Comment. It appears from the experiments reported that by means of microwave irradiations a focal lesion can be produced in the cerebral cortex of the rabbit without incising the scalp or opening the skull. The only injury to the scalp was a crusting lesion without bleb formation.

A possible explanation of the extremely small size of the lesion is that the plastic protector in contact with a small area of the scalp has dielectric properties which allow much more efficient entrance of the radiation into tissue in the area in contact, than is possible from air to tissue.

The histological lesions produced by this type of irradiation into the cerebral cortex are similar to those described in detail by Silver and Walker[4] in experiments of thermocoagulation of the cerebral cortex by the direct application of a heated piece of metal, except that microwave destruction apparently penetrates more deeply within the tissue.

Since microwave diathermy heating is dielectric heating, it is presumed to be nonionizing and any toxic effects would be those of excessive heating. In fact, no significant hematopoietic effects were observed in the work of Lidman and Cohen,[5] Fallis[6] and Daily[7] upon exposure to intensities of radiation likely to be experienced in practical radar work. It should be noted, however, that Imig, Thomson, and Hines[8] indicate that testicular degeneration may occur from microwave heating at a lower temperature than from infra-red heating, and Richardson, Duane, and Hines[9] showed that upon intentional overdosage, lenticular opacities appeared at about 50°C.

Further work is now in progress using a special butyl rubber impregnated with a titanium compound which allows an intermediate dielectric constant without excessive absorption of the radiation by the rubber. With this technic it is hoped to allow penetration in an area of any shape and, because of the greater efficiency of transfer into the tissue, in a larger area. A modification of this technic may eventually allow the easy destruction of cortical tissue without any surgical procedure both in experimental neurology and in therapeutics.

Summary. A technic is described of producing focal lesions in the cerebral cortex of rabbits by microwave irradiation without incising the scalp or skull. The results on two animals are reported and future possibilities of this work are discussed.

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5 Lidman, B. I., and Cohen, C., *Air Surg. Bull.*, 1945, **2**, 448.

6 Fallis, R. H., Jr., *Am. J. Physiol.*, 1946, **147**, 281.

7 Daily, L. E., *U. S. Naval Med. Bull.*, 1943, **41**, 1052.

8 Imig, C. J., Thomson, J. D., and Hines, H. M., PROC. SOC. EXP. BIOL. AND MED., 1948, **69**, 383.

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Ultrafiltration and Ultracentrifugation Studies of Coxsackie Virus. (17459)

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The physical properties of the Coxsackie group of viruses[1-4] have been under investigation since their isolation, and preliminary studies indicated that the original strain is very small. The present report is a summary

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2 Dalldorf, Gilbert, Sickles, G. M., Plager, Hildegard, and Gifford, Rebecca, *J. Exp. Med.*, 1949, **89**, 567.

3 Gifford, Rebecca, and Dalldorf, Gilbert, PROC. SOC. EXP. BIOL. AND MED., 1949, **71**, 589.

4 Sickles, G. M., and Dalldorf, Gilbert, PROC. SOC. EXP. BIOL. AND MED., 1949, **72**, 30.

of the observations based on filtration through gradocol membranes prepared according to Elford's technic and on sedimentation in the ultracentrifuge. The methods of Bauer and Hughes[5] were used in the filtration experiments, the membranes being sterilized by ultraviolet light. The ultracentrifuge is of the Beams-Pickels type with a rotor of 6-inch diameter. The original strain, T.T., of Coxsackie virus, serologic type 1,[4] was employed in the present work. The legs of infected immature mice and hamsters and the brains of immature mice have served as sources of the virus. The titer of virus in the extremities is markedly higher than that in the central nervous system.[3] For comparison, similar studies were made with brain suspensions of mice infected with MM virus.

Size of Coxsackie Virus. Ten-percent suspensions of the legs of immature hamsters infected with Coxsackie virus and 10% suspensions of MM-infected-mouse brains were prepared in 0.85% salt solution containing 10% infusion broth at pH 7.4. After clarification by centrifugation in a Sorvall angle centrifuge at 8,000 r.p.m. (about 6000 g) for 30 minutes and filtration through a Seitz E-K pad, the suspensions were ultrafiltered on 39 mμ, 33 mμ, and 18 mμ gradocol membranes. The Coxsackie virus suspension, initially having an infectivity titer of approximately 10^{-6}, passed all 3 membranes. Similar results were secured with other Coxsackie virus suspensions prepared from mouse skeletal tissues and brains. Application of Elford's correction factor would indicate that the particle size is 10 mμ or less.

MM virus suspensions similarly tested and treated passed the 39 mμ and 33 mμ membranes and were completely retained by the 22 mμ and 18 mμ membranes. The size of the MM virus estimated from these results would lie between 11 and 16 mμ, which agrees with results reported by other workers[6,7] and indicates that the membranes were satisfactory.

Purification. Suspensions of both viruses have been subjected to ultracentrifugation. It has been reported by Melnick, Shaw, and Curnen[8] that the Coxsackie virus could be largely precipitated after spinning at 31,200 r.p.m. (about 110,000 g) for one hour. In our experience with Coxsackie and MM viruses, much, but not all, of the virus appears in the clear brown pellets. Both viruses have also been purified by the use of methanol according to the method of Pollard.[9] We have used 60% methanol as a precipitating agent and a final concentration of 25%. A 0.2 *M* phosphate buffer at pH 8.0 was used for elution. Satisfactory results were obtained with either virus present as a suspension of infected mouse brain. The recovery of Coxsackie virus from infected immature mouse legs was less satisfactory, perhaps because of the fat present in these suspensions. It is noteworthy that Elford's[10] results indicate that the virus of Newcastle disease is not readily recovered with 20% ethanol at 0°C.

Summary. The original strain of Coxsackie virus, serologic type 1, has been measured using Elford's ultrafiltration technic. Ultracentrifugation furnished a rough check. The virus is very small, the estimated size being 10 mμ or slightly less.

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