

aid was \$300 given by the town of Pacific Grove, and \$500 given by the Pacific Improvement Company. With this a temporary establishment was maintained.

This beginning was put on a firmer basis by the generosity of Mr. Timothy Hopkins, a resident of San Francisco, and the present laboratory, known as the "Hopkins' Seaside Laboratory," is the result.

Pacific Grove is on Monterey Bay, two miles from the old California capital of Monterey, and is reached by a branch of the Southern Pacific Railway and by the Pacific Steamship Line. The coast is irregular and rocky, yielding great variety of forms. Working material may be gotten from the Chinese and Portuguese fishermen, both of whom have villages there.

There are two buildings; the older one contains three general laboratories, a supply room and seven rooms for investigators; the other building has a general lecture room, library room, a general laboratory, ten rooms for investigators and a dark room for photographic work. The basement is designed for aquaria. The library and apparatus of Leland Stanford University is used. Each student is provided with a compound microscope, reagents and all accessory apparatus needful in his work. Salt and fresh water is in both buildings and so distributed that each student may preserve his collections. The investigators' rooms are similarly provided. The laboratory provides for three classes of students:

First. Investigators who are capable of carrying on independent researches in morphology or physiology.

Second. Students of Stanford University, who wish to pursue their work under more favorable circumstances and gain knowledge of practical methods of research.

Third. Students and teachers interested in biology, who wish to become acquainted with recent biological methods. For these courses of lectures are provided, supplemented by individual instruction at the work tables.

The spirit of the school is excellent. No hours are definitely appointed, but students may be found at work from early in the morning until late at night. Although the laboratory has been open practically only three years the advancement already made and the evidence of increasing interest assure its future prosperity and growth.

INFECTION BY BREAD. BY KATHERINE E. GOLDEN.

In recent years, since the subject of bacteriology has made such headway, there have been numerous scares among the people; sometimes it is tuberculosis in milk and meat, then the development of ptomaines in fish, clams, canned goods, etc., the list going on indefinitely. Among these the dangers from bread baked

in basements, in "sweat shops," and by people who were not sufficiently clean, personally, have been dwelt upon in newspapers, and even in the Century Magazine an article appeared a year or so ago from a prominent member of the New York Board of Health, advocating certain methods of making bread in which baking powder should be used instead of yeast, so as to do away with the kneading and the consequent handling of the dough. Some of the cooking school teachers have advocated the same thing, claiming in addition that in bread not thoroughly cooked the yeast is not killed, and that on its introduction into the stomach a fermentation is set up.

To test the validity of these claims I made a number of experiments upon breads gotten from Lafayette bakers, the breads being obtained from the grocers, the object for which they were to be used not being stated. Specimens of the ordinary loaves, and also rolls that require a shorter time in baking, were obtained, an attempt being made also to select those specimens showing the least baking. In making the tests care was taken that outside germs should not be introduced. I first washed my hands with corrosive sublimate solution, then singed the outside of the loaf by means of a gas flame; the loaf was then broken open and a piece of about one gram weight taken from the center with sterilized forceps and placed in test tubes of sterilized beer wort. The specimens of bread were allowed to remain in this medium for about ten days, then plate cultures were made, the gelatine for the plate cultures being inoculated from the wort in the tubes. Duplicate experiments were made of each specimen of bread used.

Beer wort is one of the best media for the cultivation of yeast, as it contains an abundance of the food necessary for its growth. It is also valuable as a medium, as it becomes turbid by the growth and froths readily in the fermentation.

In the experiments in no case was there any apparent growth in the wort; it remained perfectly clear, and no gas was formed. In the plate cultures no growth took place, except in one case in which a mould grew. It is very probable this was introduced in the manipulation, as the duplicate showed no growth.

Duplicates of these experiments were made with bread obtained from Boston, with the same results. The Boston bread was bought in some of the large grocery stores and restaurants, which would, of course, insure the bread having come from reputable bakers. I was not successful in obtaining any basement made bread or that from so-called "sweat-shops" where the cleanliness is questionable.

Enough has been done, however, to demonstrate that yeast and the ordinary bacteria found in dough are killed in the baking, and that any germs introduced into the stomach by means of the bread have come from the outside of the loaf, and have been deposited upon it after the baking. If any doubt exists in one's mind in regard to the place from which he has obtained bread, it is very easy to

render the bread safe from living germs by singeing the surface with a flame. As the interior of a loaf of bread is raised to nearly 100° C. in the baking, besides steam being generated, the conditions are such that yeast can not live, and most bacteria can not resist this prolonged steam heat. The danger in bread is not the introduction of living germs into the system, but the introduction of ptomaines formed by bacteria during the rising of the dough. As the rising is done inside of six or seven hours, the danger from this source is very slight, as it would take considerably longer than that time for sufficient ptomaine to be generated to be injurious; moreover, the yeast is there in sufficiently large quantities to check the growth of any foreign organism, that must of necessity be there in small quantities.

SIMPLE APPARATUS FOR PHOTO-MICROGRAPHY. By M. J. GOLDEN.

This device enables one to secure a photograph of a section with little loss of time, and with little disturbance of the section.

The device consists of a piece of board, about an inch thick, forty inches long and about twelve inches wide, to which are attached a shelf to hold the microscope, and a sliding piece with a pair of brackets to carry the box of an ordinary hand camera. Under the shelf another piece of board is fastened to the first, at right angles, and this assists in supporting the shelf, and serves as a leg to help keep the apparatus in an upright position.

The back, leg, shelf and sliding piece may be constructed from a piece of smooth pine board; and the bolts and nut used with the sliding piece are ordinary machine ones, that may be gotten at a hardware store. One of the bolts must have the same pitch as the hole in the camera box, by which it is fastened to the tripod. One may easily make this stand for himself, or have it made by a carpenter at little cost.

The lens of the camera is removed, and a funnel made of heavy, black cloth, or some corresponding material having flexibility, put in place of it, so that light-tight connection may be made between the camera box and the eye-piece of the microscope. If this cloth funnel be terminated in a small cone, made of tin or paste-board, to fit over the eye-piece, the adjustment to the microscope can be more rapidly made.

By using a camera box, one can also use the ordinary plate holders for his negatives, and he can get his focus on the ground glass. Of course, the plates may be developed at one's leisure.

The advantage of the apparatus is that one can, with slight cost, have at hand in the laboratory, means for making a permanent record of any peculiarity in a section that he may find, with the expenditure of very little time.