ml of distilled water is over 100 times the concentration of thyroxin found in 1 g of thyroid powder. In doses of 10 mg or higher of thyroxin, root growth ceased, and at a lower concentration growth was slowed down.

Kodani (*3*) has demonstrated that a 2%–4% solution of ribose nucleic acid is the optimum range in which mitotic abnormalities are produced in onion root cells. In solutions of 0.05% and 0.1% of ribose nucleic acid growth was normal. In our laboratory we have found that a 2% solution of desoxyribonucleic acid (Lot No. DN4902, Schwartz Laboratories, New York City) induced mitotic abnormalities in onion root cells. Is there enough ribose nucleic and desoxyribonucleic acids in dry thyroid tissue to account for the abnormalities observed? Davidson and Waymouth (*2*) reported that in dry thyroid tissue from sheep there are 148 mg of nucleic acid P/100 g of tissue. Since P is approximately 10% (more likely 8.5%–9.5%) of nucleic acid molecules there is 0.014 g of nucleic acid/g of thyroid tissue. In 1 g of thyroid/100 ml of water, we then have 0.014% solution of nucleic acids. The concentration of thyroid tissue used in the present tests certainly does not contain enough nucleic acids to account for the abnormalities observed. Evidently there is some unknown factor in the thyroid powder which is responsible for the production of c-mitosis, chromosome bridges, and nondisjunction. The normal mitosis is upset. How this is done is unknown. This factor may either enter the cell or act upon another substance outside the cell, which in turn enters and affects the metabolism of mitosis. Since solutions of the thyroid powder that have been made up and placed in the refrigerator for 24–48 hr before use were usually more potent in producing abnormalities than fresh solutions, a decomposition product may be the causative agent.

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A Laboratory Lyophil Apparatus[1]

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During the course of work in the Gates and Crellin Laboratories, a need arose for a lyophil apparatus capable of handling liter quantities of solution. The apparatus of Campbell and Pressman (*1*) was inadequate, since the limiting capacity of this apparatus was about 400 ml of solution. Furthermore, the apparatus could be operated only intermittently, since several hours were required between lyophilizing operations for de-icing of the condenser surface. As a result, a modified apparatus was developed which obviated these difficulties and which had the additional advantages of low cost and ease of construction. This apparatus is shown in Fig. 1.

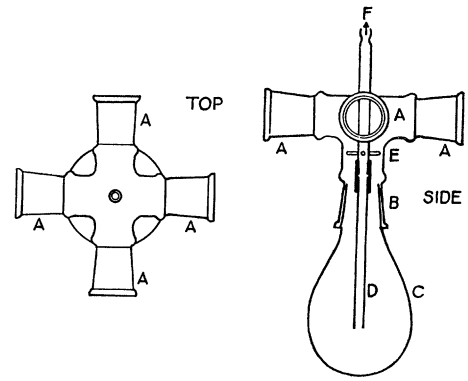

Fig. 1. Lyophil apparatus. A, ports, ST 34/45, for flasks; B, ST 34/45, for receiver flask; C, receiver constructed from 800-ml Kjeldahl flask; D, removable tube connected to center tube with rubber tubing; E, three glass pin supports arranged symmetrically on center tube; F, to vacuum.

The apparatus consists essentially of five female standard taper 34/45 joints. Four of the joints, which are arranged at right angles, serve as ports for the insertion of lyophil flasks. The flasks were constructed from male 34/45 joints and Kjeldahl flasks as described previously (*1*). The joints are arranged as compactly as possible in order to shorten the path of water vapor from the lyophil flask to the receiver; however, apparatus with joints having arms of 2 in. to 3 in. still operate effectively. The fifth joint accommodates the receiver for condensing moisture. The receiver is simply another lyophil flask constructed from an 800-ml Kjeldahl flask and is replaced periodically during operation of the apparatus.

