disk. The latter was used as the emitting surface at a distance of about 3½ inches from a photographic film. A magnetic lens consisting of an iron-clad coil with Armco iron pole pieces was used for forming the image. Fig. 1 shows the pole pieces of

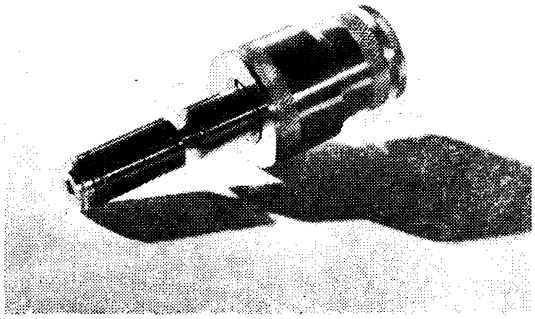

FIG. 1

the magnetic lens, with a specimen inserted at left and a simple film holder attached to the right side. The conditions were selected so that a linear magnification of 1.6× was obtained. Vacuum requirements are very moderate; the mean free path of the electrons is large compared to the apparatus dimensions, even at forevacuum pressure. Preliminary experiments were made with samples of different concentration and thickness of the radioactive layer. Exposure times ranged from 2 to 12 hours, according to the age and concentration of the sample and the numerical aperture of the lens. As a quantitative example, the following may be given: 1 millicurie/mm.^{2} of Ga^{67} at a numerical aperture of 0.04 rad. and a magnification of 1.6× gives a satisfactory photographic density with 1-hour exposure. For the most part, Process-type emulsions were used for the recording of the image. Tracer micrographs can be obtained consistently with good definition if the layer is sufficiently thin to avoid considerable self-absorption. The best resolving power obtained thus far is about 30 μ. Fig. 2 shows comparative exposures of the same speci-

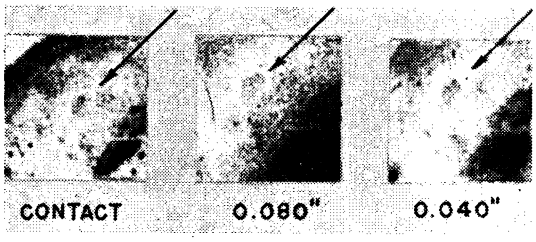

FIG. 2

men both by the radio autograph and by the electron optical method. The electron optical exposures shown are taken with two different limiting apertures having diameters of 0.040 and 0.080 inch, respectively.

Further improvements of the method include an after-acceleration of the β-particles. By such afteracceleration we hope not only to reduce the exposure times but also to achieve a better resolution through a reduction of the spherical aberration. A further reason for afteracceleration is that the chromatic aberration, which is always present (even in the case of monokinetic sources due to self-absorption), can be reduced markedly if the accelerating potential is at least comparable to, or greater than, the energy of the primary emission.

Staining of Nerve Endings in Mouse Epidermis by Feulgen's Nucleal Reaction

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So far as the writer is aware, there is no satisfactory method for the demonstration of nerve endings, especially in the epidermis. Most impregnation methods using metallic salts are tedious, fickle, and expensive. The chief objection is that the end result, even in successful preparations, though sometimes very beautiful, shows not the nerve itself but the black precipitate of silver salts.

During the study of the effect of methylcholanthrene on nerves in mouse skin, as part of a research project organized by E. V. Cowdry, of the Barnard Hospital, the writer found that nerves and nerve endings can be stained by Feulgen's nucleal reaction. Aside from being easy to operate, less time consuming, and quite specific, this method produces no precipitate. The technique is as follows:

Separate mouse epidermis from dermis by the heat method described by Baumberger, Suntzeff, and Cowdry (*1*), fixing it in 1 part formalin and 9 parts absolute alcohol saturated with picric acid (*2*). After carrying the tissue into water, hydrolyze and stain as for thymonucleic acid. The reagents used should be prepared as specified by Cowdry (*3*). It is not necessary to wash out the picric acid completely. Employ graded alcohols and xylols for dehydration and clearing. Mount in balsam for examination *in toto* or embed in paraffin for sectioning. Staining must be carried out before embedding; otherwise, the stainability of the nerves is somehow impaired. No other precautions are necessary.

Epidermis prepared in this way shows nerve fibers together with their endings and cell nuclei. This coloration of nuclei is an advantage rather than a hinderance, for the relation of nerve endings to the surrounding cells is thereby clarified. The cytoplasm and other structures may be counterstained with fast green. Slides first prepared in October 1945 are still in perfectly good condition.

Liang (*4*), also of this laboratory, recently found that nerves can be stained by Schiff's reaction. Consequently, the process of hydrolysis may be omitted. The mechanism of staining is unknown. However, unless nerves and nerve endings are proved to contain thymonucleic acid, the specificity of nucleal reaction for this chemical compound is questionable.

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