A NIB-POINT MICROLOOP AND ITS CALIBRATION[1]

JACK COLVARD JONES[2] AND A. S. PERRY[3]

In certain types of physiological and toxicological research on arthropods *round* microloops are used in making topical applications of small quantities (0.1 to 0.8 microliters) of insecticides or other substances in suitable solvents. The principal disadvantage to a round microloop is the difficulty in placing the drop with precision on a selected area of a small organism. This note describes a simple modification of the microloop which overcomes this difficulty. Additional information is given on the calibration of the microloop, using three different analytical methods. A comparison is made between the accuracy of the loop with that of pipettes and syringes by radioassay.

Construction of Nib-point Microloop. A circle of 28 gauge (0.0126″) platinum-iridium wire (90:10) is formed with jeweler's tools by winding onto a rod of appropriate dimensions (*e.g.*, 1 mm diameter). When the ring has been formed and its ends forged, it is joined to a platinum handle wire after making it white hot with a jeweler's torch. A rod of 0.125″ hard aluminum ("Dural") is milled with a slitting saw to give a tapering slot of 0.020″. The handle wire is inserted into the slot and a milled nylon ring can then be used to form a split collet grip. With jeweler's pliers the circular loop is bent freehand into the shape of a triangle and the apex of this is carefully filed open with a jeweler's saw (Figure 1).

Methods of Calibration. The three methods used for calibrating the nib-point microloop were (1) spectrophotometric, using either Sudan III or Du Pont Oil Red in benzene; (2) colorimetric, using 1.0 percent *p, p′*–DDT (Schechter–Haller technique, 1945[1]); and (3) radioassay, using 1.0 percent *p, p′*–DDT–C^{14} (one loopful applied to filter paper disc 2.97 cm^2), activity being measured in a Q–gas flow counter. As shown in table 1 these three methods give essentially comparable data, variation being somewhat greater with the dye technique.

The data in table 2 show that the accuracy of the microloop is approximately the

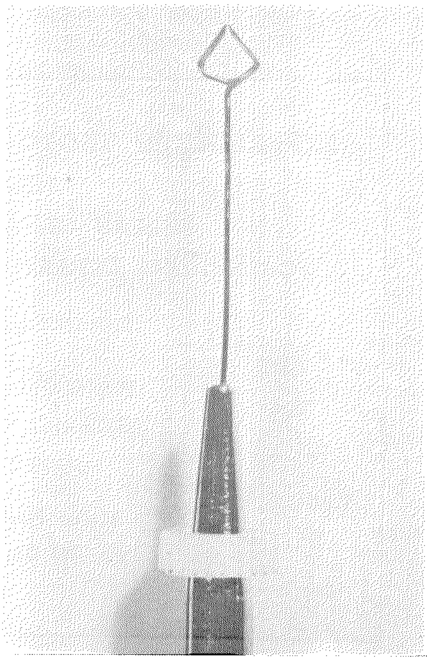

Figure 1—Nib-point microloop showing details.

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[2] Department of Entomology, University of Maryland, College Park, Maryland.

[3] Communicable Disease Center, Bureau of State Services Public Health Service, U. S. Department of Health, Education, and Welfare, Savannah, Georgia.

TABLE 1—Comparison of spectrophotometric, colorimetric, and radioassay techniques of calibration of the same nib-point microloop

Method	No. tests	Mean volume in microliters	Standard deviation	Coefficient of variation
Spectrophotometric [1]	10	0.877	0.103	11.80
Colorimetric [2]	4	0.910	0.045	4.97
Radioassay [3]	10	0.833	0.053	6.45

[1] 1.88 percent Du Pont oil red dye in re-distilled benzene. 1 loopful placed on adult housefly. Housefly placed in 5 ml. benzene.

[2] 1.0 percent *p, p'*–DDT (m.p. 107–108° C). 1 microloop placed on each of 5 houseflies. Schechter-Haller colorimetric analysis performed.

[3] 1.0 percent *p, p'*–DDT–C^{14} (m.p. 107.5–108° C). 1 microloop applied to filter paper disc.

TABLE 2—Comparison of microloop, microsyringe and micropipette using radioassay [1]

Instrument	Average c.p.m.	Average volume in microliters [2]	Standard deviation	Coefficient of variation
Microloop	682	0.491	0.037	7.6
Microsyringe	930	0.775	0.062	8.0
1 μl. pipette	1200	1.000	0.042	4.2

[1] Data based on 10 replicates per test instrument. Single drops were delivered to 3 sq. cm. filter paper discs and radioactivity was measured in a Q-gas flow counter.

[2] The volumes of microloops and microsyringes are based on standard volume of the 1 μl. pipette reference.

same as that obtained with either microsyringe or a standard micropipette.

To prevent gross errors in pick-up it is absolutely essential to dip the microloop perpendicularly into solvents. Deliveries should be made quickly and the tip of the nib must be placed perpendicularly on the desired application site.

References

1. SCHECHTER, M., SOLOWAY, H. D., HAYES, R., and HALLER, H. 1945. Ind. Eng. Chem. Anal. Ed. 17, 704.