New Jersey

Vector Surveillance

New Jersey Agricultural Experiment Station

Mosquito Research and Control

Vol. 7 No. 5

Period: 1982 Season Summation

Introduction

Eastern equine encephalitis (EEE) was widespread along the eastern coast of the United States in 1982. Equine cases were reported from nearly every state from Florida to New Hampshire. Human cases were reported from Florida, Georgia, North Carolina, Maryland, Delaware and Massachusetts. New Jersey, traditionally a focus for EEE documented considerable virus activity with 70 virus isolations from Cs. melanura and 6 confirmed horse cases. EEE virus was isolated from Ae. sollicitans on 3 separate occasions but no known human involvement occurred within the state.

Studies Undertaken in 1982

EEE investigations were initiated in May with a bird bleeding program to sample avians as they moved into the study sites to nest in the Spring. Blood samples were taken at least 2 days each week until late October. All bird sampling was conducted at the Dennisville site in 1982. Avians were collected with Japanese mist nets and tagged with Fish and Wildlife bands prior to release. A surprisingly large number of birds were recaptured from the 1981 season, thus, good data are being collected on antibody history over an extended period of time.

Resting boxes were used to collect Cs. melanura from May to October. Once virus was detected, a special effort was made to collect and test Ae. sollicitans for EEE. The New Jersey Agricultural Experiment Station provided special funds for these tests during the emergency period. Entomologist, James McNelly of the Cape May County Mosquito Extermination Commission coordinated all aspects of the special collections.

Five sentinel chicken flocks were established at inland sites to monitor SLE virus over the course of the Summer. Mosquitoes were tested for EEE and HJ virus by the New Jersey State Department of Health Laboratories. Sentinel chicken bloods were screened for evidence of SLE sero-conversion by the same facility. Wild bird bloods and a portion of the Ae. sollicitans were tested for antibody and/or virus by the Department of Epidemiology and Public Health at Yale University.

Cs. melanura Population Trends

Figure 1 shows the Cs. melanura population trends at New Gretna and Dennisville for the 1982 season. At New Gretna (East Coast), Cs. melanura increased steadily in the early Spring, but remained below 10 mosquitoes per box throughout most of the season. In the Fall, the numbers dropped rapidly with very few specimens remaining by October. At Dennisville (West Coast), Cs. melanura appeared somewhat earlier in the Spring and tapered markedly during the month of July. In early August, the numbers peaked sharply, increasing from 3 mosquitoes per box to nearly 30 mosquitoes per box in less than 2 weeks' time. Similar population increases in August have been common at this collection site and appear to represent adults originating from eggs deposited by the Spring generation. A second, but smaller, population peak was recorded during the 3rd week of September and mosquitoes remained well into October.

