and the effects of aging seeds under natural conditions as when buried in the soil; the study and determination of the changes brought about by these means.

A. V. Grosse for one year—the extraction of 1 gram of the radioactive elements 91—protactinium—from about 5 tons of raw material and its isolation in the form of pure salts and finally in the metallic state itself.

George M. Reed for one year—influence of the nutrition of the host on smut development.

Dr. V. Slipher for the Lowell Observatory for extending the search of the ecliptic covering a wide belt of the sky, for outer members of the solar system, because the small size and faintness of Pluto made it seem not improbable that other similar bodies would be found, and showed that such an exacting and complete search would be required to give answer to this important question.

Dr. Edward L. Thorndike for one year's work in support of a research in the psychology of animal and human learning.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN ADJUSTABLE STAGE FOR MICROSCOPES

A STAGE which may be raised or lowered to bring various parts of a dissection into focus, while both hands are occupied with the dissecting instruments, is here described. In the dissection of small animals, and especially insects, it is often an advantage to continually adjust the microscope to obtain a depth of focus upon the region which is being examined and at the same time have both hands free for the dissecting work. This adjustable stage offers the above advantage. In addition, there is the added factor that it may be easily and cheaply constructed in any laboratory and with materials which are nearly always available. The type here described is small, compact and very convenient. It may be placed, with ease, beneath any type-dissecting microscope. The dimensions, however, are flexible and the instrument may be made of almost any size. Plywood or any metal of suitable thickness may be used for the building.

The apparatus consists of three parts, as shown in Fig. 1: base (A), stage (B) and revolving disk or

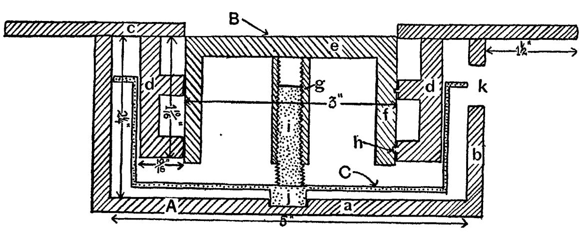

FIG. 1

rotor (C). The base (A) has an inside dimension of $5'' \times 5''$ (a) with a height of $2\frac{1}{4}''$ (b). The top (c) is $5'' \times 5''$, with an additional $1\frac{1}{2}''$ extension on two opposite sides forming the arm rests. In the center of the top a $3'' \times 3''$ opening is cut. On the under side of the top are placed four braces (d) which serve as a sleeve in which the stage is raised and lowered. These are put into the positions shown and are of the dimensions given. The figure is a side view and therefore only two braces are shown.

The stage (B) is an inverted cup with a square base (e) $3'' \times 3''$ and a depth of $1\frac{3}{4}''$ (f). In the exact center of the bottom of the cup is placed a nut, which is $1\frac{3}{4}''$ long (g). Two longitudinal grooves are cut in the outside wall along the length of the sides (f) of the stage. These grooves will fit into notches (h) and prevent the stage from rotating as it is raised and lowered.

The rotating disk or rotor (C) is a circular disk with a diameter of five inches and shaped as shown. In the center is placed a screw (i) threaded to fit the nut (g) on the stage. Directly on the opposite surface of the disk a collar (j) is placed which fits snugly into a $1/16''$ socket made into the base as indicated. A slot is cut in the side (b) of the base (A), as shown at (k). It is at this point that the rotor is exposed and the stage adjusted. This opening is located directly beneath one of the arm rests mentioned above.

