A Simple Method of Microradiography Using Ordinary Diagnostic X-Ray Equipment

THE purpose of this paper is to present a preliminary report on a simple method of microradiography. Several authors (*1–4*) have described techniques for microradiography, using either a diffraction unit with low voltage or photoelectrons. In our method rabbits were injected with a radioopaque substance (10% silver iodide, with 3% acacia added) *in vivo*, and the kidney was removed and fixed in formalin. Sections of 300 μ thickness were then cut. The apparatus used to produce the microradiograph was an ordinary diagnostic x-ray machine with a rotating anode tube. In order to prevent as much of the vibration from the rotating anode as possible, the end of

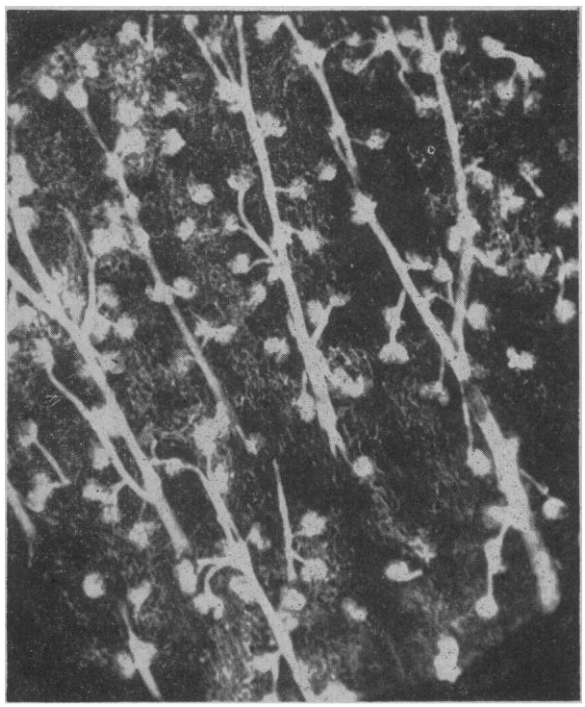

FIG. 1. Rabbit kidney. Factors: 30 kv, 100 ma, 4¾ in. target film distance, 40 sec exposure, rotating anode tube (×25).

the tube arm was braced by resting it on a cone placed on the table, the specimen was placed between two layers of Stryafoil (obtainable from B. X. Plastics, London, Eng.) and fastened to the glass plate (Kodak 548–0 spectroscopic plate) by tape at the periphery; the plate was then taped securely to the window of the tube. (The tube in our apparatus has a window opaque to light.) This eliminated independent motion of either tube or photographic plate. The factors used were 30–70 kv, 100 ma, 4–40 sec exposure. The plate was developed in Kodak D 19 developer. Examples of microradiographs produced by this method are shown in Figs. 1–3. The difference in density between the opaque medium in the smaller capillaries of the kidney

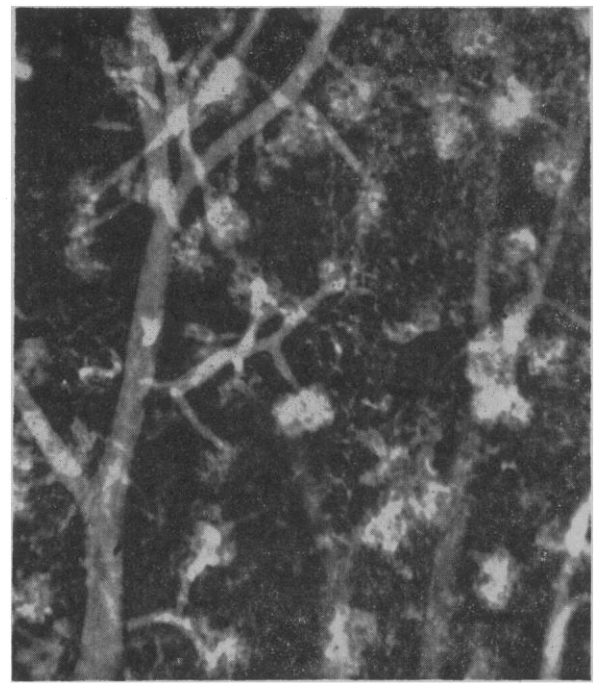

FIG. 2. Same as Fig. 1 (×75).

and the surrounding tissue apparently is sufficient to allow clear differentiation of the vessels by this new method. Lack of independent motion of the film or tube prevented diminution of sharpness of detail on the microradiograph.

