ROUTINE BLOOD FEEDING FOR INSECTS

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In the Entomology Department of the Royal Army Medical College we noticed that the female mosquitoes were not feeding as well as they had been. We found that the rabbits used for feeding the insects were increasingly difficult to handle, probably due to irritation caused by the mosquito bites. Many entomological laboratories use anaesthetized guinea-pigs for feeding the insects, but the guinea-pigs develop an increasing tolerance to the anaesthetic. There is a great deal of literature on feeding arthropods through membranes. A study was made to design an apparatus for the routine feeding of blood-sucking insects in the laboratory. This paper describes the apparatus, its use and the results.

The feeding tank was constructed from 1/4-inch perspex. It consists of a six-inch square water bath open at the top, with four circular tubes of 11-inch internal diameter passing through the tank vertically and extending half an inch beyond the tank above and below. A 100-watt aquarium heater and thermostat pass through one wall of the tank. A lid prevents evaporation and heat loss. A flange fitted all round the tank 1/4 inch from the base supports the bath on a square of hardboard with a six-inch square hole in its centre.

Two synthetic membranes and two animal membranes were tested with the apparatus, but both synthetic membranes proved unsuitable, for the mosquitoes could not obtain blood through them. The two animal membranes, hog-gut sausage casing and "goldbeater's skin" (prepared ox-cæcum), were obtained packed in damp salt. They were stored at 4°C, and have kept in good condition for a year to date.

The blood used throughout the tests was outdated human transfusion blood in an acid-citrate-dextrose anticoagulant. It was still usable after five months' storage at 4°C, even though a lot of hemolysis had occurred.

The membrane was cut into three-inch squares and washed in tap water to remove the salt. With the apparatus inverted, a membrane was placed over the end of each tube and held in place by an elastic band. The apparatus was then placed with the hardboard support on the frame of an insect cage. The water-bath was filled to within one inch of the top with warm water and the heater was turned on. When the membranes were completely dry (in about one hour), 25 ml. of blood warmed to 30°C was put into each of the tubes, pouring gently down a glass rod to prevent damaging the membranes. When the blood reached the right temperature the apparatus was put on top of the cage of insects to be fed. The half inch extension of the blood tubes below the base of the tank allowed the membranes to make a good contact with the netting on the top of the cage. The insects were starved for twelve hours before feeding by removing the sugar water from their cage on the previous evening. The apparatus was left for one hour, and the only attention needed was to stir the blood at intervals to prevent sedimentation.

Tests carried out using Aedes albopictus, Culex molestus and Anopheles stephensi showed the best temperature for feeding to be 34°C, confirming Tarshis (1958). Tests at 34°C, to find the best membrane for each species, gave the following results: Aedes albopictus 60.6 and 87.4; Culex molestus, 50.8 and 59.6; Anopheles stephensi, 87.0 and 90.4. The figures represent the percentage of females feeding in one hour on hog-gut and ox-cæcum respectively. Ox-cæcum is definitely the better membrane of the two, but being very thin it is difficult to handle without damaging it. Hog-gut gave slightly poorer results but is the simplest and most economical membrane to use. The possibility of the anticoagulant affecting the fertility of the mosquitoes was considered, but several cages of each species have now been fed solely on citrated blood for four months without any noticeable loss of fertility or reduction in the viability of their eggs.

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