

ENTOMOLOGY

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ABSTRACTS

The Life History of *Pemphredon lethifer lethifer* (Shuckard) (Hymenoptera, Sphecidae). LELAND CHANDLER, Purdue University, NANCY WORK, West Lafayette High School, and FRED SHEWMAN, Akron High School.—*Pemphredon lethifer lethifer* (Shuckard) is an adventive wasp only recently recognized in North America. The species nests in pithy-stemmed plants, especially raspberry, sumac, elderberry and rose. The cells are provisioned with aphids of several species, but only one species is used per cell. The number of aphids per cell ranged from 40-80. The number of cells per nest ranged from 1-22. The egg is laid horizontally about one-fourth of the way from the bottom of the cell. The incubation period was about 28 hours. The length of the larval feeding period was not determined although it was approximately 7-10 days. The prepupal period ranged from 1-3 days, the pupal period, 5-8 days. There are a number of generations per year, the species overwintering as a prepupa. The species is parasitized by a cuckoo wasp, *Omalus auratus* (L.), which is also an introduced species. An ichneumon wasp, *Perithous pleuralis* Cresson, is an external prepupal parasite, the life history also being recorded in this study. Fungi cause the death of the developing brood and spiders are important predators.

Protecting Cucumbers from Insects by the Use of Electric Light Traps. HOWARD O. DEAY, Purdue University, and JAMES G. HARTSOCK, U. S. Department of Agriculture.—Experiments were conducted at Lafayette, Indiana in the seasons of 1958 and 1959 to determine if cucumber plants in home vegetable gardens could be protected from striped and spotted cucumber beetles by the use of fan-type electric light traps. In spite of the fact that the rainfall in the two years was very different (1958 being especially wet and 1959 especially dry), the results obtained in the two years were very similar. A single trap equipped with three 15-watt Black Light lamps per plot protected the cucumbers in both years very effectively. Traps equipped with either one 15-watt Black Light lamp or with one 15-watt Black Light lamp plus one 15-watt green fluorescent lamp gave same protection but not as much as did the trap equipped with three 15-watt Black Light lamps.

Some New Permian Insects and Insect Localities. J. R. ZIMMERMAN, Indianapolis.—Sellards, Tillyard, and Carpenter have made extensive reports on Permian insects found near Elmo, Dickinson County, Kansas. All of the specimens were taken from but a single quarry. Carpenter has also reported three orders from several localities in Noble County, Oklahoma. Dr. Paul Tasch, University of Wichita, in studying fossil Conchostraca (clam shrimps) has found insect fragments from at least fourteen

localities distributed in every county from Dickinson County, Kansas, to Kay County, which is immediately north of Noble County, Oklahoma. The two Oklahoma insect horizons are stratigraphically above the insect beds in Kansas (Paul Tasch, personal communication). About 350 insect specimens have been found thus far by Tasch and his workers. Representatives of all but two Elmo orders have been definitely recognized. New species have been found in the extinct orders, Protorthoptera, Megaseoptera, Protelytroptera, and in the living orders, Odonata, Corrodentia, Homoptera, and Neuroptera.

Entomological Facilities and Services of the Indiana Farm Bureau Cooperative. WALTER WEBER, Indiana Farm Bureau.—The history and development of the Indiana Farm Bureau Cooperative were discussed. The various services were described. An extensive amount of informational material is distributed each year.

The Nesting Habits of *Osmia albiventris* Cresson (Hymenoptera, Megachilidae). LELAND CHANDLER, Purdue University. The nests of *Osmia albiventris* were found in nail holes and behind window casings of a poultry house and the species also utilized trap nest boards. Nests were kept under observation from June 1 (beginning of provisioning) to July 1 (last female died). Where a single, tubular cavity existed (e.g., nail hole, trap nest), the female constructed a series of linear cells made of chewed plant materials. The average size of the cells (outer dimensions) was 9 mm. in length and 6 mm. in width. They were obovate in shape and were placed in planes ranging from horizontal to vertical. Three to four cells made up a single series but each female constructed several series during her life span. The nests located behind window casings were compound, several females provisioning independent series of cells. The chewed plant materials were compacted tightly and formed a mass which could be removed intact from the site. The nest masses were rather complicated since they incorporated nests constructed over a period of several years and included cells of *Megachile* spp. as well as those of *Osmia*. Observations on provisioning, oviposition, development, predators, parasites and pollen-sources were completed. The larvae of the black carpet beetle, *Attagenus piceus*, were the primary predators.