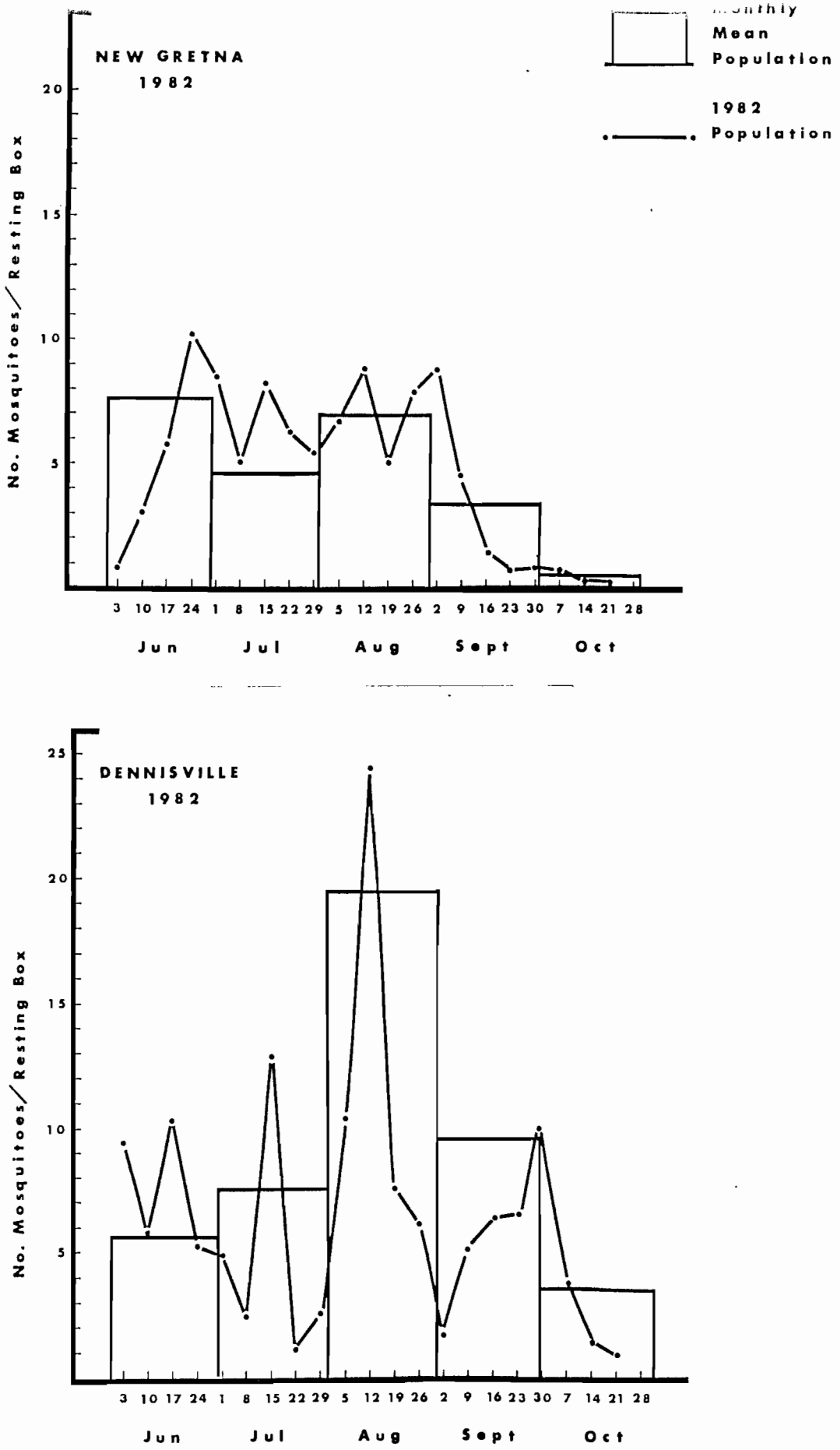

Fig. 1. Culiseta melanura populations at the New Gretna (East Coast, top graph) and the Dennisville (West Coast, bottom graph) study sites as measured by resting box collections. Monthly means are based on data from the previous 6 years.

EEE Virus in Cs. melanura

EEE virus was isolated from 70 pools of Cs. melanura in 1982 with activity extending from mid-July to early October. Figure 2 plots the 70 isolations by week for the active season. The East Coast data include isolations from Greenbank (a NJ State Dept. of Health collection site) as well as those made at New Gretna.

