

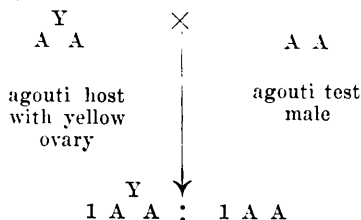
Homoplastic Ovarian Transplantability in the House Mouse.*

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Offspring have been obtained from homoplastic ovarian transplants in guinea pigs by Castle and Phillips,^{1,2,3} and in mice by this author.^{4,5} The grafting technic consists of (1) exposure of the ovary of the host by a dorso-lateral incision in the abdominal body wall, (2) a small incision in the ovarian capsule as far distant from the Fallopian tube as possible, (3) complete removal of the ovary, (4) insertion of the donor ovary into the host ovarian capsule, and (5) suturing of the abdominal wall, but not the ovarian capsule.

Ovarian Transplantation Following Unilateral Ovariectomy in the Host. In 13 cases a single ovary was transplanted from a yellow mouse of the 101A^Y inbred line into an agouti litter mate, the host differing from the donor in but a single genetic character. The agouti hosts were later test mated with agouti males. Since the yellow factor is dominant to agouti any yellow offspring resulting from such a mating would indicate a successful graft, as follows:



In every instance the only offspring obtained

from the test matings were agouti, thus indicating that the grafts were not successful.

Ovarian Transplantation Following Bilateral Ovariectomy in the Host. In 38 cases one ovary of an agouti mouse of the 101A^Y line was removed. Seven to 10 days later the remaining hypertrophied ovary was removed, and in its place an ovary from a yellow litter mate was inserted into the capsule. The agouti hosts were later test mated with agouti males. Eighteen of the 38 agouti hosts had yellow young in litters resulting from these matings, thus demonstrating functional grafts in 18 cases.

In an attempt to analyse the problem of homoplastic ovarian transplantability both ovarian sites of all 38 mice in the above group were examined histologically. This consisted of a study of serial sections of the region of the grafting operation as well as the site of the initial ovariectomy. Care was taken to remove for sectioning enough of the surrounding area to eliminate any possibility of doubt as to the presence or absence of ovarian tissue. The results, along with the results of transplantation after unilateral ovariectomy, are shown in Table I. In the 8 cases of incomplete bilateral ovariectomy previous test matings had indicated unsuccessful grafts. Of the remaining 30 females ovarian tissue was entirely absent in 12 cases. In each of the 18 successful cases the only ovarian tissue present was the hypertrophied donor ovary in the graft site.

Discussion. It is evident that in this work homoplastic ovarian grafts were successfully established and maintained only after complete bilateral ovariectomy in the host. Thus the results are entirely compatible with Halsted's "law of endocrine deficiency"⁶ which states that there must be a deficiency of an endocrine principle before transplants supply-

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¹ Castle, W. E., and Phillips, J. C., *Science*, N. S., 1909, **30**, 312.

² Castle, W. E., and Phillips, J. C., Carnegie Institution of Washington, 1911, Publ. No. 144.

³ Castle, W. E., and Phillips, J. C., *Science*, N. S., 1913, **38**, 783.

⁴ Robertson, G. G., *PROC. SOC. EXP. BIOL. AND MED.*, 1940, **44**, 302.

⁵ Robertson, G. G., *J. Exp. Zool.*, 1942, **89**, 197.

⁶ Halsted, W. S., *J. Exp. Med.*, 1909, **11**, 175.

TABLE I.
Relationship of Homoplastic Ovarian Transplantability to the Type of Ovariectomy in the Host.

Type of Ovariectomy	No. of attempted grafts	Unsuccessful grafts	Functional grafts
Unilateral	13	13	0
Incomplete bilateral	8	8	0
Complete bilateral	30	12	18

ing that principle can be successful. This has been confirmed by results of autoplasmic transplantations of parathyroids (Halsted),⁶ adrenal glands (Ingle and Higgins),⁷ thyroid (Ingle and Cragg),⁸ and ovaries (Lane and Markee),⁹ and homoplastic transplantations of adrenal glands (Pomerat *et al.*).¹⁰ In the

⁷ Ingle, D. J., and Higgins, G. M., *Endocrinology*, 1938, **22**, 458.

⁸ Ingle, D. J., and Cragg, R. W., *Endocrinology*, 1939, **24**, 550.

⁹ Lane, C. E., and Markee, J. E., *Growth*, 1941, **5**, 61.

¹⁰ Pomerat, C. M., Breckenridge, C. G., and Gordon, L., *Endocrinology*, 1944, **34**, 60.

present work homoplastic ovarian transplantations were successful only when there was a complete absence of host ovarian tissue. Therefore, the results are in accord with the concept that creation of a deficiency of the ovarian principle is necessary for the establishment and maintenance of homoplastic ovarian grafts.

Summary. Functional homoplastic ovarian grafts in mice became established only after complete bilateral ovariectomy in the host. This is in agreement with Halsted's "law of endocrine deficiency" since, in this series of experiments, the transplants were successful only in the absence of host ovarian tissue.

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Acetylcholine in the Light and Dark Adapted Frog Retina.

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Like central nervous tissue of which it is a derivative, the vertebrate retina has been shown to contain acetylcholine (Ach)^{1,2,3,4} and cholinesterase.⁵ That Ach may affect the retina has also been demonstrated, von Studnitz and Kosarov⁶ having observed a contraction of the cones and an expansion of the rods

at concentrations of 10^{-4} and 10^{-8} Ach upon both light and dark exposure. In the excised eye, Therman² has found that the application of Ach causes an irreversible depression of excitation as measured by diminished retinal potentials (an effect enhanced by eserine).

Two attempts to demonstrate a possible functional significance of retinal Ach by comparing the amounts of Ach in frog retina under conditions of light and dark adaptation have resulted in completely contradictory results. Therman,² using the leech muscle and the frog heart as test objects, found under both conditions of adaptation 6 γ Ach/g of retina extracted with trichloroacetic acid. Lange,⁴ extracting with bicarbonate-free frog Ringer, and assaying with the leech muscle, found, after complete light adaptation of 10 frogs,

¹ Loewi, O., and Hellauer, H., *Arch. f. d. ges. Physiol.*, 1938, **240**, 769.

² Therman, P. O., *Acta Soc. Sci. fenn.*, Ser. B, 1938, **2**, 5.

³ Chang, H. C., Lee, L. Y., and Li, T. A., *Chinese J. Physiol.*, 1941, **16**, 373.

⁴ Lange, V., *Ztschr. f. Physiol. Chem.*, 1943, **279**, 73.

⁵ Anfinsen, C. B., *J. Biol. Chem.*, 1944, **152**, 267.

⁶ Studnitz, G. v. and Kosarov, W. G., *Z. f. vergl. Physiol.*, 1942, **29**, 418.