A drainage technique for insulating depth electrodes

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Electrophysiological research with animals often requires use of uniformly insulated recording or stimulating depth electrodes. Their noncommercial construction usually involves soldering a lead wire onto a stainless steel insect pin (Clay-Adams Inc., 14 East 25 Street, New York, New York 10010) and dipping the pin into a bath of a petroleum polemer such as Insl-X (Insl-X Products Corp., 115 Woodworth Avenue, Yonkers, New York) or Epoxylite (Epoxylite Corp., South El Monte, California). Certain problems are inherent in the dipping technique for insulating electrodes. A uniform coating of insulation is often desired, requiring even, vertical withdrawal of the electrode pin from the insulator bath. Hand-dipping is inadequate and tedious. Another technique employs a stereotaxic to enable vertical withdrawal of the pin. However, a constant withdrawal rate is difficult to achieve unless some type of low-rpm motor is used (Sohlkhah & Schuckman, 1966).

The following insulating procedure constitutes an improvement over conventional dipping techniques. The procedure involves draining an insulator out of a bath in which the electrode pins have been vertically positioned. Besides ultimate simplicity, the inherent advantages of draining are several: (1) Gravity-controlled draining rate insures uniform insulation over the electrode's entire length; (2) an unlimited number of electrodes can be coated at one time, requiring only a few minutes per application; (3) no handling of electrodes is necessary during insulation, drying or baking, or for the application of additional insulation; and (4) a minimum of equipment is required.

An insulator bath and drying tray for using the "bathtub" technique can be easily and economically constructed. Figure 1 shows a simple insulator bath and drying tray on which a single mounting plate is positioned. The 8 x 4 x 3 in. bath is of ¼-in. Plexiglas construction supported by 1/8-in. brass rods. The insulator is drained from the bath into a storage container through a hole in the bottom of the bath. It is important to note that Plexiglas is susceptible to deterioration through continuous contact with petroleum solvents. Individual electrodes are aligned and cellophane taped onto mounting plates which are slipped onto the drying tray. The brass drying tray is lowered into the insulator bath and the insulator is added to an appropriate level above the electrode's lead-wire solder joint. Alternatively, the tray may be lowered into the bath which is prefilled with insulator. The plug in the bottom of the bath is removed to enable drainage of the insulator from the bath. The electrodes may be left in the empty bath for drying or the tray may be lifted out and placed into a backing oven. This routine is repeated until complete insulation is achieved. The thickness of the insulator coating is a function of the viscosity of the insulator, the rate at which the insulator is allowed to drain from the bath, and the number of times the electrodes are dried and recoated.

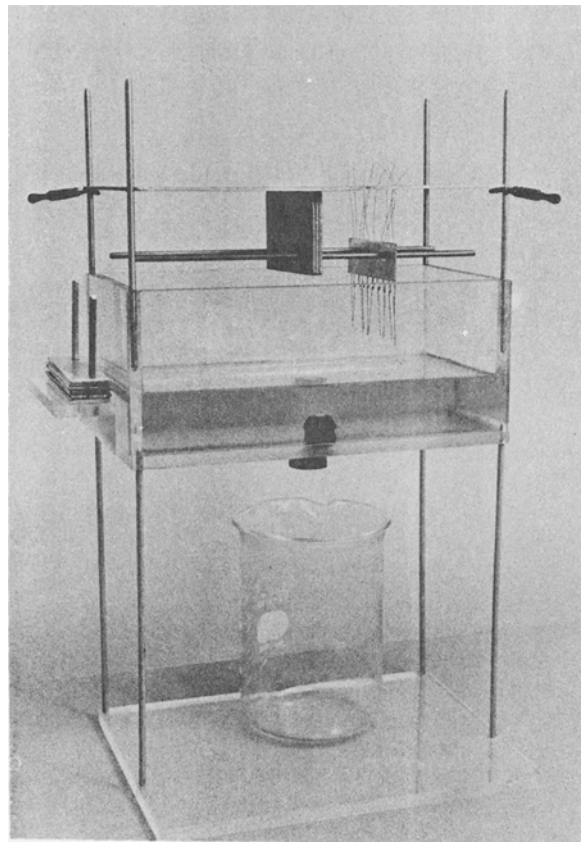

Fig. 1. Depth electrodes taped onto a mounting plate and suspended above the Plexiglas insulator bath.

Thorough insulation of an electrode is easily checked by attaching the wire lead of the electrode to one side of an ohmmeter; the other side of the ohmmeter is attached to a small wire loop. A conducting film is suspended in the loop by dipping the loop into 0.9% physiological saline. A reduced resistance reading is obtained when the loop is passed over any break in the electrode's insulation.

REFERENCE

Sohlkhah, N., & Schuckman, H. An automated apparatus for electrode insulation. Perceptual & Motor Skills, 1966, 23, 689-690.

(Received for publication November 10, 1972; accepted November 15, 1972.)