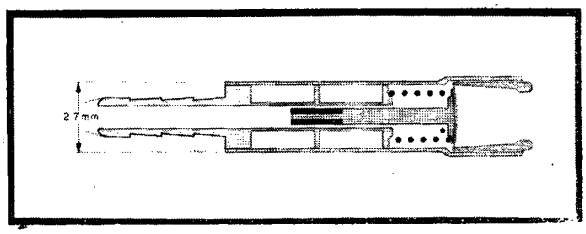

FIG. 1. Miniature manometer. Horizontal hatching, core with two chambers for the transformer coils; vertical hatching, casing; diagonal hatching, ring holding the sealing rubber membrane. Crosshatching, piston; black dots, coil spring; black rectangles, soft iron. Dotted area, catheter. Over-all length of metal tip, 12 mm; largest diameter, 3 mm.

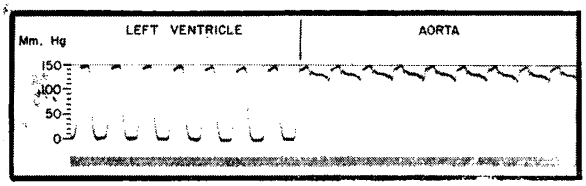

FIG. 2. Pressure record (⅛ scale) taken while catheter was pulled from left ventricle of an intact dog into the aortic root.

After trying numerous designs of pressure-sensitive elements, the authors agreed on one very similar to Wetterer's original, although smaller, sturdier, and simpler to handle. With two years of continuous use and improvement, this manometer has been developed into a rugged and dependable instrument.

The all-metal pickup fits on a No. 8 Cournand catheter. Its construction may be seen in Fig. 1. The movable part is the piston (crosshatching). It consists of a 0.6-mm brass rod carrying on one end a plate of 2.1 mm diameter and on the other end a small piece of soft iron. It is held in position by a steel spring (black dots) and is activated by the pressure on the plate. The steel spring determines the elastic properties of the manometer. A sheet of condom rubber seals the unit. This sealing membrane is easily fixed in place by means of a precisely fitting brass ring (diagonal hatching). The elongation of the casing (vertical hatching) beyond the membrane has a double function. It houses the sealing device and also protects the membrane from direct contact with the walls of the beating heart, which may cause artifacts. The core (horizontal hatching) accommodates the differential transformer. The iron part of the piston acts as an armature. According to its position, it determines the relative coupling of the transformer sections.

This differential transformer is connected to the bridge circuit of a carrier amplifier. A one-knob balancing device permits correction for the capacitance introduced by an extension cord, which may be placed between the amplifier and the pickup. In our experiments a 30-ft extension cord was used. The pickup with the bridge circuit can be incorporated in most commercially available carrier amplifiers with only minor changes, provided these furnish frequencies in the audible range (*ca.* 1,000–15,000 cps) having a reasonably pure sine form. The simple two-stage amplifier especially built for the unit has an oscillator adjusted to 9,000 cps.

The over-all performance of the miniature manometer may be summarized as follows:

1. Natural frequency of 1,000 cps in fluid.
2. Damping ratio, .34.
3. Maximum sensitivity, 50 ma/100 mm Hg.
4. Linear response between −50 and +250 mm Hg.
5. Static calibration is achieved with a mercury manometer by applying suction at the rear end of the catheter. This feature allows calibration of the sterile catheter and control of sensitivity during the measurement without touching the tip or removing the catheter from the vessel.
6. A two-knob amplifier (zero adjustment and sensitivity) provides high stability.

Fig. 2 is an example of a pressure record while the tip of the catheter was pulled from the left ventricle of an intact dog into the aortic root (recording galvanometer Heiland Type C). The record was taken in collaboration with Ellis, Essex, and Wood, of the Mayo Clinic, in tests on the adaptability of the unit for clinical work (*1, 2*).

A modification with the coil spring and sealing device replaced by a corrugated membrane is being tested. Detailed information will be given elsewhere.

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2. ELLIS, E. J., GAUER, O. H., and WOOD, E. H. *Proc. Staff Meet., Mayo Clinic*, 1949, **25**, 49.
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The Use of Thick Paper for Chromatography[1]

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Yanofsky, Wasserman, and Bonner (*1*) have recently described the use of a special heavy grade of filter paper for large-scale paper chromatography. They recommend Schleicher and Schuell filter paper No. 470-A, but state that separation is not as good as on thinner paper. Attempts in this laboratory to apply the procedure to the separation of a mixture of peptides readily confirmed this fact and indicated that for our purpose the separation achievable with this paper was hopelessly inadequate. Essentially, No. 470-A is blotting paper and is highly bibulous. Using secondary butyl alcohol containing formic acid and ethyl formate, about 90% saturated with water,[2] the solvent advances on this paper at the rate of about 17 cm/hr, a rate so rapid that there is little opportunity for selective mobilities to become manifest.

This rate can be greatly retarded by the simple expedient of attaching a strip of Whatman No. 1 paper to one edge of the thick sheet, overlapping 1–2 cm. The two

[1] Aided by a grant from the Commonwealth Fund.