This preliminary report describes an extremely

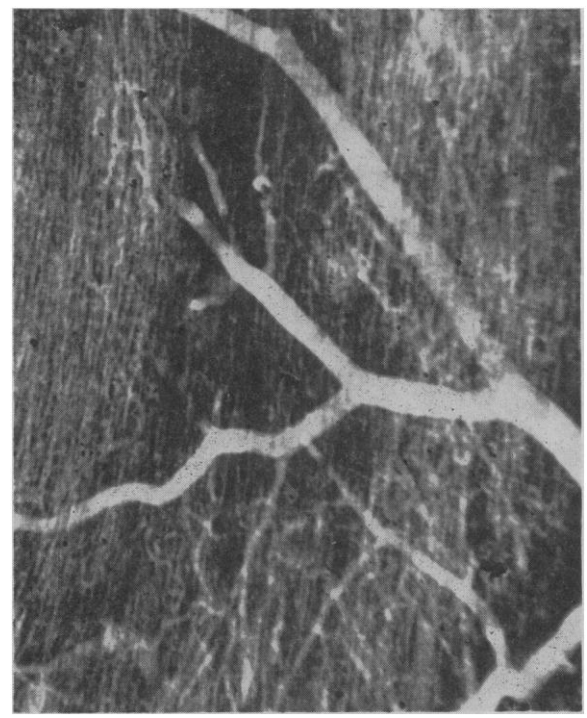

FIG. 3. Rabbit myocardium. Same factors as Fig. 1 (×75).

simple method of microradiography, which requires no special equipment other than any of the ordinary diagnostic units, and produces microradiographs that give good detail of the smallest capillaries. It is of value in microradiography when opaque substances are used for contrast, and enlargements of good quality can be made up to 75 times.

References

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Stimulation of Growth of Phytophthora Citrophthora by a Gas Produced by *Mucor spinosus*

THE contamination of a large Petri dish containing several thalli of *Phytophthora citrophthora* (Sm. and Sm.) Leonian, by *Mucor spinosus* van Tieghem[1] showed that the presence of the contaminant had stimulated the growth in diameter of *P. citrophthora,* as compared with uncontaminated dishes. The approximately equal diameter of all the thalli in the contaminated dish pointed to the action of a gas rather than to a substance produced by the culture of *M. spinosus* diffusing in the medium.

Several experiments were performed, of which only two will be described here. Seven 10-cm dishes containing potato dextrose agar medium inoculated with *M. spinosus* were placed in a 9-liter sealed desiccator. Twenty-four hr later 5 dishes containing water-agar medium, inoculated at four places with *P. citrophthora,* were placed in a similar desiccator connected with the other by means of rubber tubing, the connection, however, being closed while the air was withdrawn from the desiccator containing *P. citrophthora* until the pressure reached 3 cm of mercury. The suction pump was disconnected, and the two desiccators were connected with each other. After pressure was equalized, air was admitted so as to restore normal atmospheric pressure. The operation was repeated morning and evening for 3 consecutive days. As a control, an equal number of Petri dishes containing *P. citrophthora* had been placed in a similar desiccator connected twice a day to another desiccator containing 7 dishes with noninoculated potato dextrose agar medium. The mean diameter of 20 thalli was, respectively, 29.83 mm for the cultures submitted to the action of the gas, and 17.86 mm for the controls (minimum significant difference, 1% level: 1.26 mm).

In another experiment one 9-liter desiccator received 7 dishes containing 9-day-old cultures of *M. spinosus* on potato-dextrose agar. After 24 hr it was connected to a vacuum pump through a gas-washing bottle containing 150 ml of twice-distilled water until the pressure was reduced to 30 cm of mercury. A 2% water-agar medium was prepared, sterilized in sealed flasks, and poured into 6 Petri dishes. Checks were provided by using the same method with nontreated, twice-distilled water. Each dish was inoculated with *P. citrophthora* at 4 points. After 4 days the mean diameter of 24 thalli was, respectively, 21.7 mm for the cultures grown on the medium prepared with water bubbled with the gas from *M. spinosus* and 18.04 mm for the controls (minimum significant difference, 1% level: 1.85 mm).

The same results were obtained in experiments using Czapek agar medium instead of water-agar, but with smaller differences as compared with the controls.

It is thus apparent that *M. spinosus* produces a gas which greatly stimulates the growth of *P. citrophthora.* This gas is probably not ethylene. Petri dishes containing cultures of *M. spinosus* were placed under bell jars together with young tomato plants. No indication of epinasty of the leaves was observed. The elongation of 3-mm sections of *Avena* coleoptyles was not influenced by the presence in the same jars of cultures of *M. spinosus.* Other experiments are being carried out to ascertain the nature of the gas produced by *M. spinosus,* its influence on other microorganisms, and its production by other plants. The complete paper will be published in *Arquivos do instituto biologico.*

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[1] Identification of *M. spinosus* was supplied by the Centraalbureau voor Schimmelcultures, Baarn, Holland.

Cold-Region Plants

IN THE paper by Arnold and Libby (*Science,* **113**, 111 [1951]) on radiocarbon dates, it is stated that sample #406, charcoal, taken from the Lascaux Cave in the Dordogne is ". . . of conifer *Abies* or *Larix,* neither of which grows in cold climate." Unless it is considered that the cold climate of 15,000 years ago was different from what we consider cold today, it would be better to say "both of which grow in cold climate." *Abies* species inhabit cool and relatively cold regions, and do not flourish in regions where summers are hot. *Larix* is a genus of essentially cold-region plants, some species being noted for the fact that they form the northernmost forests in the world. They are reported north to 67° in North America and to 72° in Siberia—i.e., north of the Arctic Circle. The name *sibirica* applied to a species in each of these genera is indicative of their range. Both larches and firs extend even now, however, into the middle latitudes of the Northern Hemisphere, particularly at higher elevations.

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