic anatomy. A sketch of that portion of the preparation to be shown, with the necessary legends and explanations, is placed on a 5 x 8 inch cardboard having a drawing surface (Crescent mat board is very satisfactory).

This is covered with a 5 x 8 inch sheet of transparent celluloid (such as Eastman Kodaloid No. 3) and the two are bound together with 1-inch-wide black adhesive tape, such as is used for fastening shields on the inside of automobile windows (*e.g.*, Durwood 3A tape), as shown in the accompanying figure, front view. A little more than half of the width of the tape is folded on to the back (see Fig. 1). Ordinary

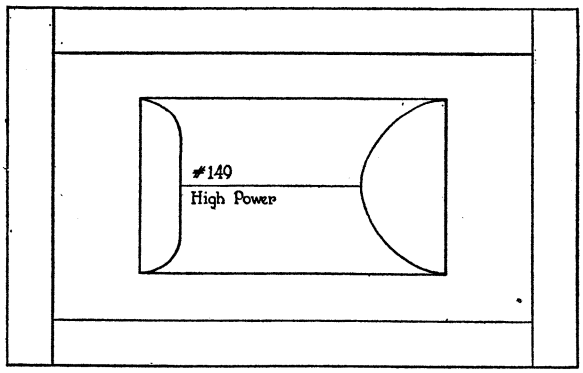

FIG. 1. Back view.

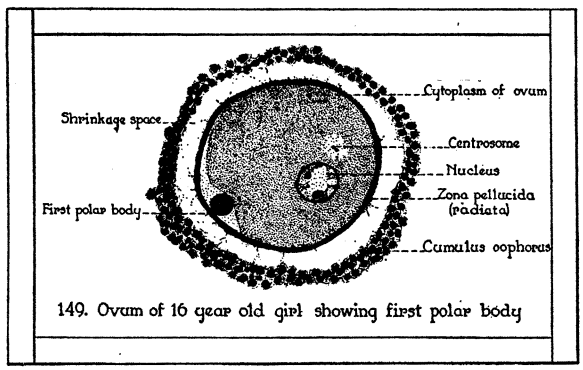

FIG. 2. Front view.

white adhesive tape can be used just as well, but it becomes soiled very readily.

On the back is fastened a strong envelope somewhat larger than the slide. On the back is also recorded the necessary information regarding the magnification to be used and key to the location of the special cells or area to be exhibited. "Ringing" the slide with India ink or a diamond point may make some of this information unnecessary. When filed away, the slide is kept in the envelope of the corresponding card. The card and slide should bear the same number, and the number on the slide should be placed so that when the number is right-side-up the slide is properly oriented on the microscope. When in use the card is placed beside the microscope. The transparent cover prevents the sketch from being marred.

If it is desired to write the explanations with the typewriter, a thinner drawing paper is used which is pliable enough to be handled by the typewriter. The sheet containing the sketch is covered with the sheet of celluloid and backed by a 5 x 8 inch piece of stiff mounting board and the three bound together with the tape.

A photograph, with the necessary indicators and explanations put in by hand, may take the place of a sketch. A very light print on a mat surface may be used for the general outline and special areas, or particular cells sharpened up and focal depth increased by retouching with diluted India ink. Explanatory cards thus mounted may be prepared to accompany models and gross specimens that are used regularly for demonstration purposes.

These cards are neat, durable and inexpensive. They make for simplicity in filing. Slides of any size, up to sections of the entire hemisphere of the adult human brain, may be accommodated by merely selecting envelopes of the proper sizes. If gross specimens and models are used with microscopic preparations in the same demonstration, uniform explanatory cards can be made which may be filed away in the same cabinet when they are not in use. Carefully selected sets of well-labeled demonstrations to supplement loan collections and material actually dissected by the students in biological courses are becoming more and more imperative as the enrolment increases, since they make it possible to reduce the relative number of laboratory instructors in some cases.

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A TANGENT METER FOR GRAPHICAL DIFFERENTIATION

THIS instrument is a simple device for the direct measurement of the tangent to a curve at any point. The derivative curve may then be rapidly and easily obtained by plotting the tangents. Since the measurements may be made as near each other as is desired, maxima, minima and points of inflection may be found without reference to the rest of the curve, as would be required by numerical methods such as finite differences.

Numerous applications will appear to those who do graphical work involving rates of change, especially in case the equation of the curve to be differentiated is unknown. The instrument may also serve as an aid in curve fitting. The biologist may use the instrument in determining the rate of growth of an organism, at any time, from the plot of the growth curve. Objective analysis of the graph of any equilibrium of a living system becomes possible directly without other information than the original graph of the ob-