a 20% solution of sucrose for 8–10 days (*2*). These plants have the mechanism for starch formation but do not form it under natural conditions, apparently because of the presence of an inhibitor.

Members of the lily, iris, amaryllis, and gentian families do not store starch in the leaves following photosynthesis, apparently because of the presence of a starch synthesis inhibitor. Onion, a member of the lily family, has the inhibitor.

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The Isthmic Mucous Membrane of the Human Uterus

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The purpose of this report is to present preliminary findings in a study of the mucous membrane lining the isthmic segment of the human uterus. These findings indicate that the isthmic mucosa is not peculiar, as it has been extensively described, but that, rather, it is an integral part of the corporeal andometrium.

According to current understanding, the isthmic mucosa is an entity in itself, separate and distinct from that of the cervix and corpus. A similarity with the endometrium is recognized, however, with the following exceptions: the isthmic mucosa is described as being thinner, poorer in glands, and richer in supporting tissue. Also, its glands are said to react poorly to the ovarian hormones, and to contain no glycogen during the secretory phase. A further difference is the reported absence of coiled arterioles, which are a prominent feature of the endometrium. The conclusion from these observations is that although the two tissues casually resemble one another, nevertheless they are fundamentally dissimilar.

Preliminary studies have been made of the mucous membrane of 38 human uteri removed at operation. The endometrial cycles were distributed as follows:

Early proliferative	6
Late proliferative	12
Early secretory	6
Late secretory	10
Post-menopausal	4

In each of these cases, similar blocks of the isthmic mucous membrane were prepared for comparison with the endometrial specimens.

Comparison of the endometrial functionalis with the isthmic mucosa confirms the observations noted above. However, when the endometrial basalis is examined in routine hematoxylin and eosin sections, it is found to be essentially similar to the isthmic mucosa. The basalis is of the same thickness. The general appearance of the glands, and their cyclic changes in response to the ovarian hormones, are the same. The characteristics of the stroma, and the vascular distribution, are similar. Special staining technics show further evidences of similarity. One concludes from these observations that the isthmic mucosa is in fact a continuation of the endometrial basalis and that it differs from the endometrium proper only in that the functional layer is lacking.

These observations cast serious doubt upon the propriety of designating the isthmus uteri as an entity of equal importance with the cervix and corpus. They suggest, rather, that this zone is part of the corpus uteri. Details of this study will be presented elsewhere.

Physical Studies on Corneal Tissues

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Improvements in the technique of corneal grafting have increased the interest in the proper preservation of corneal donor tissue. Many investigations have dealt with corneal metabolism (*6, 11*), permeability (*4*), transparency (*1, 8*), hydration properties (*8, 10, 12*), X-ray diffraction (*9*), birefringence (*8*), and elasticity (*13*). A number of investigators (*2, 3, 5, 7, 14*) have reported on methods for preserving corneal tissue but of these only three (*3, 5, 7*) have applied biological methods for determining the viability of the aging cornea. No attempts were made in the past to correlate physical properties of the aging cornea with the transplantability of the tissue. For this brief review only the most pertinent references have been selected from a large bibliography.

The object of our brief investigation was to find some physical properties of corneal tissue which would measurably change during aging to indicate suitability for subsequent successful transplants. The experiments were made with bovine corneas and comprised 1) quantitative light transmission measurements as well as 2) X-ray diffraction studies. The eyes were removed immediately after death of the animal, rinsed with a 0.025% isotonic buffered thyrothricin solution, transported into a sterile moist chamber, and processed at the laboratory within 1 hr. During aging, the corneal tissues were kept in a refrigerator at a temperature of 5° C.

