THE GREEN TREE FROG (*HYLA CINEREA*) AS A PREDATOR OF MOSQUITOES IN FLORIDA

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Anuran tadpoles have been little appreciated as a biological control agent of mosquitoes. Jenkins (1964), in a review of mosquito pathogens, parasites and predators, lists only four species of anurans whose tadpoles fed on mosquito larvae. More recent reviews have not even discussed the mosquito feeding capacity of anurans (Chapman et al. 1972, Sollers-Reidel 1973).

Nonetheless, there is evidence that tadpoles do indeed serve as a natural control of some mosquitoes. Porter (1972) states that tree frog (Hylidae) tadpoles have a diet dominated by aquatic insect larvae. Spielman and Sullivan (1974) found that tadpoles of the giant tree frog, (*Hyla septentrionalis*), not only fed on *Culex pipiens* Linn. larvae, but provided natural control in artificial containers on Grand Bahama Island.

Personal observations likewise support the notion that tadpoles may control some mosquitoes. Flooded roadside ditches and vacant lots either have many mosquito larvae or many tadpoles; seldom are the two found together in large concentrations. On September 14, 1981, several green tree frog (*H. cinerea*) tadpoles were found in a sewage treatment facility overflow tank. The tank was 4.5 m. tall with a diameter of 2.5 m; water depth was approximately 3.5 m. The overflow tank contained large numbers of larval *Culex nigripalpus* Theobald until the appearance of the tadpoles, after which no mosquito larvae were observed.

A series of experiments and observations were conducted in the overflow tank and the laboratory to verify the mosquito-feeding behavior of *H. cinerea* tadpoles. On Sept. 15, 2000 fourth instar *Cx. nigripalpus* larvae were placed in the overflow tank which contained numerous *H. cinerea* tadpoles. Twenty-four hour dips and observation of the water surface revealed no mosquito larvae. Fourteen tadpoles were collected and their stomach contents examined. Thirteen (93%) contained cuticular relics of mosquito larvae or pupae. To observe the feeding behavior of tadpoles, four tadpoles were placed in a 38 liter aquarium (containing 12 liters of pond water, kept at 22°C) containing 500 fourth instar *Cx. nigripalpus* larvae. After 48 hours, 181 larvae had disappeared, an average of 45.3/tadpole. Direct observations suggested that the larvae had been consumed by the tadpoles.

Field observations on the mosquito feeding behavior of *H. cinerea* were conducted in the overflow tank. Before the introduction of mosquito larvae into the tank, only a few tadpoles were observed leisurely swimming at the water surface. After the introduction of a large number of *Cx. nigripalpus* larvae and pupae, the tadpoles became agitated and swam hurriedly at the water surface. Many tadpoles swam from the depths of the tank and a literal "feeding frenzy" ensued at the surface. Rather than directly orienting towards larvae, the tadpoles seemed to intercept larvae at random during their serpentine swim. Tadpoles would grasp on any object encountered, such as twigs, leaves, mosquito larvae and rattailed maggots. Tadpoles would then vigorously rasp the object surface, with smaller prey, such as mosquito larvae and pupae, subsequently ingested.

Hylid tadpoles appear to limit the abundance of mosquito larvae in nature. Spielman and Sullivan (1974) found that *H. septentrionalis* effectively controlled *Cx. pipiens* in large artificial containers such as cisterns and 55 gal. drums. They also suggest that control extends to natural habitats since mosquito larvae and tadpoles are rarely found together. Likewise, flooded roadside ditches and vacant lots in southwestern Florida rarely contain large numbers of both mosquito larvae and tadpoles. These findings suggest that *H. cinerea* plays a significant role in the natural control of some mosquitoes in Florida.

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