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Transplantation of frozen-dried cornea in the rat.[1]

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The good results obtained with quick-frozen, dehydrated, stored and later rehydrated nerves as grafts (Weiss and Taylor, '43, Weiss '43) have encouraged extension of the experiments to other tissues. The superiority of freezing-drying over other preservative treatments lies in its much less radical effects on the biophysical and biochemical (enzyme, protein, etc.) constitution of the tissue. The host body may incorporate such grafts without either foreign body reaction or substitution.

Preliminary tests with cornea gave promising results. Rat corneae were frozen in Isopentane at cca. -150°C., evacuated at -40°C. for several days, then sealed and stored. Before use they were rehydrated in Ringer's in vacuo, resuming normal consistency and appearance. They were grafted over host eyes whose corneae had been excised except for a narrow rim. The exposed grafts easily succumb to postoperative infection. Uninfected grafts, however, become incorporated by fusing circumferentially with the residual rim of the host cornea. They retained their laminated structure, became resettled by host cells (in supranormal numbers), and remained transparent up to 6 weeks, when the experiments were terminated. Innervation had also returned, as the cornea (wink) reflex could be evoked from the grafts. Although microscopic examination revealed no sign of substitution of the graft matrix by the host, the permanency of the incorporation remains to be demonstrated.

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