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THE USE OF ELECTRICAL STIMULI IN LIVE-PICKING ORGANISMS FROM BOTTOM SAMPLES*

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ABSTRACT

A simple, portable, and effective apparatus for electrically stimulating macrobenthos is described as a material aid for rapid picking of bottom samples in the field.

Experience has demonstrated that the use of electrical stimulation not only shortens the time required, but it also results in recovering many organisms that otherwise would be overlooked.

INTRODUCTION

Picking organisms from bottom samples has long posed a problem in fisheries work. At best, it is a time consuming and tedious task and, too often, a compromise must be made between a desired degree of accuracy and the time required to achieve it. Samples are more quickly and accurately picked at the time of collection when the observer can take advantage of motion directing his attention to an otherwise obscured organism. Even so, unless field time is of no consequence, the period required for even a qualitatively representative picking becomes almost prohibitive. As a consequence, bottom samples usually are preserved in toto for subsequent recovery of the organisms when more time can be devoted to the task. Picking a preserved bottom sample is extremely time consuming if any acceptable degree of thoroughness is desired.

The use of electrical stimuli was tried to obviate the disadvantage of picking preserved samples and yet reduce to a feasible limit the time required for live-picking a sample at the time of collection. The technique proved eminently satisfactory. The worker can cause movement of the organisms at will by applying an electrical stimulation and thereby greatly reducing the time required for picking a bottom sample and correspondingly increasing the accuracy of the individual worker.

MATERIALS AND METHODS

A readily portable apparatus for shocking macrobenthos into movement during the streamside sorting and picking of bottom samples is easily constructed for a negligible cost. The apparatus, including the source of power, may be enclosed in a weatherproof case measuring no more than 15- by 12- by 5 inches. The total weight involved approximates 10 pounds, hence the apparatus easily can be carried to the sampling station along with the other equipment required. The total cost, including the case, should not exceed $20.00.

The apparatus, the wiring diagram for which is shown in the preceding figure, utilizes a six-volt dry cell battery as a power source. The current demand of the apparatus is only 3 to 4 milliamperes, hence the unusual "Hot-Shot" type of electric fence battery will last through an

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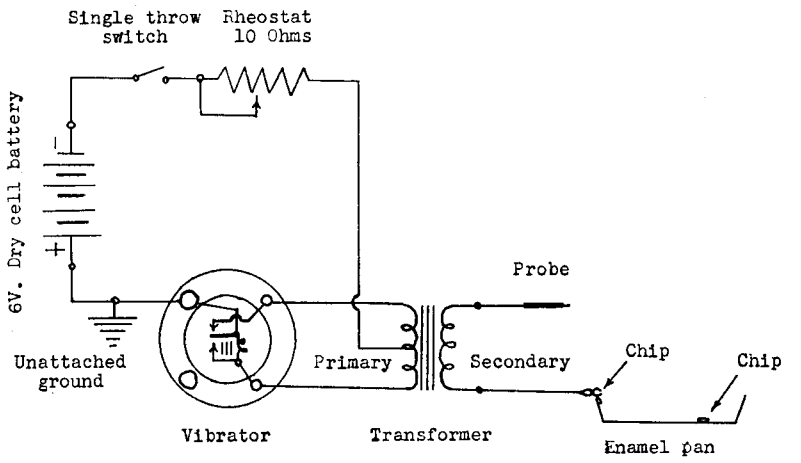
FIGURE 1.

WIRING DIAGRAM FOR SHOCKER



entire field season. The vibrator-transformer unit is standard equipment in car radios and can be obtained from any radio shop by requesting the vibrator and transformer from a six-volt car radio. The standard 10-ohm rheostat is available from the same source or from some "army surplus" stores. The apparatus will deliver up to 280 volts at the secondary terminals of the transformer.

During use, an alligator clip is attached to one terminal of the transformer by a convenient length of 14-gauge stranded wire. A probe, consisting of an eight-inch length of insulated 12-gauge single-strand wire with a half-inch section of exposed wire at one tip, is attached to the other output terminal. The unit is non-directional so it is immaterial to which transformer terminal the clip or the probe is attached.