Notes on Regulatory Entomology in Indiana, 1959. JOHN FAVINGER and FRANK MADINGER, Indiana Department of Conservation.—During 1959 the Division of Entomology initiated a reappraisal and reorientation—of regulatory projects within its province—aimed at improving, and facilitating, legal control of movement of exotic insect pests and plant diseases in Indiana. The changes resulting from this re-evaluation include a more intensive inspection and licensing of nursery dealers and agents and a change in survey procedures for exotic plant pests. Increased movement of nursery stock through interstate channels presents increasing opportunity for introduction of plant pests alien to Indiana agriculture. Therefore, examination and licensing of nursery stock handled by nursery dealers and agents has been given much emphasis and effort during 1959.

Exotic plant pest surveys were redesigned during 1959 to include (1) intensive *detection surveys*, for a given season, to indicate location of

incipient infestations; and (2) *delimitation surveys*, the following season, to determine population densities. During 1959 the *detection-type survey* for Japanese beetle (*Popilia japonica* Newman)—which was predicated upon the theory that common carriers (especially railroads) serve to introduce the pest—revealed 20 heretofore unknown locations of Japanese beetle. These locations were in or near: *Arcola*, *Beech Grove*, *Bolivar Crossing* (*Wabash Co.*), *Bourbon*, *Carbon* (*Clay Co.*), *Clarks Hill*, *Clarks-ville* (*Clark Co.*), *Columbus*, *Crawfordsville*, *Hamlet* (*Starke Co.*), *Hobart*, *Jamestown* (*Elkhart Co.*), *Kingsland* (*Wells Co.*), *Laketon*, *LaPorte*, *Montezuma*, *Peru*, *Piercetown*, *Roachdale*, *Seymour*. An important aspect of this type of survey is that these 20 locations represent 12 new county records, as well as significant infestations for the first time in that part of the state south of U. S. 40.

The Division has also devoted more time and interest to excluding the following exotic pests from Indiana: *European chafer* (*Amphimallon majalis*), *White-Fringed Beetle* (*Graphognathus* sp.), *Soybean Cyst Nematode* (*Heterodera glycines*), *Khapra beetle*, (*Trogoderma granarium*), *Imported Fire Ant* (*Solenopsis saevissima richteri*) and *Gypsy Moth* (*Porthetria dispar*).

Aerial Application in Agriculture. RICHARD L. CUNNINGHAM, Aeronautics Commission of Indiana.—The beginning of aerial application goes back to 1919 when the U. S. Department of Agriculture aerially dusted fruit trees infested with caterpillars (larvae of the catalpa sphinx), which fed on the leaves. From that origin the practice has expanded to the point that aerial crop control work is now done on more than 200 different types of crops. One of every twelve acres under cultivation is treated from aircraft. Insect control has been, and still remains, the primary use of airplanes in agriculture, although it is far from the only one. The importance of insect control to the farmer can readily be seen when it is realized that losses caused by all insects add up to a staggering \$4 billion each year despite the control measures now available. The major uses of the airplane in agriculture may be grouped into five rather broad classifications: (1) insect and plant control, (2) weed and brush control, (3) fertilization, (4) defoliation, and (5) seeding. In 1957, nearly three-fourths of all agricultural flying involved the control of insects and plant diseases.

The Effectiveness of Systemics when used in Different Ways. RICHARD CRUM, Purdue University.—A variety of techniques were demonstrated to show the effectiveness of systemic insecticides. The solutions were applied by hypodermic needle, sprinkler can, speed sprayer, and custom-made tree injection equipment. The materials used were di-syston, demeton, and phorate. Applications of these systemics were made to a variety of weeds, shrubs, and trees, demeton being the most efficient material used.

The Use of *Bacillus thuringiensis* Berliner for the Control of Cabbage Caterpillars. WILLIAM L. PARROTT, Purdue University. The bacterium, *Bacillus thuringiensis* Berliner, is now being formulated by several concerns and in preliminary tests has been effective against certain cater-

pillars. Field tests were conducted during the summer of 1959 at the Purdue University Agronomy Farm in Tippecanoe County to determine the effectiveness of this organism on the imported cabbage worm, *Pieris rapae* (L.), and the cabbage looper, *Trichoplusia ni* (Hbn.). *Bacillus thuringiensis* was applied as a spray to the cabbage plants by suspending the spore formulation in water. A wetting agent was added to insure an adequate coverage of the foliage. Applications were made at six, twelve and eighteen days intervals to determine the degree of control and the length of residual action. Population counts were made at six day intervals by examining the plants for the presence of the larvae of the two species. Results indicated that satisfactory control of the imported cabbage worm was obtained only by applications of *Bacillus thuringiensis* at six day intervals. At the rate tested (3 pounds of commercial formulation per acre), this bacterium was not effective in reducing the cabbage looper population. Tests on both early and late cabbage gave similar results.