

## Studies on the Use of Radioisotopes for the Control of the Red Palm Weevil, *Rhynchophorus ferrugineus* F., by the Sterile Insect Technique.

II-A Technique for tagging insects with precise lengths of radioactive Iridium,  $^{192}\text{Ir}$  wire.

by

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### ABSTRACT

Special apparatus was designed for the measurement, handling, and insertion of precise lengths of radioactive Iridium,  $^{192}\text{Ir}$  wire into the body of an insect. The construction and use of this apparatus is described.

### INTRODUCTION

Kloft (1977) indicated that the radioactive tag in the case of adult beetles could be applied on the lower surface of the elytrae to prevent mechanical rub-off. However in preliminary radioecological experiments with the red palm weevil, *Rhynchophorus ferrugineus* Fabr., Kloft *et al.* (1986) reported that their attempts made to fix the pieces of wire of radioactive Iridium  $^{192}\text{Ir}$  with rubber cement to the lower surface of the weevil's elytra, were unsuccessful, because the glued pieces of wire did not adhere satisfactorily. Attempts were also made to mount the wire tags into the dorsal intersegmental groove between head and prothorax. This procedure was not satisfactory because exactly known reproduceable amounts of Iridium,  $^{192}\text{Ir}$  wire could not be cut off as the wire was hard. Therefore studies were carried out to develop an improved method of tagging insects with radioactive Iridium wire. The method should enable the measurement and cutting of precise lengths of Iridium wire of 0.3 mm diameter, facilitate the handling of small pieces of this tough material and enable the insertion of the piece of wire into the interior of insects with hard exoskeleton.

### METHODOLOGY

Precise measurement of radioactive wire.

An exact copy of the glass parts of the AGLAR - micrometer syringe was fabricated in brass. This syringe is loaded with a piece of the radioactive wire and utilized for dispensing precise lengths of the wire. As a shield against the radiation, the brass 'syringe' is covered with a heavy lead sleeve (Fig. 1). The metallic plunger of the syringe is gradually propelled forward by rotation of the micrometer head and the radioactive wire pushed out. The protruded wire is held with a pair of sharp pointed tweezers and cut with a pair of scissors. With this apparatus it is possible to measure and cut the wire into tiny pieces of determined length.

