# THE DETECTION OF NECTAR IN MOSQUITOES[1]

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The extensive studies on blood-feeding should not obscure the fact that feeding on flower nectars greatly affects longevity and dispersal potential of mosquitoes, and therefore the ability to transmit diseases. In the laboratory, mosquitoes can be maintained entirely on sugar solutions and in the field, feeding from flower nectaries has been observed (Hocking, 1953; Haeger, 1955). It is presumably due to lack of a simple test method that nectar-feeding of field populations has not been adequately investigated. The method presented is based on the following: unfed and blood-fed mosquitoes do not contain fructose; the sugars of floral and extrafloral nectars consist of at least 50 percent fructose, which may be present as free fructose or as the fructose component of sucrose (Van Handel, Haeger and Hansen, 1972); both fructose components can be easily detected in individual mosquitoes with a single reagent (Van Handel, 1967).

PROCEDURE. Pour carefully, and while cooling, 380 ml concentrated sulfuric acid into 150 ml distilled water (dilute sulfuric acid); mix 150 mg anthrone with 100 ml dilute sulfuric acid (fructose reagent). The reagent can be used for about a week. Place each mosquito in a 10 x 75 mm test tube. Add 0.5 ml of the fructose reagent and crush the mosquito with a glass rod. The reagent will turn green or blue at room temperature, depending on the amount of nectar. If the reagent has not changed color in about an hour, the test should be considered negative.

Visual inspection at the end of one hour will easily differentiate between light, medium and heavy nectar feeding.[2] Crushing is necessary because the outer wax layer prevents penetration of the reagent. Crushing can be omitted when a drop of chloroform-methanol (1:1) is added prior to the addition of the fructose reagent. This removes the wax and a blue ring is formed on top of the yellow reagent. This procedure is simpler and, because of the ring formation, it is also more sensitive than crushing.

After 12–24 hr at room temperature, or at elevated temperatures, not only fructose, but all other carbohydrates, including glycogen, starch and paper react with the reagent. Hence, any color developing after several hours at room temperature would be due to glycogen (the mosquito's reserve carbohydrate) and trehalose (the mosquito's blood sugar) and not to nectar feeding.

When mosquitoes can not be tested on the day of capture it is essential to arrest enzymatic conversion of fructose to products that do not react with the reagent. The conversion enzymes are destroyed by heating at 80–90 C for at least 15 min. The dried specimens may then be preserved at room temperature and tested later. Instead of heated, the mosquitoes may be stored at −60 C. The enzymes are then inactive, but not destroyed. Preservation in an ordinary household freezer is not recommended.

The method provides a highly sensitive and specific test for the presence of nectar in mosquitoes. One person can test several hundred mosquitoes per day. Investigations now in progress indicate that nectar feeding is widespread in both sexes, and that considerable variability exists among species, and within the same species, at various times.

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[2] More quantitative information would require comparison with a standard color, e.g. food coloring diluted with a 10–20 percent glycerol solution, matched against the color produced by adding the reagent to known amounts of fructose or sucrose.

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