[2] A slight modification of a solvent suggested by Lyman C. Craig, of the Rockefeller Institute.

papers are fastened with a double row of stitches by means of a sewing machine. The material to be separated is applied as a ribbon on the thick paper just beyond the "seam," using the kymograph technic of Yanofsky *et al.* The thin paper is then brought into contact with the solvent, where it acts as a "valve," which allows the requisite slow passage of the solvent along the heavy paper. A strip of thin paper approximately 9 cm in diameter results in a slowing of rate such that 24 hr are required for the solvent to traverse 17 cm of C. S. & S. No. 470-A. Resolution so achieved is superior even to that obtained on Whatman No. 1, and, curiously, it is worth noting that the relative rates of flow are not invariably the same for the two papers with the same solvent.

The rate of flow can be increased by using a narrower strip of light paper, and vice versa. If the ascending method is used, the cylinder of paper must be supported at the top by tying it to a glass or stainless steel support, for the rim of thin paper is not strong enough to support the weight of the heavy paper plus solvent.

Reference

1. YANOFSKY, C., WASSERMAN, E., and BONNER, D. M. *Science,* 1950, **111**, 61.

Preparation of Thin Films of Crystalline DDT and γ-Hexachlorocyclohexane in Celloidin[1]

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At this laboratory investigations are in progress to determine the possibility of breeding strains of beneficial insects resistant to DDT and other insecticides; during this work it became necessary to devise a suitable and easily produced test surface. A new method is described here of making thin films of crystalline DDT and γ-hexachlorocyclohexane (benzene hexachloride) rapidly and in large numbers in a celloidin base on glass. As well as being crystalline, these deposits fulfil the requirements of being reasonably uniform and of possessing known quantities in a given area.

Solutions of pure para para DDT (mp > 108° C) or of γ-hexachlorocyclohexane of at least 99% purity (lindane) are made up in a mixture of equal parts of absolute alcohol and ether in which 0.2% celloidin has been dissolved. Insecticide concentrations ranging from 0.3% to 3.0% have been used up to the present. A lantern slide cover glass, size 3¼ in. × 4 in., is thoroughly cleaned with a solvent and lens paper, and a circle 2 in. in diameter is drawn with the aid of a guide in the center of the glass, with a grease china-marking pencil. From a microburette or Mohr pipette 0.15 ml of celloidin-insecticide solution is run into the middle of the cover glass. The solution spreads out rapidly as a very thin film with a circular outline until it is stopped by the grease-penciled circle. Evaporation of the solvents proceeds rapidly; and after about 30 sec or so, determined by trial, the drying

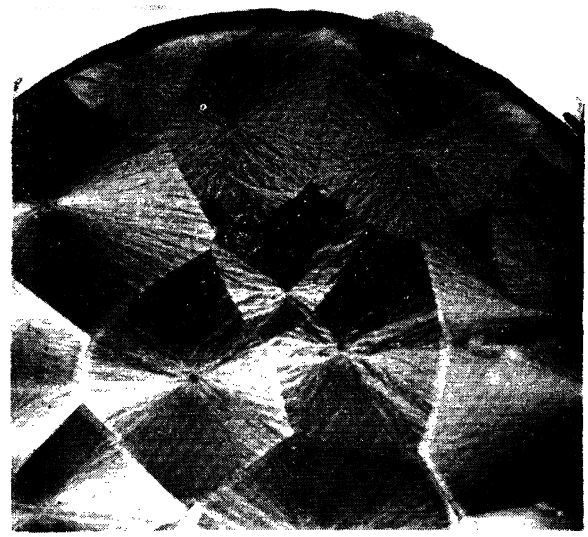

FIG. 1. Part of a crystallized DDT deposit in celloidin, containing approximately 0.08 mg DDT/cm² and showing centers of crystallization (× 2).

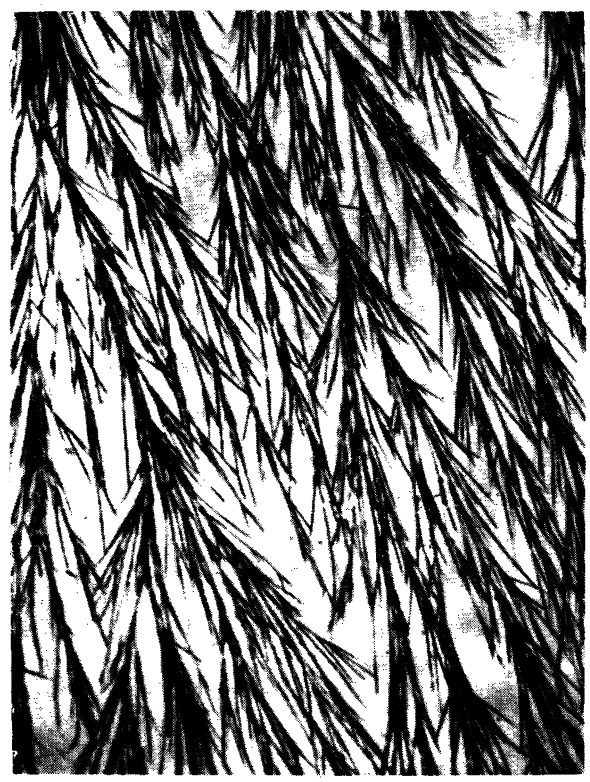

FIG. 2. Detail of structure of crystals deposited from an alcohol-ether-celloidin solution containing 1% DDT (× 120).

[1] Contribution No. 2,669, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Ontario.