A Simple Technique for Making Very Fine, Durable Dissecting Needles by Sharpening Tungsten Wire Electrolytically

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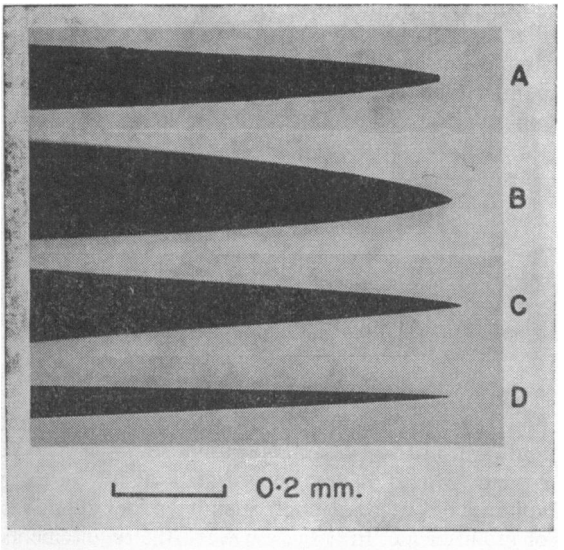
The use of fine needles made from tungsten wire has been known to experimental biologists for several years (see, for instance, Tindall [a]), but does not seem to be widely known among malaria entomologists.[b]

Tungsten dissecting needles can be made finer than the finest entomological pins and have the great advantage that they are very resilient and strongly resist bending. Fixed in a mounted needle-holder and used regularly in dissection they outlast entomological pins used similarly many times over. They can, moreover, be made to any desired thickness or sharpness; Fig. 1 compares examples of the types of points that can be produced with that of a very fine entomological pin. It is, in fact, easy to make needles much finer than it is practicable to work with in unaided manual manipulations.

FIG. 1
PHOTOMICROGRAPH OF SAMPLE NEEDLE POINTS

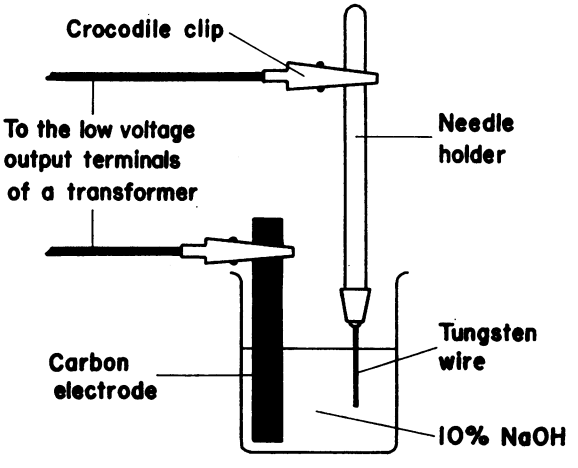


A = Tip of very fine entomological pin.
B & C = Tips of needles made from 0.50-mm tungsten wire.
D = Tip of needle made from 0.25-mm tungsten wire.

These needles can be used to advantage in many dissections performed under magnifications greater than about 20×, but they become invaluable above 40×. An obvious indication for their use is the dissection of mosquito ovarioles to determine the presence of "dilatations" in current age-grouping techniques. A sophistication is to braze two such needles to the tips of a pair of steel forceps; these can then be used in many semi-micro operations, either as forceps or as scissors.

A simple method for making these needles electrolytically, using a low-voltage alternating-current power source, is described below, and is illustrated diagrammatically in Fig. 2. It is also possible to sharpen tungsten wire using direct current from a car battery or by dipping in fused sodium nitrite; both of these methods, however, are much more laborious and time-consuming than the procedure which follows.

FIG. 2
DIAGRAMMATIC REPRESENTATION OF APPARATUS FOR SHARPENING TUNGSTEN WIRE NEEDLES ELECTROLYTICALLY



[a] Tindall, A. R. (1960) *Stain Technol.*, **35**, 105-106.

[b] I am indebted to Dr J. A. Ramsay of the Zoological Laboratory, Cambridge, for introducing me to the technique.

Materials

Tungsten wire; 0.25-0.50 mm (0.010-0.020 inches) diameter is suitable.

Mounted needle holder; preferably with a metal handle.

Aqueous NaOH (or KOH) solution at 10% w/v, in an open glass vessel.

Electric wire; light gauge and flexible.

Carbon electrode; for instance, from the centre of a torch battery.

Four " crocodile " clips.

Electric power source; A.C., 3-12 volts, e.g., the output terminals of a microscope-lamp transformer.

Use of an electric grindstone (e.g., at a local garage).

Method

1. Cut off lengths of tungsten wire (2-4 cm is convenient) and mount one in the needle-holder. (Note: Tungsten wire can be cut most rapidly on an electric grindstone but it frays very easily on violent bending or shock so that care must be taken. If the fraying is not too bad it will be removed during sharpening.)

2. Attach the four crocodile clips, one to each end of two bits of electric wire.

3. Using the crocodile clips, connect the metal handle of the needle-holder to one output terminal of the transformer and the carbon electrode to the other.

4. Place the carbon electrode in the NaOH or KOH solution and switch on the transformer.

5. The tungsten wire can now be sharpened to the desired point as follows:

(*a*) Hold the tip of the wire just immersed in the alkali solution until the frayed end has been eroded away.

(*b*) With the mounted needle held vertically, immerse 1-2 cm of the wire in the NaOH and move it slowly up and down. Since the tip will be longer in the electrolyte than its stem, it will have more metal electrolysed from it and a tapering point will be produced (a parallel-sided needle is made by holding the wire stationary).

(*c*) A variety of points may be produced: moving the wire rapidly up and down produces a coarse point and moving it more slowly a finer point (Fig. 1).

Using a 6-volt supply, it takes from two to five minutes to sharpen a needle in this way, depending on the type of point required. Once made, such a needle will last indefinitely for normal dissection, but should it accidentally become bent or damaged, the point can be touched up in a few seconds by connecting up again and re-dipping in the electrolyte.

A Motorized Molluscicide Dispenser *

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Several different kinds of molluscicide dispenser have been described which are suitable for treating flowing water (e.g., Foster & Poulton; [b] Klock [c]). However, most of these have been designed for use with specified kinds of molluscicide formulations and lack versatility. Also, they have mostly been designed for treating small streams and canals with flow rates up to about 5-10 ft³/s (ca 140-280 litres/s) and are not very suitable for use in irrigation systems where it is necessary to handle greater volumes of water and consequently greater quantities of molluscicide. In irrigation work the requirements of a molluscicide dispenser are very different from those of dispensers used to treat small natural streams. The accent is on dependability and automation rather than on cheapness and simplicity.

The dispenser described here has been used extensively in an irrigation system. It is very versatile, being capable of dispensing most kinds of molluscicide formulations and treating a wide range of flow rates. It has been used with the molluscicides

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[b] Foster, R. & Poulton, G. F. (1960) *Bull. Wld Hlth Org.*, **22**, 549-554.

[c] Klock, J. W. (1956) *Bull. Wld Hlth Org.*, **14**, 639-646.