Frederick Forsch, Kim Plockman, John Steinman, Eugene Williams, Jane Winternitz
Topic: Crystals and Crystallization

GROUP III

5. Byrne C. Manson — John Muir Tech. High School, Pasadena, California:
Topic: The Water Supplies of Ancient and Modern Peoples
6. Dunbar Triplett, Jr. — The Lewis and Clark High School, Spokane, Washington
Topic: My Experiments with the Hydra
7. Wm. Stewart — Beverly Hills High School, Beverly Hills, California
Topic: A Home in Crude Petroleum
8. Katharine Marie Hall — University High School, Ann Arbor, Michigan
Topic: The Life and Inventions of Thomas Alva Edison

GROUP IV

9. John Winslow French — Pawling, New York
Topic: The Study of Rats and Mice
10. Virgil Bolen — Academy of the Western Illinois State Teachers College, Macomb, Ill.
Topic: What Modern Science Means to Me and My Community
11. Rose Auerbach — Washington Irving High School New York City
Topic: How Science has Helped Man Overcome His Limitations
12. Robert Ray — University High School, Oakland, California
Topic: A Hero of Science—Dr. Jacques Loeb
13. David Putnam — High School, Keene, N. H.
Topic: Inventions in Astronomy
14. Jean Elizabeth Boling — Shortridge High School, Indianapolis, Ind.
Topic: How has Science Changed my Daily Life?

GROUP V

15. Matilda Diorio — S. Phila. High School for Girls, Phila., Pa.
Topic: The Relation of Science to the Art of Music
16. John Alloways — Central High School, Kalamazoo, Michigan
Topic: Rayon
17. Freda Becker — S. Phila. High School for Girls, Phila., Pa.
Topic: Science and the Home
18. Omer Widmoyer — Central High School, Kalamazoo, Michigan
Topic: Cellulose and Rayon
19. Wade Allen — Central High School, Kalamazoo, Michigan
Topic: Products of the Electric Furnace
20. Benjamin Richman — Lyndhurst High School, Lyndhurst, N. J.
Topic: Radium and its Uses

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A RAPID METHOD FOR OBTAINING SINGLE SPORE CULTURES OF MOLDS

IN the course of a cultural study of a large number of molds it became desirable to procure as rapidly as possible single spore cultures of certain of the hardy, saprophytic molds.

With a modified Chambers micromanipulator[1] a comparatively large number of ascospores of *Aspergillus fischeri* were individually isolated on drops of malt extract agar[2] made on sterile cover slips. The mode of isolation in brief is as follows. A standard research microscope with mechanical stage is mounted on a metal base. To this base, properly aligned, are attached in front of the microscope movable, vertical arms designed to hold the micropipettes with which spore isolation is accomplished. These arms have vertical and lateral fine adjustments, enabling the operator to manipulate the pipettes as desired. The pipettes are made up just before use by drawing out sterile 3 mm glass tubing to the desired fineness in a micro-flame. The extreme tips of the pipettes are bent at right angles to the rest of the shaft. A moist chamber with an aperture on its upper side is placed in the mechanical stage. Two sterilized square cover slips are fitted with edges together over the open top of the moist chamber. On the under side of one cover slip has been placed a drop of sterile agar medium, on the other, a drop of spore suspension. The pipettes, as they are made up, are clamped in the arms in a horizontal position, and their vertical tips are then, by means of the movable pipette arms, brought into the moist chamber and centered under the low power objective. By means of the vertical

[1] For details as to the use of this micropipette method in the isolation of single cells, see W. H. Wright and E. F. McCoy, "An Accessory to the Chambers Apparatus for the Isolation of Single Bacterial Cells," *Jour. Lab. and Clin. Med.*, 12, 795, 1927.

