With stop-cocks, pinch-cocks, rubber tubing, etc., eliminated, one has merely an open tube to clean. The burette is never open at the top to catch contaminating solids or fumes, and no funnels are needed.

(7) It can be used for liquids too viscous to flow readily through a stop-cock, *e.g.*, agar agar—which must often be handled in measured quantities, and handled at a temperature where stop-cock grease would become thin. With the rotette the lower outlet can be made a size suited to the liquid and to the speed employed. The rotette can be used equally well with liquids which attack either stop-cock grease or the ground surface of the glass itself, such as, *e.g.*, KOH or NaOH which so often cause cocks to freeze.

(8) A rotette can not wear out—and while in use it saves the price of a stop-cock on every burette with which it is employed. The burettes without stop-cocks are not only cheaper, but are less fragile—for most of the breakages of burettes are due to stop-cock troubles rather than to accidents. One of these mounted over a stock bottle might facilitate obtaining the definite quantities that may be required in routine tests.

(9) It can be used in places where stop-cocks would be inaccessible, as well as in hot, corrosive or poisonous liquids.

It would appear that the rotette is especially well suited for all types of burette and pipette work, for rapidly measuring out fixed quantities of liquids for routine tests in chemical, biological and clinical laboratories. As the movement is wholly rotational it lends itself to mechanical operation as a rack and pinion arrangement provided with stops would adapt it to the commercial or laboratory filling of vials with definite quantities of liquid. Or, similarly, it could be arranged for foot control in which case both hands would be free for other operations, which would be a very great advantage in many situations.

Suggestion: When connecting the rubber tubing to the burette the mercury should be in the middle coil, as this minimizes the twist that must be given the former in use. The tubing should be one of the smaller commercial sizes, preferably heavy walled to prevent kinking.

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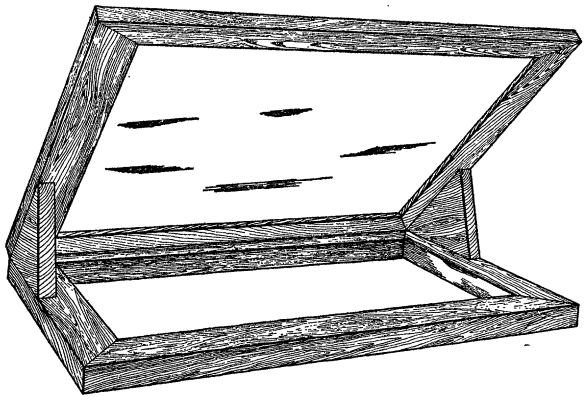
MIRROR DEMONSTRATION APPARATUS

IN many lecture rooms the top of the instructor's table is above the line of vision of persons seated in the audience. Demonstrations which must remain flat upon the table are therefore often out of sight of, or at best imperfectly seen by, observers in the lecture room. The difficulty attendant upon demonstrating certain materials to large groups of students can be overcome by the device represented in Fig. 1.



A wooden frame holds a mirror at an angle with the table top. The object to be demonstrated is placed inside the base of the frame under the mirror; the reflected image is then visible to students seated in all parts of the room. The angle of the mirror will be determined by the height of the table top above the horizontal line of vision of the audience. In our laboratory, a mirror (size 40×50 cm) held at a 40° angle gives good results with groups of seventy students. Spot lights may be directed upon the demonstration area from the sides or from above without interfering with the visibility.

The apparatus is particularly useful in demonstrating artificial "amoeboid" action induced by the interaction of various chemicals; in these experiments it is essential that the dishes remain stationary and in a horizontal position. The apparatus is also useful in showing the peculiar movement of waltzing mice; other uses will doubtless suggest themselves to the reader.

The writer is indebted to the department of graphics in Dartmouth College for the perspective drawing in Fig. 1.

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THE USE OF PHENOSAFRANIN FOR STAINING FUNGI ON CULTURE MEDIA OR IN HOST TISSUE

THE work of Mangin (1890) first brought out the use of phenosafranin as a differential stain for pectose and lignin. This stain is frequently used in dilute aqueous solution as a desensitizer for panchromatic film. It gives a dark red color in the alkaline condition, which may be removed by means of alcohol or an acid alum solution. This stain has been found useful in mycological studies for both fresh and preserved material and also in the examination of bacterial colonies growing on an agar substratum.