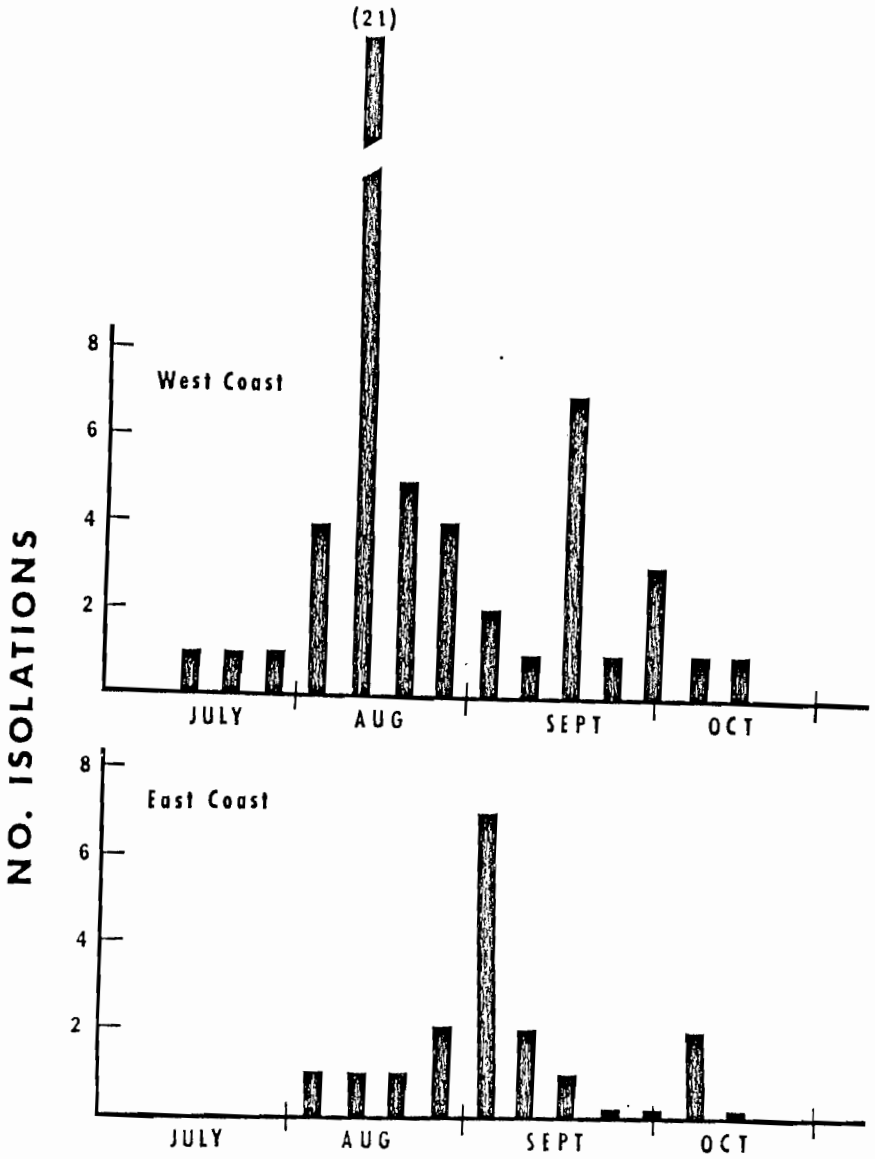

Fig. 2. EEE virus isolations from Culiseta melanura at 2 study sites monitored during 1982.

The Dennisville data show that virus amplification closely paralleled the population trends seen at that site. The early August increase in Cs. melanura was accompanied by 21 virus isolations and the September population peak resulted in a similar increase in the virus isolation rate. Data indicate that transmission to local birds was intense during these periods. From August 5 to August 12, 1 isolation was obtained for every 130 Cs. melanura tested. From September 13 to September 20, 1 isolation was obtained for every 89 Cs. melanura tested.

Additional Indication of EEE Transmission During 1982

The 1982 season yielded a great deal of evidence to suggest that EEE virus was widespread and exceptionally intense. Human cases were reported from southern states during May and June. Human cases occurred to the North later in the season and equine cases were widespread in the East. During this same period, the New Jersey program documented EEE in wild birds, confirmed virus in horses and documented transfer to Ae. sollicitans at the study sites.

The sequence of events during the 1982 season raises some interesting questions regarding EEE and its mosquito vectors. Virus was first detected from wild birds during 1982, with 5 virus isolations in late May and early June. The isolations occurred more than 6 weeks before the first indication of virus in Cs. melanura, even though nearly 5000 Cs. melanura had been screened. No explanation can be offered at the present time but the results complement the detection of early season antibody in juvenile birds recorded in previous years.

Once virus was detected in Cs. melanura, the events proceeded rapidly. At the same time that virus was being amplified at Dennisville during early August, 4 equine cases were confirmed in Gloucester and Salem Counties (inland areas of the State to the North of Dennisville). During the same week, a virus isolation was obtained from a single pool of Ae. sollicitans at Dennisville. Data suggest that the events at Dennisville were indicating that virus amplification was occurring over a fairly wide geographic area. The horse cases in Gloucester and Salem Counties were transmitted by freshwater vectors, but no isolations were obtained to indicate which species were involved.

In the middle of August, a 2nd EEE isolation from Ae. sollicitans was obtained from a pool of mosquitoes collected at New Gretna. Within 2 weeks, horse cases were confirmed at Estelle Manor, Cape May and Lewes, Delaware. A human case was also recorded at Lewes late in August. The mosquito vectors in these areas could have been either fresh or salt marsh species, but control was directed primarily toward Ae. sollicitans, the dominant mosquito in the coastal areas.

No further unusual activity was documented in New Jersey until the 3rd week of September when Cs. melanura isolation rates showed their 2nd peak. During this period, the 3rd and final EEE isolation was obtained from Ae. sollicitans collected at Dennisville. No horse or human involvement accompanied the virus activity in New Jersey, but Delaware did document equine involvement at this time.

Summation

Considerable information was achieved through surveillance efforts during 1982, particularly on the potential role played by Ae. sollicitans during epidemic years. Virus did transfer to this abundant salt marsh species in 1982, as previously suggested by numerous workers. The inland horse cases reaffirm that other vectors are involved in the cycle and that additional work is needed to identify those vectors and clarify the complex cycle. New Jersey's classical pattern has involved inland horse cases in the early season followed by coastal involvement including humans toward Labor Day. The pattern held firm in 1982 except that horse cases along the coast were not followed by human cases in our State.

As the 1983 season commences, acknowledgement is offered to those who cooperated this past year, including the New Jersey State Department of Health, the New Jersey Department of Environmental Protection, the New Jersey State Airspray Program, the Yale Arbovirus Unit, the Cape May County Mosquito Extermination Commission and the mosquito commissions in Ocean, Burlington, Cumberland, Salem, Atlantic and Gloucester Counties. Gratitude is also expressed to the New Jersey Agricultural Experiment Station for providing emergency funds and to the New Jersey State Mosquito Control Commission for continued funding of this project since its conception.

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New Jersey Agricultural Experiment Station Publication No. R-40500-01-83, supported by the New Jersey Agricultural Experiment Station and the New Jersey State Mosquito Control Commission.