[2] The nutrient agar used was made up on the basis of 25 g malt extract (Trommer's Analyzed), 15 g agar, 1,000 cc distilled water. The malt broth was made with 25 g malt extract, 1,000 cc water. These media were filtered through asbestos for clarification, but a clear agar is scarcely necessary when germinated spores are picked, as their development may be readily followed on the hanging drop slide.

fine adjustment one of the pipettes is then brought momentarily into the drop of spore suspension and a considerable amount of the liquid with its spore load is taken into the pipette by capillary action. With the mechanical stage the chamber is moved to a clear spot on the cover slip, and a certain amount of liquid expelled, by means of a long blowing tube, to form a small drop on the cover slip. This procedure is continued until a drop is obtained which contains a single spore. The second pipette is then brought into this drop and the spore removed. The drop of sterile agar medium is brought into position and the isolated spore deposited on it. As the spores are isolated, the cover slips with the agar drop and its single spore are sealed with sterile vaseline onto deep hanging drop slides, the well of the slide containing sufficient moisture to prevent drying of the agar, and the whole is incubated at the desired temperature.

Early results were most discouraging, as none of the single spores germinated. It was deemed advisable to germinate the spores in malt extract broth, and to isolate germinated spores shortly after the emission of the germ tube, in the hope that growth, once started, would be continued. That the procedure may be successfully applied, at least to some of the common, vigorous forms, is indicated in the accompanying table.

An experienced operator can, with considerable ease and with absolute certainty, isolate 20 or more germinated spores in the course of from three to five hours with the use of this micromanipulator method, so that it is apparent that single spore cultures of many organisms can be accumulated with considerable rapidity.

GROWTH OF SINGLE GERMINATED SPORES

Organism	Germinated spores isolated	Spores continuing growth	Per cent. continuing growth
(Ascospores)			
Aspergillus fischeri	8	5	62
(Conidia)			
Aspergillus fischeri	17	10	59
(Conidia)			
Aspergillus nidulans	8	3	37
Aspergillus sydowi	12	6	50
Botrytis sp.	8	7	87
Hormodendron sp.	12	12	100
Monilia sitophila	8	8	100
Penicillium digitatum	12	3	25
Penicillium islandicum	8	7	87
Syncephalastrum sp.	11	8	73
Trichoderma sp.	9	5	55
Totals	113	74	Av. per cent. = 65

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A METHOD FOR DETERMINING THE VOLUME OF SMALL PIECES OF TISSUE

A SERIES of test-tubes of varying sizes have each a capillary tube drawn off from one side, as shown in Fig. A. With the tube retained in a perpendicular position fluid is run into the tube to a point above the lower outlet and then brought down to this exact level by air pressure exerted through the mouth of the tube. For greatest simplicity direct mouth pressure has satisfactorily served this purpose.

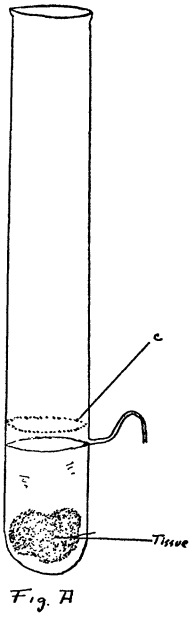

Fig. A

The tissue is then immersed in the fluid, and in accordance with the principle of fluid displacement, a new level is established at "C." By a procedure similar to that described above, the displaced fluid is collected through the capillary tube and its volume estimated.

Temperature and barometric corrections are hardly necessary, since in volumes as small as can be measured by this method the errors are negligible.

By this method volumes as small as one tenth of a cubic centimeter have with ease been estimated. It is, however, essential to use a test-tube whose diameter is only slightly larger than that of the tissue in order to secure a maximal rise of fluid and minimize error.

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ALOXITE AS AN ABRASIVE FOR GRINDING BONE SECTIONS FOR HISTOLOGICAL PURPOSES

SECTIONS of dry bone for histological study are prepared usually by one of the following methods: Grinding on a lathe, on compact pumice stone, on sand—or carborundum—paper of different grades of fineness, and lastly, on or between stones of suitable fineness. These methods are suitable but slow and tedious.

In the course of preparation of bone sections, the writer has found that aloxite powder (crystalline alumina) possesses exceptional abrasive properties for rapidly reducing bone to any desired thinness.

The technique here given has been found most satisfactory and particularly suitable for classroom use be-