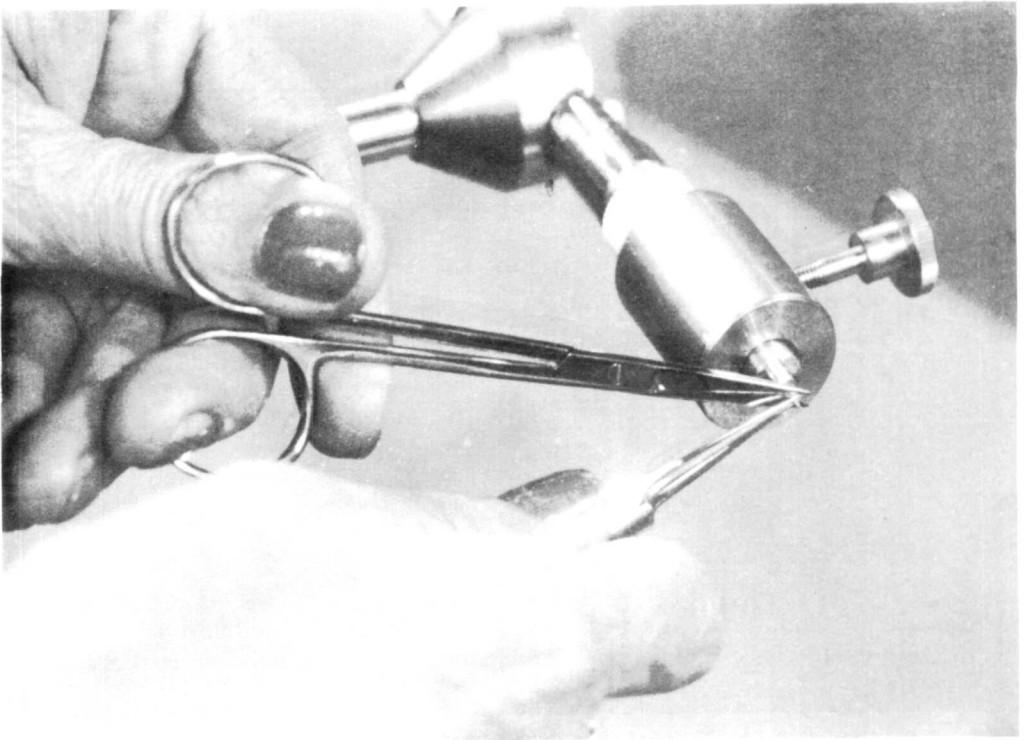


Fig. 1. Modified AGLAR. - micrometer syringe, made of brass. The brass syringe is covered with a lead tube. At the anterior end of the apparatus is the wire protruded by the plunger of the syringe. The wire is held by a pair of tweezers and is cut off with a pair of scissors.

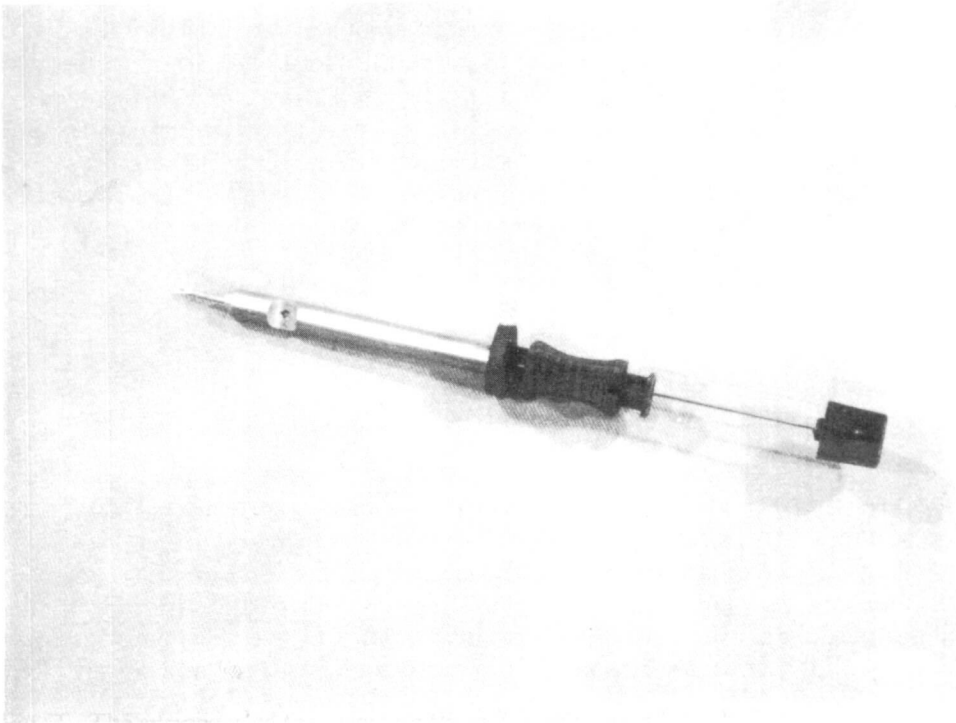


Fig. 2. The syringe used for inserting the radioactive wire into the insect.

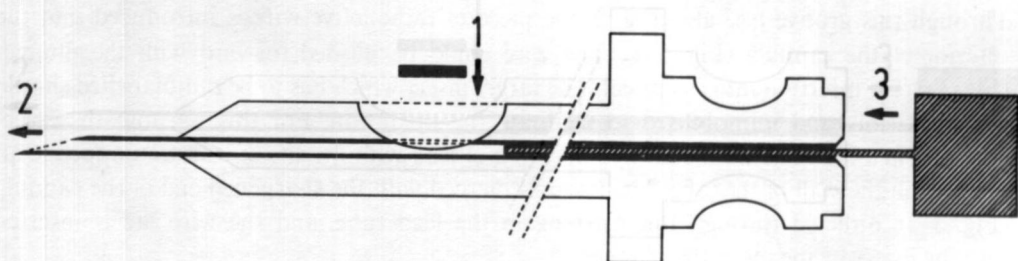


Fig. 3. A schematic drawing of the syringe in Fig. 2. (1) radioactive wire (2) inner channel made of steel, (3) the plunger.

