# SCIENCE

VOL. 88 FRIDAY, DECEMBER 2, 1938 NO. 2292



SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal

Lancaster, Pa. Garrison, N. Y.

Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington, D. C.

# THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

## PRELIMINARY ANNOUNCEMENT OF THE VIRGINIA MEETING

**Edited by Dr. F. R. MOULTON**

PERMANENT SECRETARY

FROM December 27 to 31, 1938, the association and about 35 of its affiliated societies will hold meetings in Richmond, Virginia. This is the one hundred third meeting of the association.

Richmond, the capital of Virginia, is a city of approximately 200,000 inhabitants. Not only is it a city of proud traditions, culture and education, but it is a center of industry and finance, being the seat of the Federal Reserve Bank of the Fifth District. Near its center is the Medical College of Virginia, a vigorous and rapidly expanding institution which last spring celebrated the one hundredth anniversary of its founding. In a suburb are the colleges for men and for women of the University of Richmond, and the College of William and Mary has a Richmond division. In addition, there are in this city a law school, a theological seminary and a university for colored students.

### REGISTRATION

Registration will be in the Mosque, a magnificent recently constructed building within easy reach of all the hotels in Richmond and of each of the four groups of meeting rooms in which the scientific sessions will be held. The Mosque has splendidly appointed lounges, several rooms in which conferences and committees may meet and a restaurant which will be in operation during the meeting. The presidential address and the addresses delivered under the auspices of the Society of the Sigma Xi and the United Chapters of Phi Beta Kappa, as well as several other gen-

vations have been confirmed by Moore and Walker[5] and Gaylord.[6] Little consideration has been given to the rate of freezing or thawing, and the tissues have not been kept in the frozen state for long periods.

We have observed recently[7] that slow freezing is less injurious to neoplastic cells than is rapid freezing, and cells that were destroyed by rapid freezing survived slow freezing. At the time these observations were made, the authors were not aware of the similar results obtained by Rahn[8] with rotifers, nematodes and tardigrades. Rahn has found that these animals, in the active state, survived slow cooling to −253° C. but were killed when frozen rapidly.

The rate of deterioration of neoplastic cells in the frozen state is very slow, and the results shown in Table I indicate that they can be stored for long periods at −70° C.

TABLE I

RESULTS OF INOCULATIONS OF FROZEN AND THAWED MOUSE NEOPLASMS

| Cell | Length of time kept at −70° C. | Route of injection | No. of mice | | Average incubation period | Average length of life after inoculation |
|---|---|---|---|---|---|---|
| | | | inoculated | + | | |
| | (days) | | | | (days) | (days) |
| Lymphoid leukemia (Strain Akf 5) | 8 | s.c. | 6 | 6 | 12 | 28 |
| | 86 | s.c. | 2 | 2 | 13 | 16 |
| | 147 | s.c. | 4 | 4 | 13 | 17 |
| | 440 | i.v.,s.c. | 4 | 4 | 15 | 25 |
| Myelocytic leukemia (Strain Ar 117) | 20 | s.c. | 7 | 5 | 19 | 42 |
| | 99 | s.c. | 6 | 5 | 17 | 58 |
| | 281 | i.v.,s.c. | 6 | 6 | 9 | 56 |
| | 440 | s.c. | 2 | 2 | 18 | |
| Chloroleukemia (Strain S1b 351) | 6 | i.v. | 4 | 1 | 24 | 42 |
| | 447 | i.v.,s.c. | 5 | 0 | | |
| | 13 | i.v. | 4 | 1 | 21 | 36 |
| | 94 | i.v. | 5 | 0 | | |
| | 1 | i.v.,s.c. | 5 | 4 | 14 | 25 |
| Monocytic leukemia (Strain S2) | 2 | s.c. | 4 | 4 | 14 | 23 |
| | 52 | s.c. | 4 | 3 | 13 | 20 |
| | 337 | i.v.,s.c. | 3 | 2 | 10 | 20 |
| | 430 | i.v.,s.c. | 4 | 3 | 15 | 25 |
| Sarcoma (Strain S.3172) | 1 | s.c. | 4 | 4 | 13 | 56 |
| | 151 | s.c. | 4 | 4 | 13 | 61 |
| | 448 | s.c. | 4 | 4 | 13 | 70 |
| Carcinoma (Strain Afb 601) | 2 | s.c. | 4 | 4 | 14 | 63 |
| | 98 | s.c. | 4 | 4 | 17 | 75 |

*Abbreviations used in the table*: s.c. = subcutaneously; i.v. = intravenously.

