

Physical Instrument for the Biologist

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Direct Centrifugation onto Electron Microscope Specimen Films

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A TECHNIQUE by which minute amounts of suspended material may be sedimented directly onto an electron microscope specimen film should find many uses in physics and biophysics. We have made an apparatus which will do this, by modifying the air-driven top of Beams and Pickels.¹ A circular groove was cut in the rim of the rotor, about $\frac{3}{16}$ " wide and $\frac{3}{16}$ " deep, as shown in Fig. 1. Two Duralumin cups were made having an outside diameter slightly less than $\frac{3}{16}$ " to fit the groove in the rotor and having an inside diameter slightly greater than

$\frac{1}{8}$ ", to take an RCA electron microscope specimen screen. One or two small hairpin clips were provided for each cup to keep the specimen screen in place when the cup was tipped into a horizontal position. To use the device, the specimen screen, with a fresh collodion film on it, is placed in the bottom of one of the cups, and a drop or two of the liquid to be centrifuged is dropped in with a dropper. Surface tension holds the liquid in the cup while it is being placed in the rotor. Two cups are always used, to balance the rotor.

The amount of material required for preparing a specimen screen is remarkably small. A single drop of liquid containing a hundred or so suspended particles is ample, since nearly every particle is precipitated onto the film. The top we have experimented with is a relatively slow one—it is two inches in diameter and gives about 100,000 g on the 25-pound air pressure available from the laboratory line. Judging from the experiments of Beams and Pickels it should not be very difficult to spin these tiny cups at 1,000,000 g, by using smaller rotors and higher air pressures. In our experience at 100,000 g no damage to the collodion film owing to air trapped underneath has been noticed. Air undoubtedly is trapped under the film, but it probably makes or finds one small hole in one of the squares of the mesh and drains out during the early part of the rotation. The attraction between the precipitated material and the film is apparently great enough so that the particles are not washed off when the screen is removed from the cup; in fact, the screen can be rinsed by dipping in distilled water without much danger of losing the specimen material.

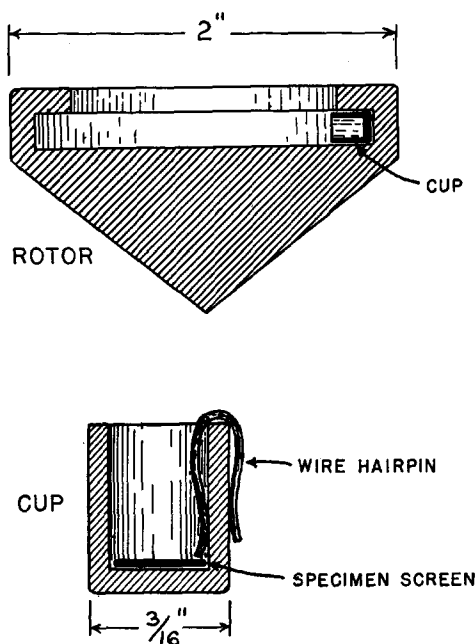


FIG. 1.

¹ J. W. Beams and E. G. Pickels, *Rev. Sci. Inst.* 6, 299 (1935).