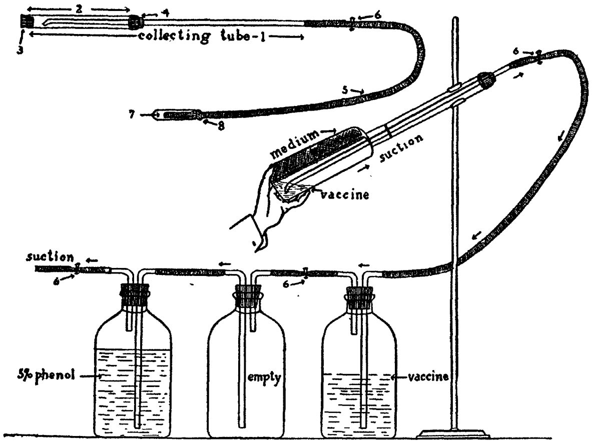

FIG. 2. Collective tube. (1)—glass tube; (2)—outer glass tube; (3)—solid rubber stopper; (4)—perforated rubber cap; (5)—rubber tube; (6)—metal clamp; (7)—glass tube; (8)—cheese-cloth plug.

ing pipette from contamination as well as the mouth of the bottle during the process of collecting the vaccine. The collecting tube is connected serially by means of a rubber tube with two sterile bottles and a bottle of 5 per cent. phenol (see Fig. 2). The bottle of phenol is connected with a suction pump, and the bacterial suspension is collected by means of suction. A clamp (6) at the top of the collecting tube stops the suction as soon as the growth of the individual bottle is delivered into the vaccine-bottle and the collecting tube is withdrawn from the bottle into the outer glass tube. Thus the tip of the tube is protected and no air is allowed to be drawn into the vaccine bottle.

When the growth from all the bottles is collected, the suction pump is stopped, and air is allowed to flow through the phenol. This sterilizes the air before it enters the bottle of vaccine and fills the vacuum there. The collecting pipette is then disconnected, and the two-hole stopper in the vaccine bottle is replaced by a sterile solid rubber stopper.

This apparatus has been used successfully in our laboratory for the past year. It facilitates the preparation of bacterial vaccines in that it saves time and labor and reduces contaminations to a minimum.

I wish to express my appreciation to Miss Mildred Melman for making the drawings from the model.

LUCY MISHULOW

THE PRODUCTION OF HIGH VELOCITY IONS FOR THE DISINTEGRATION OF ATOMIC NUCLEI

LAWRENCE has been able to give in the cyclotron a multiple acceleration to positive ions in a uniform magnetic field and has obtained very high velocities of the particles. Thus energies of the order of seven million electron volts have been attained, and an increase to ten million should be accomplished soon. In the cyclotron the ion is accelerated twice by the high frequency electrical field during each (approximately) circular orbit.

In experiments on a small apparatus it is proposed to endeavor to apply the use of a three-phase oscillator system to give either three or six accelerations per revolution of the positive ion in its orbit. If successful this should make it possible to attain much higher equivalent voltages. The principal difficulty involved is that of getting a satisfactory high-frequency, high-voltage, three-phase oscillator system.

Consideration of the simplest and least effective application of a three-phase potential, such as that in which it is connected to a trisector electrode cyclotron, for example, as compared with a duant cyclotron, leads to the following results: An ion is accelerated three times instead of two times per circuit. The ion density is reduced 50 per cent. The capacity of the electrode is reduced 33 per cent. The proper sequence of accelerating voltages in a forward direction occurs every 120 electrical degrees. In the reverse direction the proper sequence occurs only half as often, *i.e.*, every 240 electrical degrees. Resonance is preferred in the forward direction. In the duant type the accelerating potential in both the forward and reverse directions occurs 180° apart. The magnetic field frequency of the oscillating potential and the root mean square high frequency potential are the same in both cases. The use of six electrodes instead of three would be much more efficient.

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BOOKS RECEIVED

ADAMS, ORVILLE. *Elements of Diesel Engineering.* Pp. xvi + 478. 240 figures. Henley. $4.00.

CROWTHER, J. G. *Men of Science.* Pp. xiii + 332. Illustrated. Norton. $3.50.

HOBBIE, JOHN R. *Introduction to College Physics.* Pp. ix + 756. 458 figures. Farrar and Rinehart. $3.50.

KUBIE, LAWRENCE. *Practical Aspects of Psychoanalysis.* Pp. xiv + 223. Norton. $2.00.

MURPHY, ROBERT C. *Oceanic Birds of South America.* Volumes I and II. Pp. xxii + 1245. 80 figures. 88 plates. American Museum of Natural History, New York.

Osiris: Studies on the History and Philosophy of Science, and on the History of Learning and Culture. Vol. I, January, 1936. GEORGE SARTON, Editor. The David Eugene Smith Presentation Volume. Pp. 777. Illustrated. Saint Catherine Press, Bruges, Belgium.

ROBB, ALFRED A. *Geometry of Time and Space.* Pp. vii + 408. 57 figures. Macmillan, The Cambridge University Press. $7.50.

WATMOUGH, W. *The Cult of the Budgerigar.* Pp. viii + 296. Illustrated. Cage Birds, London. 6/6d.