ENTOMOLOGY

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ABSTRACTS

A Preliminary Report of Mosquito Population Sampling Methods in Delaware County, Indiana, 1973. Gregory L. Spangler and R. E. Siverly, Public Health Entomology Laboratory, Ball State University, Muncie, Indiana 47306.——Three sites were selected in Delaware County to evaluate and compare egg sampling, larval sampling, and adult sampling as indicators of species, number of species, and seasonal occurrence of indigenous mosquito populations.

At each field study site stakes were set 2 to 22 feet apart on successive dates at different waterline levels. A minimum of three contours were thus established at each site. Egg samples were obtained by removing topsoil sections 6 x 6 x 1 inches at various levels on the profiles of the study sites. Eggs were isolated using the mechanical separation and flotation method developed by Horsfall and co-workers.

These studies are ongoing and complete data will not be obtained this year. Eggs from all loci will be identified and relegated to time of oviposition as well as place of oviposition. Special relations to eggs deposited by other species will be determined, and identifiable ecological factors, such as proximity to logs, saturation, etc.

Larval sampling was done by dipping with a standard pint-sized enameled dipper. Most data were qualitative, but in some cases estimations of total populations were made. This method tended to exaggerate the prevalence of one or a few species and not to reveal the presence of others.

Adult collections were obtained by using battery-operated light traps (with carbon dioxide) and taking biting collections. These data tended to reveal more than the species indigenous to the specific study site due to infiltration.

Non-Random Segregation of Interchange Complexes in a Compound Structural Rearrangement (Translocation + Inversion) in the Mosquito, *Aedes aegypti*. James J. McGivern, Department of Biology, University of Notre Dame, Notre Dame, Indiana 46556.——A compound structural rearrangement, designated T(1;2)1Mc + In(2)b was induced by gamma irradiation. This rearrangement was originally detected through suppression of recombination between certain markers in linkage groups I and II and observation of pseudolinkage between markers on those same linkage groups. An analysis of the orientation of metaphase chromosomes was done and a high frequency of alternate segregation

(86%) was observed. This phenomenon may be related to the cytological features of this rearrangement, and it is the first report in any mosquito species of directed orientation of multiple associations of chromosomes.

Notes on Identification and Biology of *Bufolucilia silvarum* (Meigen) (Diptera, Calliphoridae) in East-Central Indiana. R. E. SIVERLY and JOHN JOYNER, Public Health Entomology Laboratory, Ball State University, Muncie, Indiana 47306.——The ratio of head length to head height as cited by Hall is not considered a reliable character for separation of *Bufolucilia silvarum* from similar and more prevalent species, particularly *Phaenicia sericata.* The erect, medial, marginal bristles on the second abdominal segment and the dark basicosta appear to be more reliable characters for identification of *B. silvarum* than head length: height ratio.

Bufolucilia silvarum was present in traps baited with chicken entrails from May through August 1973. This species comprised approximately four per cent of trap collections. Further studies are planned which should elucidate certain aspects of its biology, particularly the extent of its parasitism upon amphibia.

Review of Findings on the Taxonomic Status of *Culex pipiens* L. and *Culex fatigans* Wiedemann in the United States. J. W. BURGESS, Department of Entomology, Purdue University, West Lafayette, Indiana 47907.——The taxonomic relationship of two members of the *Culex*-complex, *C. pipiens* and *C. fatigans,* has been the object of much previous study. Literature yields examples of fertile crosses between the two groups resulting in offspring which resemble natural "intermediates". Mating preference, swarming behavior and feeding behavior seem, in some cases, to provide no natural isolating mechanism. In other cases, crosses have been shown to be infertile, or seldom fertile. Climatic tolerance, ability to utilize fat reserves for hibernation, and population response to feeding and swarming have all been cited as examples of natural barriers.

Due to the morphological similarity of the two groups, it is difficult to ascertain whether past literature was based on accurate determinations. Characters to date are unsatisfactorily variable, and several vary with environmental conditions. Future researchers in this area are urged to record any environmental data which might affect their determinations.