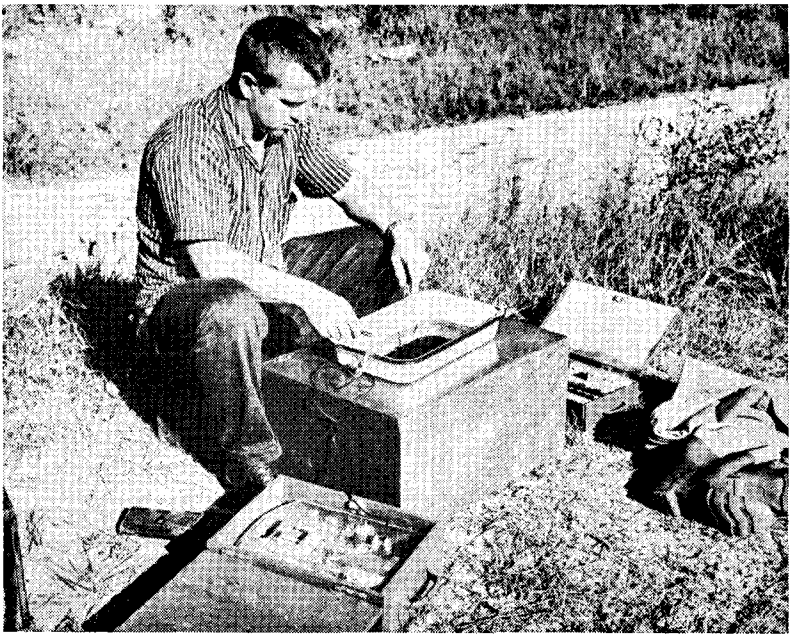
The bottom sample to be picked is then placed in a white enamel pan from which a small chip of the enamel has been removed from the rim for attachment of the alligator clip and another chip removed from the bottom to complete an electrical connection between the transformer and the water in the pan. When the probe is touched to the water, the circuit is completed. The unit is then turned on and after the vibrator has been actuated, the rheostat is turned for minimum voltage. The probe is touched to the water and the reaction of the organisms is observed. The voltage is gradually increased with the rheostat until the organisms respond as illustrated in the accompanying photograph. The optimum voltage must be determined at the sampling station since the resistance of the water varies widely in different locations. When the optimum voltage has been established by observing the reaction of the organisms, the picking begins. The probe is held in one hand and a pair of insulated forceps in the other. The probe is touched to the water to create a stimulus and removed while an organism is secured with the forceps. This procedure is repeated as the sample is picked. The sample should be stirred occasionally to liberate any organisms trapped under debris. The fast-moving organisms should be picked last. These may prove difficult to capture, but by increasing the voltage and placing the probe near the specimen, the animal will be immobilized and easily picked up. The forceps, or if preferred a small screen scoop, used to pick up the organisms should be wrapped with waterproof electrical tape which will allow the worker to place the forceps and the probe in the water simultaneously without risk of shock. The maximum shock produced by the apparatus is harmless because of the low amperage involved, but care is advised not to touch the water while the circuit is complete. Harmless or not, the shock will cause momentary discomfort if the observer accidently includes himself in the circuit.

DISCUSSION

The electrical stimuli has produced muscular contractions in all types of macrobenthos thus far observed. The dragonflies and damselflies ordinarily exhibit the least reaction when shocked and often only the legs will contract when the probe is applied. This contraction, however, still is sufficient to draw attention to the specimens even though they may be well hidden beneath debris. Electrical stimuli produce violent contractions of oligochaetes, midge larvae, and similar small organisms. Snails and caddis flies may be located by the movement of the animal within the case or shell. When the current if applied often organisms will be seen emerging from under the bark of dead twigs and from similar hideouts where, undoubtedly, they would be missed by usual methods of picking.

VALUE OF ELECTRICAL STIMULUS

Electrical stimuli are recommended to effect the rapid and efficient picking of living macrobenthos from bottom samples. The advantages of electrical stimuli for picking live organisms from bottom samples may be summarized as follows: (1) electrical stimuli materially reduce the time required for thorough picking, (2) the small, readily portable apparatus is inexpensive to construct, (3) the unit is very adaptable and it may be adjusted to fit any particular situation.



PRELIMINARY RESULTS OF HERBICIDES TESTED ON CERTAIN AQUATIC PLANTS IN FLORIDA

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ABSTRACT

A screening program to determine the effects and best methods of applying new developments in herbicides on noxious aquatic weeds is a part of the efforts of the Florida Game and Fresh Water Fish Commission to improve its aquatic weed control program.