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A SIMPLE METHOD FOR THE ISOLATION OF GLUTATHIONE FROM YEAST

ABOUT 4 kgms of fresh baker's yeast were mixed with two liters of water. After one hour six liters of 95 per cent. alcohol, to which eight cc of conc. sulfuric acid were added, were poured in a slow stream into the yeast with constant stirring. The suspension of yeast was allowed to stand at room temperature for 3 hours and was stirred occasionally. After that it was filtered off under suction in large Buchner's funnels. To the filtrate were added 400 cc of copper sulfate solution, which was prepared immediately before use by mixing a 3 per cent. solution of $CuSO_4$ in water with an equal volume of 95 per cent. alcohol. The precipitated substance was allowed to settle for a few hours; the supernatant liquid was decanted; the sediment was centrifugalized off and washed with alcohol and ether. It was suspended immediately in water and decomposed by sulfur hydrogen. The solution of glutathione thus obtained was freed from sulfur hydrogen by aeration; the substance was oxidized and further purified by a crystalized glutathione-copper compound.[1]

If small amounts of glutathione are needed, it is sufficient to mix 100 gms of yeast with 30 cc of water and to add 150 cc of 95 per cent. alcohol, containing about 0.2 cc of H_2SO_4. After one hour the precipitate is centrifugalized off, and the supernatant liquid, filtered if necessary, is mixed with 6 cc of 1.5 per cent. solution of copper sulfate in 45 per cent. alcohol. The precipitated substance is centrifugalized off. The mechanism of the reaction involved in the precipitation lies here in the reduction of cupric to cuprous ions, which form an insoluble compound with the reduced glutathione.

The yield of glutathione in the above method is not quantitative and depends upon the correct proportion of the reagents (H_2SO_4 and $CuSO_4$), which should not be used in a too small or too large quantity.

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[1] *Biochem. Ztschr.*, 242: 249, 1931.

SPECIAL ARTICLES

METHYLENE BLUE AND GASSED PLANTS

THE recent publications of Brooks[1] on the effectiveness of methylene blue in antidoting hydrocyanic acid and carbon monoxide poisoning in animals raised the question of how this dye would influence gassed plants. Illuminating gas leaks in greenhouses and in the soil in the vicinity of shade trees present a wide range of problems of practical as well as theoretical interest. Commercial illuminating gases contain carbon monoxide and frequently hydrocyanic acid as well as many other constituents which are singly or collectively toxic to plants.

In this study methylene blue was supplied to tomato plants exposed to illuminating gas or to ethylene. The characteristic behavior of the leaf petioles of tomato plants when exposed to these, as well as other gases, to move downward and when placed in fresh air to move upward was the response and recovery feature followed. The roots of pot-grown tomato plants were washed free of soil and placed in a nutrient solution before being subjected to relatively low concentrations of illuminating gas or ethylene in a closed chamber. After twenty-four hours' exposure to either of these gases the nutrient solutions were renewed. One half of the plants received methylene blue at concentrations from 1:100,000 to 1:1,000,000 of the nutrient solution. The remaining plants did not receive this dye. Both lots were then placed in a well-ventilated greenhouse. The movements of the petioles were followed by measuring the angles formed by the third and fourth leaf petioles and the stem above them before the gassing, immediately after and at two and four days following removal from the gas chamber to note the recovery.

The detailed results of the experiments conducted during the summer of 1933 will be published elsewhere. The following abbreviated table, however, gives the trend of the results.

These and the complete results of this investigation are interpreted as indicating that methylene blue sup-

[1] M. M. Brooks, *Am. Jour. Physiol.*, 102: 145, 1932; *Proc. Soc. Exp. Biol. and Med.*, xxix: 1228, 1932; *Am. Jour. Physiol.*, 104: 139, 1933; *Proc. Exp. Biol. and Med.*, xxx: 493, 1933.

Expt. no.	Plants exposed to:	Conc. of methylene blue	Recovery* of petioles in: Two days	Four days
1	Illuminating gas	none	19.4 per cent.	——
	1: 100	1: 100,000	36.5 " "	——
3	Ethylene	none	66.8 " "	75.7 per cent.
	1: 10,000	1: 1,000,000	72.7 " "	78.5 " "
5	Illuminating gas	none	80.0 " "	75.4 " "
	trace	1: 500,000	65.4 " "	87.1 " "
6	Ethylene	none	50.0 " "	71.1 " "
	1: 1,000	1: 500,000	55.5 " "	89.9 " "

* Recovery is given as the percentage of the average upward movement of the petioles after the gassing on the average downward movement in response to the gassing.