Both *Culex pipiens* and *C. fatigans* exhibit distinctive behavioral patterns regarding host preference, mating patterns, temperature and photoperiodic response, and capability of gonadotropic dissociation, which may be used to distinguish them. However, presently it is not possible to decide the taxonomic relationship of these two groups. Both show discrete characteristics, but conclusive population relations in the field have not yet been demonstrated.

Biology of *Bellura gortynoides* Walker (=*vulnifica* [Grote]), the Yellow Water Lily Borer (Lepidoptera: Noctuidae). ELI LEVINE, Department of Entomology, Purdue University, West Lafayette, Indiana 47907.——

Keys to the species of *Bellura* whose larvae feed on yellow water lily, *Nuphar advena*, are based largely on the color of the anal tuft of the female moth. Research conducted during the spring and summer of 1973 has shown that dark brown-tailed females (*B. vulnifica* Grote, 1872) give rise to white-tailed daughters (*B. gortynoides* Walker, 1865).

There are two complete generations per year in the Tippecanoe County area. Eggs are laid in masses on both upper and lower surfaces of emergent leaves of yellow water lily. First generation eggs are laid in late May-early June and are well covered with brownish hair from the female's anal tuft. Fertile eggs hatch within 6 days. For approximately the first three instars, the larvae are leaf miners; thereafter, they become petiole borers. There is a total of six or seven instars, and last instar larvae average about 5.5 centimeters in length. The larvae pupate in the water-filled bores of the petioles. Throughout most of July, white-tailed females emerge, mate and lay white-covered second generation egg masses. As in the first generation, second generation larvae pass through leaf mining and petiole boring stages. Between mid-September and November, the larvae swim to shore and overwinter as larvae under the bark of trees, in rotten wood, or under leaf litter.

Both first and second generation eggs are highly parasitized by *Telenomus arzamae* Riley (Hymenoptera: Scelionidae). First, and to an even greater extent, second generation larval populations are limited by an ichneumonid parasite and a polyhedrosis virus.

A Preliminary Study of Autogeny in Stenogamous and Non-stenogamous Strains of *Culex pipiens pipiens* (Northern House Mosquito). THOMAS M. LEE and R. E. SIVERLY, Public Health Entomology Laboratory, Ball State University, Muncie, Indiana 47306.——Two strains of *Culex pipiens pipiens* were reared in the laboratory to compare the frequency of the expression of autogeny in each strain. A stenogamous strain was established from egg rafts taken from storm sewer catch basins located in Muncie. A previously established non-stenogamous strain originated from egg rafts collected from an open, unshaded industrial waste lagoon.

Larvae were obtained from egg rafts produced by the laboratory colonies and were reared under standardized conditions. Adults emerged in 1 x 1 x 1-foot screened cages and then were transferred to pint-sized cardboard cartons and maintained on a 10 per cent honey solution.

A total of 748 females, all of which were at least 5 days old, were dissected, their ovaries removed, and categorized according to Christophers' classification.

Both strains exhibited a low frequency of autogeny. Further study is indicated to establish physiological and/or environmental factors which influence autogeny in this species.

Evaluation of ALTOSID SL-10 in Controlling Mosquito Populations in an Industrial Waste Lagoon Complex. THOMAS M. LEE and R. E. SIVERLY, Public Health Entomology Laboratory, Ball State University,

Muncie, Indiana 47306.——A previous study (Shroyer and Siverly, 1970) reported a population potential of immature mosquitoes in excess of 300 million at one waste lagoon complex in central Indiana. Observations attending use of FLIT-MLO in 1972 suggested that control might be achieved by treatment of the first lagoon in the series, since overflow from the first to the second lagoon frequently occurred.

ALTOSID SL-10 was the treatment compound used in 1973. This is a synthetic, hormonomimetic compound which imitates natural juvenile hormone and causes abnormal larval development in late fourth instar. Lagoon I was sprayed weekly with a water-flowable mixture at the rate of 12 ounces per acre. The second lagoon was untreated.

