study of *Ae. triseriatus* oviposition between July 10 and August 28, Beier et al. (1982) in Indiana found 1.6% of the eggs deposited at 9.5 m above the ground were *Ae. hendersoni.*

This report from eastern U.S. confirms the presence of *Ae. hendersoni* as well as its preference for arboreal oviposition sites. The absence of *Ae. hendersoni* from prior reports in this locality may be the result of several factors. First, in the adult stage, this species is difficult to accurately separate morphologically from the closely related *Ae. triseriatus.* Based on this study, populations of *Ae. hendersoni* may not be very large, and when collecting near the ground, this species is not routinely sampled. Novak et al. (1981) found that almost all biting activity of *Ae. hendersoni* occurred in the canopy, approximately 21 m above the ground.

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DEPTH OF OVIPOSITION BY *ROMANOMERMIS CULICIVORAX* (NEMATODA: MERMITHIDAE) IN LOUISIANA RICELAND SOILS[1]

T. W. WALKER AND C. L. MEEK

Department of Entomology, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, Louisiana State University, Baton Rouge, LA 70803

Romanomermis culicivorax Ross and Smith is a mermithid nematode that parasitizes larval mosquitoes. Upon emergence from the host as a postparasite, the nematode burrows into the soil substrate of the aquatic habitat to mature, mate and reproduce. Oviposition begins about 25 to 30 days after host emergence (Petersen 1975).

Petersen et al. (1968) originally found *R. culicivorax* in ponds located in semiopen areas of piney woods near Lake Charles, LA. The soil type was a Kinder-Messer Complex (Kinder: fine-silty, siliceous, thermic, Typic Glossaqualf; Messer: Coarse-silty, siliceous, thermic, Haplic Glossudalf). In California studies, Washino and Westerdahl (1981) demonstrated successful cycling of *R. culicivorax* in three soil types characterized as a loamy sand, a fine sandy loam and a clay loam.

[1] This research was conducted as part of a cooperative effort between the State Agricultural Experiments Stations of Arkansas, California, Louisiana, Mississippi and Texas and the Agricultural Research Service, USDA as part of the USDA/CSRS Southern Regional Project S–122 on the Biology, Ecology and Management of Riceland Mosquitoes in the Southern Region.

This study was conducted to quantify the depth of oviposition by *R. culicivorax* in soils characteristic of Louisiana ricelands. These data are important in assessing the role that *R. culicivorax* may provide in an integrated approach to riceland mosquito management since soil cultivation is inherent in rice production and may inhibit the life cycle of this nematode.

The research was conducted in a fallow rice field located near Crowley, LA. The soil represented a Mowata silt loam characterized as a fine, montmorillontic, thermic, Typic Glossaqualf soil. In May 1982, five schedule 40 polyvinylchloride (PVC) pipes (10.2 cm inner diam. x 27 cm long) were driven vertically into the soil until 2 cm of the pipes remained exposed. Two hundred postparasites (100 males and 100 females) were placed on the soil surface in each pipe. In addition, 10 ml of well water was added to prevent possible desiccation. The exposed portions of the pipes were covered with a schedule 40 PVC pipe cap to prevent disturbance of the soil surface. The pipes were left in the field for 2 wk to allow sufficient time for the postparasites to develop to the adult stage and stabilize themselves in a preferred soil stratum. Afterwards, the pipes with the soil cores were retrieved from the field and transported to the laboratory. They were maintained in a vertical position in an incubator at 28 ± 0.5°C for 5 wk to allow sufficient time for females to complete oviposition and egg maturation (Petersen 1975). The soil cores were subsequently removed from the PVC pipes and cut transversely into eight sections. Each of the top five sections were 2 cm thick and the remaining three lower sections were 5 cm thick.

Each section was placed in an enameled pan (18 x 30 x 5 cm) containing about 1 liter of well water. Each 5 cm section was manually broken into smaller portions to permit submersion. About 100 first instars of *Culex quinquefasciatus* Say were then added to each pan. When the mosquito larvae reached the fourth instar they were examined for parasitism.

Results indicated that *R. culicivorax* oviposition occurred primarily in the upper 2 cm of riceland soil (Table 1). Of the 401 parasitized mosquito larvae recovered from all five soil columns, 364 (90.8%) were infected by preparasites that emerged from eggs previously laid in the uppermost stratum. When the top 4 cm portions of the soil columns were considered, the percentage of infected larvae increased to 98.5. There was no parasitism of mosquito larvae from strata below 6 cm. These data agree with Washino and Westerdahl (1981) who reported that most *R. culicivorax* were generally found in the upper 5 cm of riceland type soil.

In an earlier attempt to determine the preferred stratum of *R. culicivorax* postparasites and adults in riceland soils, substantial difficulty was encountered when attempting to separate the nematodes from the soil and plant debris.