1) *Light transmission.* Experiments were made to determine the light transmission of corneal tissue with aging under different conditions. Periodic light transmssion measurements were performed on several corneas set up for simultaneous aging. A disk-shaped cellulose acetate sponge with a round opening in the center served as the

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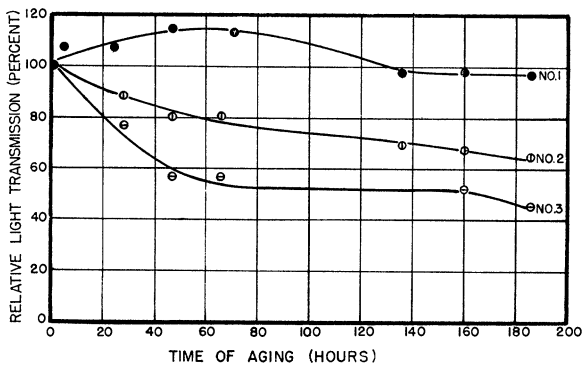

FIG. 1. Light transmission characteristics of aging corneal tissue. No. 1—in mineral oil; Nos. 2 and 3—in moist chamber.

support for the cornea. The auxiliary equipment consisted of a stabilized incandescent light source with a condensing system for producing a parallel beam of light which, after transversing an iris diaphragm and a blue filter, passed through the cornea. The transmitted light fell on the photocell equipped with a second iris diaphragm (set to a fixed 2-mm opening) and was measured by means of a photometer (Photovolt Model 500).

Typical results obtained with one set of bovine corneas are given in Fig. 1, showing relative light transmission values plotted against time of aging. Cornea No. 1 had been placed in mineral oil (Nujol) according to a procedure by Buerki (*2, 3*), which reportedly preserves corneal tissue for many days or even weeks; corneas Nos. 2 and 3 had been aged in a moist chamber. In the former case, Nujol was used to fill completely the chambers of the specimen holder, whereas in the latter case physiological saline solution was used merely to cover the bottom of the outer and inner chambers and to moisten the sponge supporting the specimen. The transmission values given in Fig. 1 were computed from the maximum photometer readings obtainable; relative values were obtained by assigning the value 100 to the amount of light transmitted initially by each cornea and expressing the other values in proportional units. With the first eight corneas studied, the photometric readings were not taken at maximum transmission and the results are therefore not strictly comparable.

The results obtained with two other sets of four bovine corneas, some aged in mineral oil and others in presence of saline solution as described above, were essentially like the ones presented, except for the apparent increase in light transmission shown in Fig. 1 (cornea No. 1). It is believed that a focusing effect caused by a slight mechanical deformation brought this about. In one case a cornea taken from an eye which had not been rinsed with thyrothricin solution gave the exceptionally low light transmission of 25% after about 100 hr in the moist chamber; subsequently the turbidity decreased, but this effect was probably due to bacterial attack or some other form of decomposition.

The light transmission data for corneas during aging appear to furnish a quantitative measure of their viability. Refinements of the technique might lead to the development of a method for testing corneal tissue and predicting its suitability for transplanting.

2) *X-ray diffraction.* Hertel (*9*) in 1933, using diffraction methods, carried through a very comprehensive investigation of the transparent tissues of the eye. His interest, however, was largely concerned with ultimate structure and constitution of materials available, and the effects on diffraction patterns of water content, ash constituents, etc.

In the present experiments, equipment was arranged so that corneal specimens could be maintained under conditions considered to be satisfactory for storage while the X-ray exposures were made. The camera, maintained near ice temperature, was filled with a fine mist of physiological salt solution to insure against moisture changes of any importance. Two samples each from four corneas were used.

Fresh corneas yielded diffraction patterns essentially identical to those published by Hertel for his fresh material. Corneal specimens were maintained at about 2°–5° C under an atmosphere of saturated relative humidity for various periods of time previous to examination. Aging under these conditions yielded diffraction patterns which were practically identical with those from samples which had not been aged, although there were indications of slight changes in the small angle scattering region. Samples preserved in mineral oil (*2, 3*) gave patterns equivalent to those indicated above, even when the sample was slightly hazy.

Air-dried samples and samples dried by immersion in successively more concentrated solutions of ethyl alcohol (from 30 to 100%) gave diffuse patterns quite similar to those of undried material, even though the sample turned opaque. Probably in this case the epithelium and endothelium were responsible for the appearance (*8*). Stretched samples both fresh and aged gave for the fiber period 11.2 A (Hertel finds 9.7 A) and the most intense spacing at right angles 2.85 A (Hertel finds 4.4 A). It must be concluded that the diffraction patterns furnish no evidence for degree of aging, and with the present technique cannot indicate whether an aged cornea is suitable for a successful transplant.

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