A Description of the Egg of *Culex (Culex) nigripalpus* Theobald from Florida, With Notes on Five Egg Rafts (Diptera: Culicidae)

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ABSTRACT. The external morphology of *Culex (Culex) nigripalpus* egg is described and illustrated for the first time. The egg rafts of *Cx. nigripalpus* are compared with four other mosquito species belonging to the *Culex* subgenus *Culex* at the microscopic level. It is now possible to separate the five species on the basis of egg raft characteristics.

INTRODUCTION

Previously, many eggs of the *Culex* subgenus *Culex* have been described and these include *Culex quinquefasciatus* Say, *Culex molestus* Forskal, *Culex pipiens* Linnaeus (Christophers 1945) and *Culex gelidus* Theobald (Berlin and Subramanian 1974). However, the eggs of *Culex (Culex) nigripalpus* Theobald have never been described.

Culex nigripalpus is an important vector of St. Louis encephalitis in Florida. The adult mosquitoes display marked seasonal changes in feeding patterns, biting mammals in early summer and birds in winter and early spring. This feeding pattern enables *Cx. nigripalpus* to be a possible enzootic and epidemic vector of St. Louis encephalitis. In the field, the immature stages are usually collected from wooded swamp habitat (Edman and Taylor 1968), in artificial pools or containers (Smith and Jones 1972, Lowe et al. 1974) and in more or less permanent collections of water (Nayar 1982).

Females lay their eggs in rafts on the water surface. The egg raft are almost whitish green in color when newly laid, but changes to dark black within one to two hours (Nayar 1982). The present description of *Cx. nigripalpus* is based on a number of egg rafts collected form a colony established at the Florida Medical Entomology Laboratory, University of Florida, Vero Beach, Florida (Haeger 1963). . The neomanclature used in the description of the *Cx. nigripalpus* egg follows that outlined by Harbach and Knight (1980).

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DESCRIPTION OF EGG

The eggs of *Cx. nigripalpus* are subfusiform in outline and circular in cross-section. They measure approximately 667-670 microns in length and about 187-190 microns in width at the broadest point (near the anterior end). The eggs are light brown in color with areas of pigmentation confined to the anterior and posterior polar specialized areas.

The outer chorion is almost transparent with minute sculpturing or tubercules on the egg surface. The tubercules on the posterior and anterior polar specialized areas are larger than those on the rest of the egg. The entire egg is ornamented with these tubercules except on the micropyle apparatus.

On the anterior end of the egg, the micropyle, through which the spermatozoa enters is obstructed or filled by a micropylar plug or egg spike. The micropylar plug is surrounded by an arrangement of ornamented tubercules on the anterior polar specialized area similar to those of *Culex pipiens* (Christophers 1945) and *Cx. molestus* (unpublished data).

Surrounding the micropylar plug is the partly hidden micropylar disc which is further surrounded by the micropylar collar which is part of the raised portion of the outer chorion. Between the micropylar collar and the outer chorion there is a delicate transparent "frill" or corolla. It should be noted that the corolla is frequently lost when the egg hatches. The micropylar apparatus of *Cx. nigripalpus* is seen as a "black spot" on the anterior end of the eggs or egg rafts and is very similar to that of eggs of *Cx. pipiens, Cx. fatigans (= quinquefasciatus)* and *Cx. gelidus* at the macroscopic level (Christophers 1945, Berlin and Subramanian 1974). The micropylar apparatus measures 16.5 microns across.

The posterior end of the *Cx. nigripalpus* egg is tapered forming a "nipple like" structure associated with the apical droplet. The apical droplet assists in the correct orientation of tilted eggs or egg raft - this area is rather hydrophilic. On the other hand, the area around the micropylar apparatus on the anterior end of the egg is rather hydrophobic. The egg hatching pattern of *Cx. nigripalpus* is apical and incomplete (Fig. 1).

