

STAGES IN THE LIFE CYCLE OF A PREDATORY STINK BUG, PODISUS MACULIVENTRIS (SAY)

(HEMIPTERA: PENTATOMIDAE)^{1,2}

David B. Richman³ and Frank W. Mead⁴

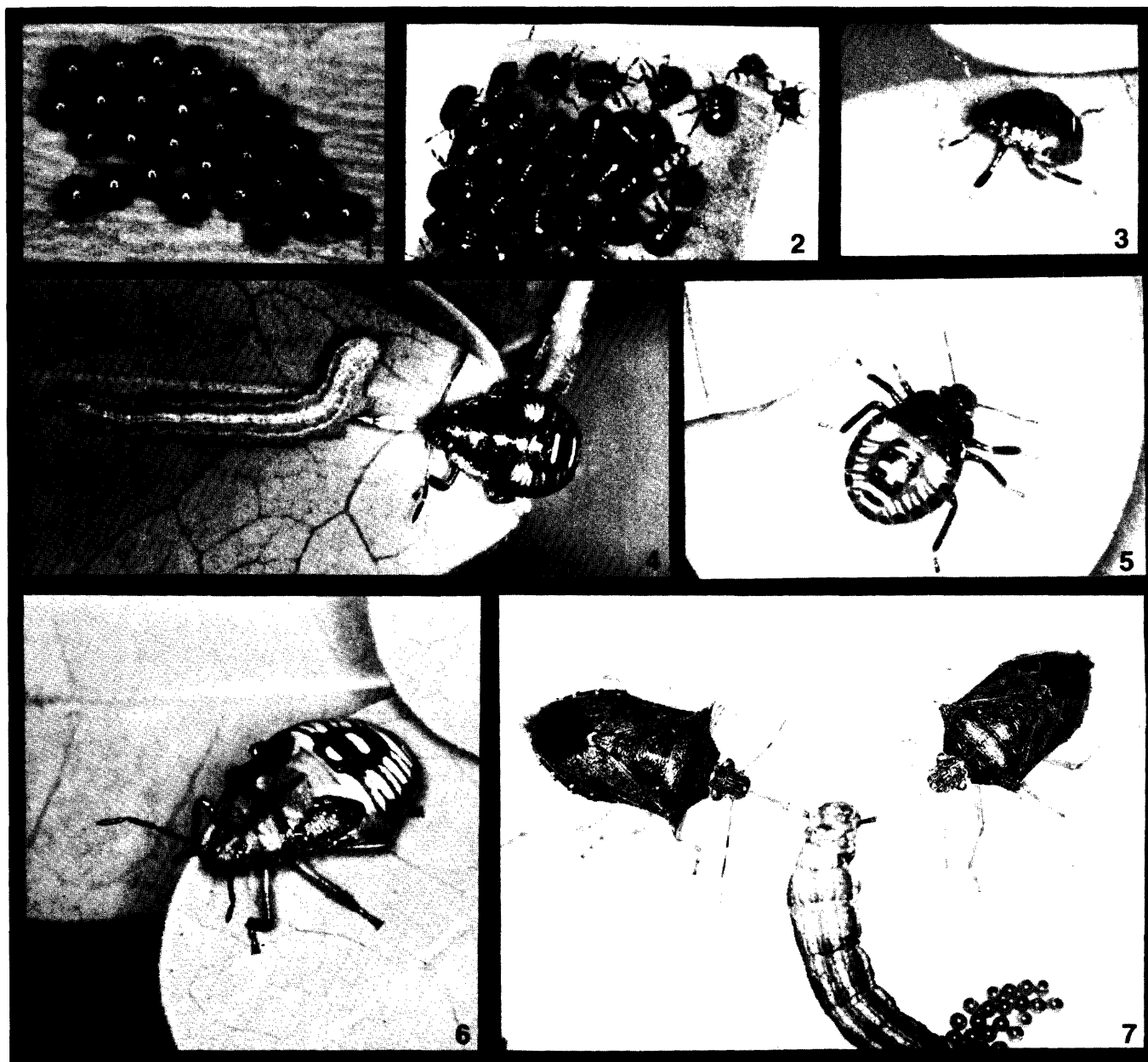


Fig. 1-7, Podisus maculiventris (Say): 1) eggs, 2) 1st instar nymph, 3) 2nd instar nymph, 4) 3rd instar nymph feeding on caterpillar, 5) 4th instar nymph, 6) 5th instar nymph, 7) adults feeding on caterpillar. Scale variable. Photographs by D. B. Richman.