*Technic:* The tissue to be frozen was removed immediately after the animals were killed and was placed in a Petri dish on a chilled ice plate. It was minced with scissors in the presence of a small amount of Tyrode's solution. The minced tissue was distributed in small test-tubes (9 × 75 mm), approximately 0.5 cc in each, and the tubes were sealed with a blast lamp. The sealed tubes were immersed in alcohol at 0° C. and small pieces of solid $C_2$ were dropped in the alcohol at such a rate that the temperature dropped from 0° C. to −70° C. during approximately one hour. The frozen tissue was stored under alcohol in a 12-gallon thermos bottle containing large pieces of solid $CO_2$. The tissues to be injected were thawed rapidly by shaking the tube in water at 37° C. This was found to be less injurious to the tissue than slow thawing.

Epithelium of chicken trachea was preserved in the frozen state in a similar manner. Many cilia were actively motile after 2, 16 and 327 days.

All strains of neoplasms tested could be preserved without difficulty except for the myeloid cells of a transmissible chloroleukemia (Strain S1b 351), but these, too, were found to resist freezing when large fragments of spleen, with no Tyrode's solution, were frozen.

The possibility that transmission by frozen cells is due to a virus present in the cells is very unlikely.[7] The results of an experiment suggested by W. A. Barnes are noteworthy in this connection. Cells irradiated while in the frozen state at −70° C. with 4000 r of x-ray were completely inactivated. This dose of x-ray does not injure viruses at room temperature, and it is not likely to injure them at −70° C.

*Summary:* All neoplastic cells so far tested could be preserved by freezing, and the virulence of those tested after a year at −70° C. had not altered.

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[5] J. E. S. Moore and C. E. Walker, *Lancet*, 174: 226, 1908.

[6] H. R. Gaylord, *Jour. Infect. Dis.*, 5: 443, 1906.

[7] C. Breedis, W. Barnes, and J. Furth, *Proc. Soc. Exp. Biol. and Med.*, 36: 220, 1937.

[8] Rahn, quoted by Heilbrunn.[2]

## BOOKS RECEIVED

EVANS, ALWEN M. *Mosquitoes of the Ethiopian Region.* Pp. x + 404. 174 figures. British Museum (Natural History). Oxford University Press. 20/.

HARRIS, THOMAS M. *The British Rhaetic Flora.* Pp. xi + 84. 26 figures. 5 plates. British Museum (Natural History). Oxford University Press. 7/6.

HAYWARD, HERMAN E. *The Structure of Economic Plants.* Pp. x + 674. 340 figures. Macmillan. $4.90.

LATIMER, WENDELL M. *The Oxidation States of the Elements and their Potentials in Aqueous Solutions.* Pp. xiv + 352. 5 figures. Prentice-Hall. $3.00.

MARSHALL, J. F. *The British Mosquitoes.* Pp. xi + 341. 172 figures. 20 plates. British Museum. Oxford University Press. £1.

MERA, H. P. *The "Rain Bird"; A Study in Pueblo Design.* Memoirs of the Laboratory of Anthropology, Vol. II, 1937. Pp. 113. 48 plates. The Laboratory, Santa Fé, New Mexico. $3.50.

MOORE, JANE. *Cityward Migration; Swedish Data.* Pp. xix + 140. University of Chicago Press. $2.00.

*Scientific Reports of the John Murray Expedition, 1933–34:* Vol. IV, No. 9, by T. T. MACAN. *Asteroidea.* Pp. 324–432. 12 figures. 6 plates. 10/. Vol. V, No. 2, by H. G. STUBBINGS. *Pteropoda.* Pp. 33. 2 figures. 1/6. No. 3, by M. M. RAMADAN. *Crustacea; Penaeidae.* Pp. 76. 15 figures. 2/6. British Museum, London.

*Universal Inventions; United States Patents Owned by Universal Oil Products Company as of September 1, 1938.* Pp. 330. Illustrated. The Company, Chicago.