In order to avoid plasmolysis and to restore turgor to the cells the stain was made up in solution after the formula of Satory, as given by Linder:[1]

Carbolic acid crystals	20	gms.
Lactic acid, syrup	20	"
Glycerine	40	"
Distilled water	20	"
Phenosafranin	0.5	" or less

Mordanting fixed sections for two hours with a 2 per cent. iron alum solution intensifies the stain. Destaining may be accomplished by washing the material in a solution of 0.5 per cent. alum and 0.5 per cent. HCl or by means of alcohol. After destaining it is often desirable to set or intensify the stain by applying a 1 per cent. ammonium hydroxide solution. For use in the examination of mycelia in host tissue, the destaining of the parenchymatous tissue is more rapid than that of the parasite, so that by proper control of this process a differential stain may be attained. Sections of Johnson grass leaves infected with a rust stained for twenty minutes in phenosafranin and then destained for ten minutes in acid alum show a differential stain between host and parasite tissue. In the case of mycelia within woody tissue the contrast is not so pronounced, since the lignified walls retain the stain as well as the mycelia.

This stain has proved particularly adaptable in the study of bacterial and fungal colonies growing on an agar substratum. If these colonies be treated with phenosafranin the medium does not absorb the stain as readily as the cells, so that the latter stand out intensely stained against a lighter background, no destaining being necessary.

Phenosafranin is superior to the cotton blue suggested by Linder, because the red is a more intense stain than the blue and also because of the much greater permanence of the phenosafranin color

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SPECIAL ARTICLES

PROTEIN FRACTIONS OF THE H 37 (HUMAN) STRAIN OF TUBERCLE BACILLUS[1]

THE method of protein fractionation[2] recently used in the case of the timothy grass bacillus[3] has now been applied to a human strain (H 37) of the tubercle bacillus.

A frozen and dried harvest of the organism[4] (grown on Long's medium) was extracted in the cold with acetone and ether, ground in a ball mill and again extracted, as described previously.[3] The cell residues were stirred for about 6 hours in the cold successively with buffer at pH 4.0 (fraction C), buffer at pH 6.5 (fraction D), water containing enough *N* NH_4OH to keep the pH at 8.3–8.5 (E), water made alkaline to about pH 9 (F), and water made alkaline to about pH 11 (G). The residual material was stirred in turn with 0.1, 0.2 and 0.5 *N* NaOH at room temperature (K, K′, K″). The properties of the fractions obtained by acidifying two lots of the extracts are given in the table. Each fraction was redissolved and reprecipitated twice.

Fraction	$[\alpha]_D$ degrees	N Per cent.	P Per cent.	Basic ash Per cent.	Precipitin reaction of 1:2000 solution with: anti-human strain serum[4]	Precipitin reaction of 1:2000 solution with: anti-timothy bacillus serum[4]
701						
D	+ 9	15.7	3.4	0.7	±(±)*	−(+)
E	+11	15.4	2.0	0.5	±(±)	
F	−26	15.0	1.8	1.4	±(±)	±(+)
G	−31				±(±)	±(±)
K	−61	16.2	0.4	0.4	±(±)	+(+±)
K′	−50	14.9	0.04	0.3	±(+)	+(+)
K″	−18	11.2		1.9	+++(++++)	+(+±)
702						
D	+ 9	15.6	3.7	0.8	±(±)	+(+±)
E	−19	15.8	2.1	0.2	±(±)	+(++)
G	−28	15.7	2.1	0.2	±(±)	+(++)
K	−56	15.3	0.6	0.3	±(+)	+(+)
K′	−51	15.3	0.06	0.2	±(+)	+(+)
K″	−46				+++(++++)	+(++)

$[\alpha]_D$, N, P calculated to ash-free basis.
* Values in parentheses obtained after centrifugation.

As in the case of the corresponding fractions of the hemolytic streptococcus,[2] levorotation increases and

[1] David H. Linder, "An Ideal Mounting Medium for Mycologists," SCIENCE, 70: 430, 1929.

[1] From the Department of Medicine, College of Physicians and Surgeons, Columbia University and the Presbyterian Hospital, New York City.

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[2] M. Heidelberger and F. E. Kendall, *Jour. Exp. Med.*, 54: 513, 1931.

[3] M. Heidelberger and A. E. O. Menzel, *Proc. Soc. Exp. Biol. and Med.*, 29: 512, 1932.

[4] Kindly supplied by the H. K. Mulford Biological Laboratories of Sharp and Dohme, Glenolden, Pa.