INTRODUCTION: The spined soldier bug, Podisus maculiventris (Say) is a medium-sized predatory stink bug which preys on a wide variety of other arthropods, especially larval forms of Lepidoptera and Coleoptera (Mukerji and LeRoux (1965)). This beneficial species is associated with several crops in Florida, including alfalfa, celery, soybeans, cotton, and crucifers (Stoner 1930, Hayslip et al. 1953, Whitcomb 1973, Deitz et al. 1976). This stink bug ranges over most of the United States and into southern Canada. The Florida State Collection of Arthropods (FSCA) has specimens from 22 Florida counties in all regions of the state.

LIFE CYCLE: Kirkland (1896), Stoner (1930), Esselbaugh (1949), Mukerji and LeRoux (1965), Warren and Wallis (1971) and Richman and Whitcomb (1978) have reported on the rearing of P. maculiventris. The temp-

1/ This research was supported in part by the National Science Foundation and the Environmental Protection Agency, through a grant (NSDGB-34718 later known as BMS 75-04223), to the University of California. The findings, opinions, and recommendations expressed herein are those of the authors and not necessarily of the University of California, NSF, or EPA.

2/ Contribution No. 486, Bureau of Entomology, Division of Plant Industry.

3/ Dept. of Entomology and Pathology, Box 3BE, New Mexico State University, Las Cruces, NM 88003.

4/ Taxonomic Entomologist, Div. Plant Ind., P. O. Box 1269, Gainesville, FL 32602.

eratures and photoperiods differed markedly among these workers, consequently the time from egg to adult varied from 27-38 days, with the egg stage lasting 5-9 days. The shortest time was reported for Florida specimens (Richman and Whitcomb 1978). Food consumption, prey size, and energetics of P. maculiventris were detailed by Mukerji and LeRoux (1969a, b, c). The work by Couturier (1938) is a landmark study on the bionomics of this bug. Records in the FSCA indicate that P. maculiventris is active all year in peninsular Florida but does not appear until spring in the "panhandle" counties.

IDENTIFICATION: Eggs: (fig. 1). The eggs of P. maculiventris are approximately 1 mm in diameter, with long projections around the operculum that are especially characteristic of Podisus spp. Eggs are laid 17-70 at a time in loose oval masses.

1st instar: (fig. 2). Length 1.3-1.5 mm; head width including eyes 0.6 mm; humeral width 0.9 mm. The 1st instar nymph of P. maculiventris has a blackish head and thorax and reddish abdomen with black dorsal and lateral plates.

2nd instar: (fig. 3). Length 2.5-3.0 mm; head width 0.9 mm; humeral width 1.3 mm. As in other asopine nymphs the 2nd instar nymph begins to feed on other insects. This species is highly cannibalistic. The 2nd instar resembles the 1st instar.

3rd instar: (fig. 4). Length 3.5-4.0 mm; head width 1.3 mm; humeral width 2.0 mm. The 3rd instar nymph has a black head and thorax; the abdomen is reddish with black, orange and white maculations. The central bar-shaped markings are white and the lateral markings orange.

4th instar: (fig. 5). Length approximately 6 mm; head width 1.7 mm; humeral width 3.2 mm. The colorations and patterns of the 4th instar nymph are similar to that of the 3rd instar nymph, but the wing pads become noticeable.

