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THE FIFTH CLEVELAND MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES

Edited by Dr. F. R. MOULTON

PERMANENT SECRETARY

FROM September 11 to 16, 1944, the one hundred and eleventh meeting of the American Association for the Advancement of Science was held in Cleveland, Ohio. Four meetings of the association had previously been held in Cleveland, the first in 1853 and later ones in 1888, 1913 and 1931. A meeting scheduled for Cleveland in 1852 was canceled because of an epidemic of yellow fever that prevailed from the Ohio River southward. This was the only time in 96 years that a meeting of the association was interfered with by disease, but during that interval there were seven years in which the association held no meetings because of war. Five of those years were 1861 to 1865, inclusive, when those who together had won their political freedom became for a time bitter enemies; and the remaining two were the years 1942 and 1943, when nearly all the world was at war.

Only 43 papers were presented at the Cleveland meeting in 1853, and 215 in 1888. In 1913 the number had increased to 813, and in 1931 to 1,830. At the recent meeting the number of addresses and papers had declined to fewer than 1,000 because of the many distractions due to the war. The membership of the association in 1853, 1888, 1913 and 1931 was 940, 1,764, 8,333 and 19,059, respectively. This year at a corresponding date was 25,000, in round numbers.

SOME GENERAL IMPRESSIONS

First on the list of general impressions of the Cleveland meeting is that it was much better than any one

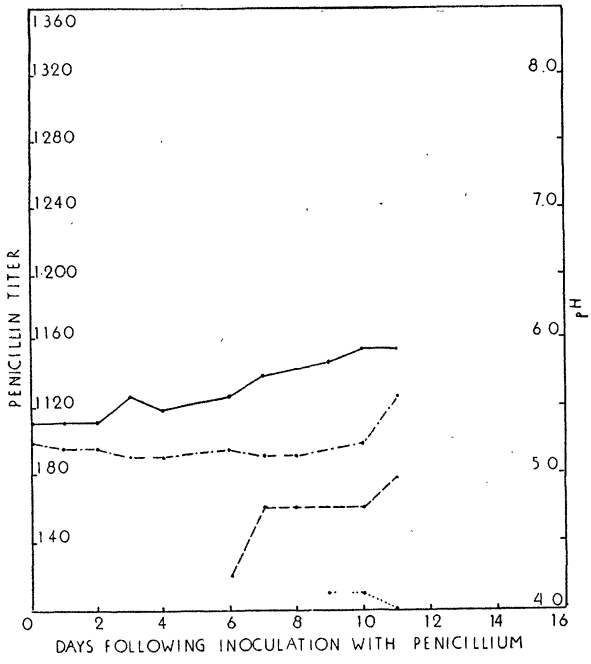

FIG. 2. *Inoculum:* suspension of spores in H_2O from a 9-day-old agar culture with white cottony growth of strain NRRL 832, submerged penicillin producer. — — —: daily determinations of penicillin in a fluid culture containing Cellophane. *Medium:* 400 cc $\frac{\text{surface ratio}}{\text{total volume}}$ ratio 0.0775. . . . . : daily determinations of penicillin in a fluid culture without Cellophane. *Amount of medium:* the same; $\frac{\text{surface area}}{\text{total volume}}$ ratio: approximately the same as above. ———: daily pH changes in the Cellophane containing culture. — . —: daily pH changes in culture without Cellophane.

on the 11th day. It may be also noted that the control flask yielded on the 6th day a moderate growth which became fairly abundant during the following 2 days. The experimental flask showed numerous colonies on the 3rd day and a heavy growth on the 5th day.

In the experiment described below strain NRRL 1249.B21, the surface penicillin producer was used. The flasks each contained 475 cc of the medium. The $\frac{\text{surface area}}{\text{total volume}}$ ratio of 0.0315 was extremely unfavorable for production of penicillin. Observations were made for 19 days. In the flask without Cellophane the highest penicillin titer obtained was 1:10. In the flask with Cellophane penicillin appeared on the 12th day. The highest titer 1:120 was reached on the 15th day, remaining approximately the same for the following 4 days. The growth was decidedly better in the experimental than in the control flask.

The changes in the H-ion concentration within the first 15 days of cultivation are given in Figs. 1 and 2. During this period cultures with Cellophane maintained consistently a somewhat higher pH level than the controls. A more significant effect of the Cellophane upon the pH was observed at later stages of growth not recorded in the figures. Thus, in control flasks having the favorable $\frac{\text{surface area}}{\text{total volume}}$ ratio 0.313 the pH usually rose sharply from 6.6–6.8 on the 14th day to 7.8–8.2 on the 19th day. Consistently during the same period the pH did not exceed 6.8 in the flasks with Cellophane.

SUMMARY

Enhanced production of penicillin is made possible by addition of Cellophane to fluid media. With Cellophane bags of suitable surface, the growth of the submerged and surface penicillin producing strains of *Penicillium notatum* is significantly faster and more abundant; penicillin makes its appearance earlier and reaches higher concentration in larger total volumes than in control cultures without Cellophane.[7] Thus the gain with the method described is both in the rate of production as well as in the total yield of penicillin. The enhancement also occurs under conditions unfavorable for development of penicillin, namely, (a) with degenerated cultures of the mold; and (b) when the surface penicillin producing strain is grown in cultures with an unfavorably small $\frac{\text{surface area}}{\text{total volume}}$ ratio (0.0315). There is also noted a markedly stabilizing effect of Cellophane upon the H-ion concentration of abundantly growing cultures during active production of penicillin. The stabilization is of significance, since the sharp rise in pH usually occurring in Penicillium cultures tends to destroy rapidly the penicillin.

GREGORY SHWARTZMAN

[7] In subsequent experiments in which large numbers of Cellophane strips instead of the bags were used, there was obtained markedly greater and faster production of penicillin than described in this report.

BOOKS RECEIVED

Annual Report of the Board of Regents of the Smithsonian Institution Showing the Operations, Expenditures, and Condition of the Institution for the Year Ended June 30, 1943. Illustrated. Pp. xi + 609. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. $2.00. 1943.

HERTZLER, ARTHUR E. *Ventures in Science of a Country Surgeon.* Illustrated. Pp. xi + 304. Halstead, Kansas: Arthur E. Hertzler. 1944.

SWANK, EDITH ELLIOTT. *The Story of Food Preservation.* Illustrated. Pp. 97. H. J. Heinz Company. 1944.

TIMM, JOHN ARREND. *General Chemistry.* Illustrated. Pp. xii + 692. McGraw-Hill Book Company. $3.75. 1944.