Table 1. Parasitism of *Culex quinquefasciatus* larvae by preparasites of *Romanomermis culicivorax* hatched from eggs deposited at various depths in Louisiana riceland soils.[1]

Soil core	Section depth (cm)	Number of nematodes per infected mosquito larvae						No. infected	Total larvae	Total % parasitism
		0	1	2	3	4	5+			
I	2	2	21	29	20	12	11	93	95	97.9
	4	107	0	0	0	0	0	0	107	0
	6	85	4	0	0	0	0	4	89	4.5
	8+	97	0	0	0	0	0	0	97	0
II	2	76	31	3	0	0	0	34	110	30.9
	4	112	0	0	0	0	0	0	112	0
	6	118	0	0	0	0	0	0	118	0
	8+	113	0	0	0	0	0	0	113	0
III	2	10	35	27	10	7	2	81	91	89.0
	4	102	0	0	0	0	0	0	102	0
	6	93	1	0	0	0	0	1	94	1.1
	8+	102	0	0	0	0	0	0	102	0
IV	2	30	55	21	4	1	0	81	111	73.0
	4	110	0	0	0	0	0	0	110	0
	6	0	0	0	0	0	0	0	109	0
	8+	117	0	0	0	0	0	0	117	0
V	2	0	5	8	15	16	31	75	75	100.0
	4	52	28	3	0	0	0	31	83	37.4
	6	127	1	0	0	0	0	1	128	0.8
	8+	117	0	0	0	0	0	0	117	0

[1] Soil cores, previously inoculated with 200 (100♂♂:100♀♀) postparasites, were cut into 2 or 5 cm sections, flooded, and about 100 first instar *Cx. quinquefasciatus* were added.

Many of the nematodes had become entwined among themselves and debris, and others found harborage in hollow plant stems and seed hulls. This behavior impeded the processing of soil samples (Walker and Meek 1983). Croll (1970) indicated that aggregations of nematodes are common and evidence suggests that aggregation behavior is associated with quiescence and resistance to adverse environmental conditions. Of the 30 samples processed in the earlier studies, approximately 50% of the nematodes recovered were found in the upper 2 cm of soil surface (Walker and Meek 1983).

Superparasitism, defined as ≥2 parasites of the same species in a single host, was commonly observed in this study. It occurred in 54.9% of all parasitized mosquito larvae. Eleven percent of the larvae had > 5 parasites per host.

Romanomermis culicivorax oviposits in the top 4–6 cm of the soil that is common to Louisiana ricelands. However, the majority of the nematode eggs are found in the uppermost 2 cm. Although the nematode eggs are subjected to soil cultivation practices during seedbed preparation of rice fields, parasitism by overwintering *R. culicivorax* can still occur in spring broods of susceptible riceland mosquito species.[2]

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MOSQUITOES FEEDING ON SHEEP IN SOUTHEASTERN WYOMING

CARL J. JONES[1] AND J. E. LLOYD[2]

Little is known about the species of mosquitoes that attack sheep in the United States. In the high plains region and the Rocky Mountain region, only a few researchers (Beadle 1959, Shemanchuk et al. 1963) have used serology to demonstrate the presence of ovine blood in mosquitoes collected from light traps. In Australia, Muller and Murray (1977) aspirated feeding mosquitoes from the legs of restrained ewes, and observed mosquitoes feeding on the face, ears, bare areas of the breech and udder.

Pennington and Lloyd (1975) surveyed mosquitoes that attacked cattle in a flood irrigated area near Laramie, Wyoming, and captured 161,127 culicine mosquitoes on 16 collection dates from June 16 to August 10, 1971. Since that time, mosquito control programs have been implemented in the region (Hulett 1977, Lloyd and Kumar 1979) and numbers of adult mosquitoes have been reduced. The objectives of this study were to determine which mosquito species in this intermountain meadow region of Wyoming were ovine feeders and to make a preliminary examination of the prevalence of that feeding.

Traps were established at the 199.3 ha Paradise unit of the University of Wyoming Farms, 4.7 km west of Laramie in Albany County, Wyoming (elevation 2,184 m). The land is flood-irrigated for crop production and is inundated by overflow from the Laramie River during runoff in May and June. Depressions in fields and along the river remain filled with standing water after irrigation and as spring runoff recedes. In 1978, both cattle and

[1] Florida Health and Rehabilitative Services, Office of Entomology, C/O USDA-ARS, Insects Affecting Man and Animals Research Laboratory, P. O. Box 14565, Gainesville, FL 32604.

[2] Department of Entomology, University of Wyoming, P. O. 3354 Univ. Station, Laramie, WY 82071.