5th instar: (fig. 6). Length 8-10 mm; head width 2.2 mm; humeral width 4.8 mm. The wing pads are prominent in the 5th instar, and the head and thorax become mottled with brown. The abdominal markings are white or tan, and black.

Adults: (fig. 7). Male length approximately 11 mm; head width 2.3 mm; humeral width including spines 7.6 mm. The adult of P. maculiventris resembles the adult of Alcaeorrhynchus grandis (Dallas) in being a mottled brown in color, but differs in size (A. grandis adults are over 15 mm long) and in having only 1 spine on each humeral angle. These spines project outward, not forward as in Podisus macronatus Uhler. Each hind femur of P. maculiventris has 2 blackish dots at apical 3rd. See standard works on Heteroptera for other key characters.

SURVEY AND DETECTION:

1. It has been collected throughout the year in Florida but is more common in the warmer months.
2. Prey is highly variable, but caterpillars and leaf beetle larvae form the main diet, so crops and wild hosts of Lepidoptera and Coleoptera are most likely places to find this predator.
3. Specimens can be collected by hand or net and submitted for identification in alcohol-filled vials or dry in pill boxes. In general, do not collect or kill these predators; let them exert their form of natural control.

LITERATURE CITED:

- Couturier, A. 1938. Contribution a l'étude biologique de Podisus maculiventris Say, prédateur américain du doryphore. Ann. Epiph. Phytogén. (n.s.) 4(1):95-165.
- Deitz, L. L., H. W. Van Duyn, J. R. Bradley, Jr., R. L. Rabb, W. M. Brooks, and R. W. Stinner. 1976. A guide to the identification and biology of soybean arthropods in North Carolina. North Carolina Agric. Exp. Sta. Tech. Bull. 238:1-264.
- Esselbaugh, C. O. 1949. Notes on the bionomics of some midwestern Pentatomidae. Ent. Americana (n.s.) 28(1-2):1-73.
- Hayslip, N. E., W. G. Genung, E. G. Kelsheimer, and J. W. Wilson. 1953. Insects attacking cabbage and other crucifers in Florida. Florida Agric. Exp. Sta. Bull. 534:1-57.
- Kirkland, A. H. 1896. Predaceous Hemiptera-Heteroptera, p. 392-403. In E. H. Forbush, and C. H. Fernald (eds.) The gypsy moth, Porthetria dispar (Linn.). Wright and Potter Printing Co., State Printers, Boston, Mass.
- Mukerji, M. K., and E. J. LeRoux. 1965. Laboratory rearing of a Quebec strain of the pentatomid predator, Podisus maculiventris (Say) (Hemiptera: Pentatomidae). Phytoprotection 46:40-60.
- Mukerji, M. K., and E. J. LeRoux. 1969a. The effect of predator age on the functional response of Podisus maculiventris to the prey size of Galleria mellonella. Canadian Ent. 101(3):314-327.
- Mukerji, M. K., and E. J. LeRoux. 1969b. A quantitative study of food consumption and growth of Podisus maculiventris (Hemiptera: Pentatomidae). Canadian Ent. 101(4):387-403.
- Mukerji, M. K., and E. J. LeRoux. 1969c. A study of energetics of Podisus maculiventris (Hemiptera: Pentatomidae). Canadian Ent. 101(5):449-460.
- Richman, D. B., and W. H. Whitcomb. 1978. Comparative life cycles of four species of predatory stink bugs (Hemiptera: Pentatomidae). Florida Ent. 61(3):113-119.
- Stoner, D. 1930. Spined soldier-bug reared on celery leaf-tyer. Florida Ent. 14(2):21-22.
- Warren, L. O., and G. Wallis. 1971. Biology of the spined soldier bug, Podisus maculiventris (Hemiptera: Pentatomidae). J. Georgia Ent. Soc. 6(2):109-116.
- Whitcomb, W. H. 1973. Natural populations of entomophagous arthropods and their effects on the agroecosystem. Proc. Mississippi Symp. Bio. Control. Univ. Press of Mississippi. P. 150-169.