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A Simple, Inexpensive Method for Drying Serum in the Frozen State in Cellophane Bags.

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A number of methods have been devised for drying serum and other fluid materials while in the frozen state.[1, 2] These methods, though excellent, are somewhat complicated and require moderately expensive apparatus. A simpler, less expensive method would be useful.

Since serum can be concentrated in a cellophane bag by evaporating the moisture in front of an electric fan either at room temperature or in a refrigerator at 5°C, it was decided to find out if the serum would evaporate to dryness when kept continually in a frozen state in the refrigerator. The refrigerator available maintains a temperature of 14°F, that is, 18°F below freezing.

Serum was placed in cellophane bags described in the preceding communication and suspended in the refrigerator. The serum froze rapidly and remained frozen. It eventually became completely dry and this dry residue had the same spongy consistency and light color as serum dried by the lyophile process. It redissolves rapidly, in a minute or two, when distilled water is added, forming a clear or practically clear solution, with the color and appearance of the original serum.

Small sausage casings, about 1 cm in diameter, made out of very thin cellophane allowed about 10 cc of serum, under the above conditions, to evaporate completely to dryness in several weeks. However, it took months for about 100 cc of serum to dry completely in a thicker walled sausage casing whose lumen was about 5 cm.

Some further experiments were carried out keeping the bag of frozen serum under lowered atmospheric pressure and in the presence of a drying agent, such as calcium chloride. By this means, it was possible to reduce considerably the time necessary for drying the serum.*

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1 Elser, W. J., Thomas, R. A., and Steffen, G. I., *J. Immun.*, 1935, **28**, 433.

2 Flosdorf, E. W., and Mudd, Stuart, *J. Immun.*, 1935, **29**, 389.

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