TABLE 1

Operation time (hr)	Percent total water collected
0.9	21.1
2.0	44.5
3.2	64.4
4.3	80.2
5.9	97.2

The operation of the apparatus was similar to that of Campbell and Pressman (*1*). The four flasks were filled with solution and frozen by turning in a bath of methyl cellosolve and dry ice. The flasks were attached to the apparatus after lubrication of the joints, the receiver was put in place, and the apparatus was moved downward until the receiver was immersed to within a few inches of the joint in a dry ice-methyl cellosolve bath. The cooling mixture was conveniently contained in a 1-gal wide-mouthed Dewar flask. The system was then evacuated with an efficient vacuum pump (a Hyvac was satisfactory). In order to replace the receiver, air could be admitted into the system through an auxiliary manifold system. The

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limiting capacity of the 800-ml receiver is about 300 g of water, since this is the maximum amount of water that can be frozen in the flask safely without breakage during subsequent de-icing. De-icing was conveniently performed by allowing the flask to warm slowly in air.

TABLE 2

Operation time (hr)	Water collected (ml)
3.5	325
5.5	700
11	1015
27	1040 (complete)

The efficiency of the apparatus may be judged from the data in Table 1. Approximately 6 hr was required to remove 200 ml of water distributed equally between four 400-ml flasks. The time of sublimation is somewhat slower than that possible with the apparatus of Campbell and Pressman (*1*), as might be expected from the shorter path from the ice surface to condensing surface in the latter apparatus. The effectiveness of the present apparatus with large volumes of solution is evident from the results in a typical run (Table 2) in which 1050 ml of a dilute solution of blood group A substance was distributed among four 800-ml flasks. The lyophilizing was essentially complete after 27 hr, the apparatus being in continuous operation during this time except for receiver changes. Care must be taken if melting of the material in the lyophil flask is to be avoided to make the final receiver exchange when sufficient ice remains in the lyophil flasks to keep the material frozen. This precaution may be of importance in case the material being lyophilized is denatured readily.

The author is indebted to D. H. Campbell and E. L. Bennett for discussion concerning the operation and construction of this apparatus.

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Pollination of *Asarum canadense* L.

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There has been some question whether *Asarum canadense* L. is self-pollinated or whether it is cross-pollinated by insects. Guides to the wild flowers of the northeastern states, even some of those most recently published, state that *Asarum canadense* L. is pollinated by small insects found among dead leaves on the forest floor. At least one species of *Asarum* is known, however, not to be so pollinated. Kugler (*1*) was led by his experiments to conclude that insects in no way aided the pollination of *Asarum europaeum* L. He further showed that the stigma matured first, but it was still receptive to pollen at the time the anthers of the blossoms matured. He thought that *A. europaeum* L. could be and probably was self-pollinated.

To ascertain the type of pollination occurring in *A. canadense* L. the following method was employed. The anthers and filaments were removed from the blossoms, some of which were left uncovered, and some covered with wax paper bags. Still other blossoms, with the flower parts intact, were covered with wax paper bags before the stamens matured. Care was taken to see that no insects were present in the flowers at the time of covering.

Thirty-seven of the 50 plants, whose blossoms had been covered and the flower parts left intact, were observed a few weeks later. Of these 37, 26 had produced seeds. These could be distinguished readily by the greatly enlarged or inflated ovary. When they were opened, sound seeds were found. Four of these 37 plants had not produced seeds. Their blossoms were not withered or dried. Seven other plants had blossoms which had withered and turned brown, showing no sign of seed development.

Thirty of the 50 plants with covered blossoms and with stamens removed were observed. All of these were abscised. No trace of any blossoms was found in the 50 specimens from which stamens had been removed and which were left uncovered among the other intact plants. In the flowers from which the stamens were removed, or where the stamens for some reason had not developed, the pistils withered and died.

The few insects seen to visit the flowers during this experiment were fulgorids, aphids, and one ant.

Since no plants with stamens removed produced seeds, whether the flowers were covered or uncovered, and since the majority of those with flowers intact did produce seeds, even when enclosed in bags, it seems reasonable to conclude that the plants are normally self-pollinated and that cross-pollination occurs rarely if at all. The plants in this group that did not produce seeds had evidently become injured while being tied up.

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