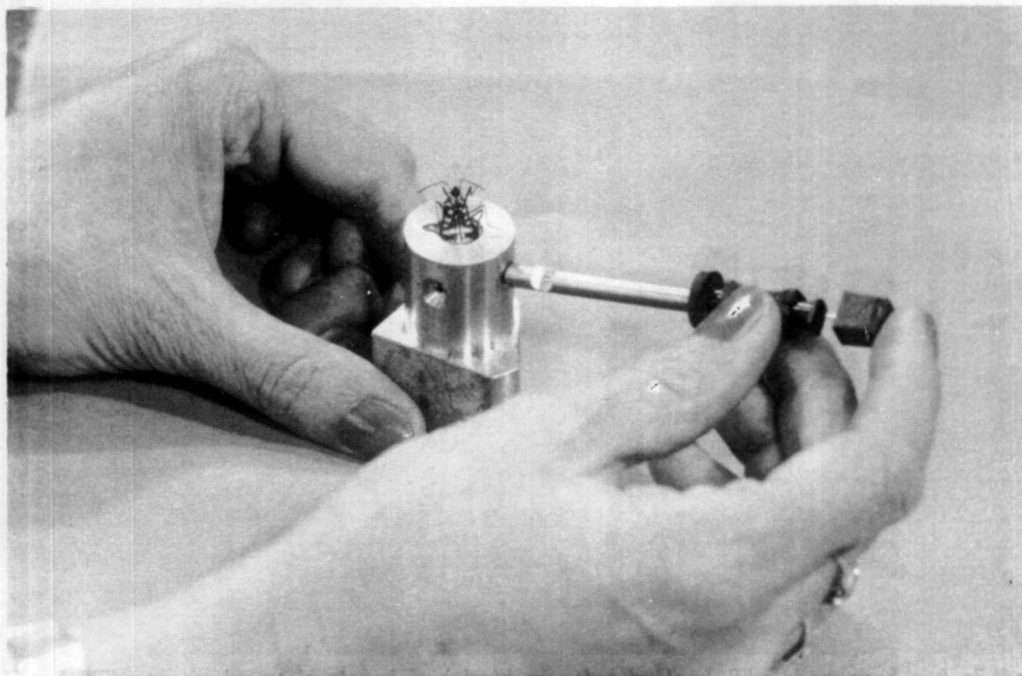


Fig. 4. The target insect is placed in a hold mantled by lead. The sharpened end of the cannula has been directed through the opening in the lead tube and is in position for insertion of the wire tag into the insect's body.

Handling and insertion of the radioactive wire into the insect's body.

A special apparatus was designed to facilitate the handling and insertion of the radioactive wire (Fig. 2). In this apparatus a steel cannula is mantled with a brass tube. At one end of the cannula is the sharpened opening for piercing into the insect. A metal plunger is inserted at the other end. This is shown in the schematic drawing in (Fig. 3). The mantle has a groove which provides access into an opening in the upper wall of the cannula. Through this groove (see also Fig. 2) the piece of radioactive wire is introduced into the interior of the cannula (Fig. 3-1). The wire could be pushed forward with the plunger (Fig. 3-3) for insertion into the insect. The target insect which has to be radiolabelled should be held firmly and immobilised to facilitate the operation. For this purpose the insect is placed in a tube like hold, mantled by 7 mm of lead with the site of insertion opposite an opening in the wall of the tube. The insect is pierced with the sharpened end of the cannula (Fig. 3-2), directed through this opening in the lead tube, and the wire tag is inserted into the insect by means of the plunger.

REFERENCES

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