Gelatine was inoculated while liquid, then allowed to solidify. At the end of two days colonies appeared as small white dots beneath the surface of the gelatine. In gelatine thus inoculated with M. amylovorus such colonies were not apparent.

Upon agar the only essential difference in the two germs that might be noted is that germ No. 2 grows much more rapidly than M. amylovorus does when exposed to the same temperature.

This paper has been prepared under the direction of Dr. J. C. Arthur, to whom I am very much indebted for a number of suggestions which have been of great value in my experiments.

Water Power for Botanical Apparatus. By J. C. Arthur.

In vegetable physiology a number of kinds of apparatus are required which must be run at an approximately uniform speed. Some of the most important of these pieces are used to influence the direction of growth, and as plant movements dependent upon growth are slow, the apparatus must often be kept in motion continuously from twenty-four to seventy-two hours or more.

The chief reliance where the movement is very moderate, ranging as it does for clinostats between ten to sixty minutes for one revolution, has usually been some form of clock-work, regulated by escapement or fan. For comparatively rapid movement, such as a centrifuge requires, which ranges from fifty to five hundred revolutions per minute, recourse is generally had to water or electric power. Both of these sources prove very unsatisfactory as a rule, for machines doing such light work as the physiologist requires, and especially when they must be run steadily and without interruption both day and night.

Electric power from a commercial plant usually varies greatly, and, moreover, is rarely continuous for the twenty-four hours. If the power is taken from a battery of some form of cells, the difficulty of maintaining a uniform current is almost as great, beside the annoyance of caring for the cells. The potash cells, especially those sold under the name of Edison-Lalande, have given the best satisfaction for this kind of work of any so far tried in the laboratory of Purdue University. But even these are treacherous, and quite uneven.

Water power, if secured, as is customary, by connection with a tap in the laboratory, has some of the disadvantages of electric power in being inconstant. Every tap in the vicinity that is opened or closed varies the pressure, and even the initial pressure can by no means be depended upon.

After many and vain efforts to obtain efficient power for my laboratory the following plan was hit upon, and has proved wholly satisfactory. The method is very simple. It consists in providing a tank with an inlet valve operated by a float. As the water is withdrawn from the tank the float sinks and opens the valve, and the inflowing stream of water brings the water in the tank back to the full height. As the inlet valve permits a much larger stream of water to pass than the outlet valve does, the tank always stands essentially at the same level.

The simplicity of my whole arrangement is one of its particular features. The tank consists of a vinegar barrel. It is set upon a platform in the story above my laboratory, and gives a fall of about fifteen feet. The water supply is taken from the city water that is piped throughout the building. The pipe conducting the water to the laboratory below is a small lead pipe and siphons the water over the top of the barrel. It is almost as easily put in place as rubber tubing, and can readily be changed to reach any part of the laboratory. It is closed at the lower end with a short piece of rubber tubing and a screw pinchcock, with which connection can be made with a water motor or other apparatus. The float and valve in the barrel are such as plumbers usually furnish for dwelling houses.

With this arrangement a practically uniform head of water is available at all times, and although a fall of more than fifteen feet would be desirable, yet it has proven ample to run a centrifuge, using a Crowell water motor.

A larger tank and more extensive plumbing might be used, but the arrangement as I have described it is so easily constructed and inexpensive as to be available in almost any laboratory.

Many more uses of a small constant stream of water will come to mind than those mentioned. For instance, it is almost indispensable in running such an aspirator as is used for aerating seeds in a respirometer or for producing a regular alternating movement by filling a pair of buckets set on a pivot. The cheapness and uniformity of the power are its great merits.