NOTES ON FIVE EGG RAFTS

Nayar (1982) reported that egg rafts of *Cx. nigripalpus* were macroscopically indistinguishable from egg rafts of other *Culex* species. Observations made throughout this study seem to support this view. However, when the *Cx. pipiens, Cx. quinquefasciatus, Cx. molestus, Cx. gelidus* and *Cx. nigripalpus* mosquito egg rafts were examined at the microscopic level, a number of differences were found which would enable separation of the five *Culex* species studied (Table 1).

Mattingly (1970) pointed out how incorrect the assumption was that all members of the genus *Culex* compacted their eggs into rafts on the water surface. During the present study one characteristic found common to all five mosquitoes of the *Culex* subgenus *Culex* was that they laid eggs in rafts and these rafts were formed directly on the water surface. However, it is quite possible that other members of this subgenus may also lay eggs on moist substrate in close proximity to water.

It should be noted that the descriptions of the five egg species when read, all have certain characteristics in common and these include shape (subfusiform), color (brown), presence of darker anterior and posterior polar areas, sparsely ornamented exochorion and similar patters of dehiscence (apical and incomplete). However, differences may be found in their length, width, diameter of micropylar apparatus, and the variations found in egg rafts (see Table 1).

It is hoped that more egg rafts from species both within the subgenus *Culex* and from other subgenera will be made available to us for comparison and description. It may be possible, if rafts from more species could be examined, to construct a diagnostic key separating both rafts from species of the same subgenus and rafts from different subgenera.

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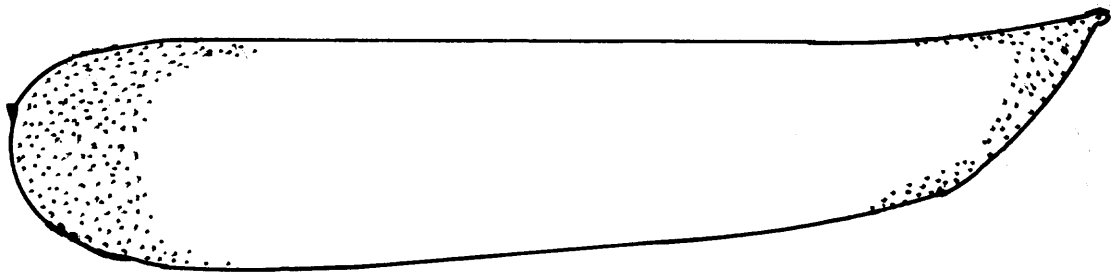
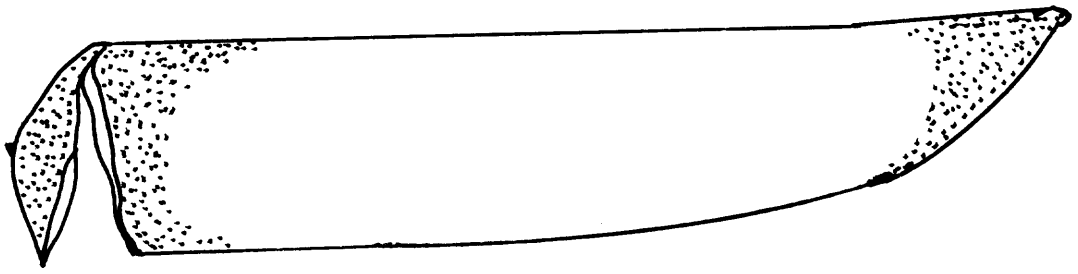
Table 1. A comparison of five *Culex (Culex)* egg rafts

Species	Shape of raft	Length of raft	Width of raft	No. Egg/ rafts	No. of egg rows
Cx. nigripalpus	broadly oval	2-4mm	1.0-1.8mm	45-300	4-5
Cx. quinque-fasciatus	broadly oval	3-4mm	1.3-1.8mm	30-350	4-5
Cx. pipiens	narrowly oval	5-6mm	1.8mm	400	6-9
Cx. gelidus	dorsally concave	2.9-3.2mm	0.9-1.2mm	160-180	-
Cx. molestus	narrowly oval	2-4mm	1.1-1.5mm	50-160	5-7

Fig.1 The egg of Culex (Culex) nigripalpus



(a)



(b)

(a) single egg

(b) Pattern of dehiscence