Evaluation was based on estimated numbers of immatures derived by sampling with a standard pint-sized dipper. Each weekly count was an average of at least 25 dips.

ALTOSID SL-10 did not effect control in either lagoon and in fact was inferior in performance to FLIT-MLO in 1972. Population control of immatures at this lagoon complex is extremely difficult, however, due to fluctuations in water level, turbulence, overflow, and a high organic content of the waste material. Further trials are planned with compounds which meet Environmental Protection Agency standards, and which can be applied either with a hand sprayer or broadcast by hand.

Observations on the Biology of *Mansonia perturbans* (Walker) (Diptera, Culicidae) in Indiana. R. E. SIVERLY, Public Health Entomology Laboratory, Ball State University, Muncie, Indiana 47306.——Wild-captured females fed readily in small cages, either on warmed beef blood or on the human hand. Egg rafts were laid in small plastic cups provided with floating cork discs. Rafts consisted of 100-150 eggs. Eggs measured approximately 500 microns in length and 100 microns at the anterior diameter. At room temperature, eggs hatched in 5 or 6 days after oviposition.

Larvae were free-swimming during early life but attached to submerged roots of cattail in second instar. Larvae tended to aggregate on one root system or even one root, but they changed positions frequently and re-attached without apparent difficulty. Larvae surfaced if root tracheal systems failed to transport air.

Pupation occurred at the sites of larval attachment. Unlike larvae, pupae were unable to transfer from one attachment site to another. Darkening of the pupal integument was concurrent with loosening of the respiratory trumpets at the points of attachment. Adult emergence occurred within a few hours after surfacing of mature pupae.

NOTE

A New Barberry Pest Found in Indiana.[1] DONALD L. SCHUDER, Department of Entomology, Purdue University, West Lafayette, Indiana 47907.——The barberry looper, *Coryphista meadii* (Packard), (Lepi-

[1] Journal Paper No. 5306, Purdue University Agricultural Experiment Station.

doptera, Geometridae) is a pest of barberry and mahonia (2). The insect was first described from Colorado in 1874. Two color variations were noted. The looper was reported from Ohio and other eastern states in the early 1940's (4). It was found defoliating an ornamental barberry planting in West Lafayette in the summer of 1973. According to the owner, defoliation also occurred in 1972, but the problem was not reported to the writer until this year.

The insect has been reported feeding on *Berberis thunbergii* (D.C.) (Japanese barberry) and its varieties: *B. thunbergii minor* (Rehd.); *B. thunbergii atropurpurea* (Chenault); *B. thunbergii erecta* Rehd. (3); *B. repens* Lindl. (1); and *Mahonia aquifolium* (Pursh.) Nutt. (Oregon grape) (3).

The moths are buff to smoky brown with a wavy pattern on the wings. They are nocturnal, but when flushed during the daylight hours they fly rapidly in a zigzag pattern. In late June and early July the females deposit their yellow, oval, flattened eggs singly on the lower surface of leaves (1, 2). The incubation period varies with the temperature but is usually 3 to 4 days during midsummer. The larvae require 12 to 16 days to complete development. Full-grown larvae are about 1 inch long. The head is orange and the body is very dark brown to black. A lateral light colored stripe extends the full length of the body and is punctuated with black spiracles. The larvae are nocturnal and can be found best by checking the plants with a flashlight. Pupation occurs in a cell in the soil, or in a cocoon of leaves and litter at the soil surface and lasts 11 days during the summer months (3). The pupa is a shiny dark brown. Thus, a life cycle is completed in about 4 weeks, but there are three or more overlapping generations. The larvae can be found from early July until cold, freezing weather (3, 4). The insect overwinters in the pupal stage.

The caterpillars feed on the margins of the barberry leaves causing them to have a ragged appearance (3). Heavy populations completely defoliate the host plants. On mahonia the larvae tend to feed on the lower leaf surfaces producing a skeletonized appearance.

Neiswander (3) and Sun (4) have reported five hymenopterous pupal parasites, three dipterous parasites, and a pentatomid predator.

Acknowledgment

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