BIOLOGY OF A PREDACEOUS STINKBUG, *STIRETRUS ANCHORAGO,* (HEMIPTERA: PENTATOMIDAE)[1]

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ABSTRACT

Stiretrus anchorago (F.) was collected from S. C. soybean fields and reared at 3 constant temperatures. Larvae of *Epilachna varivestis* Mulsant were used as prey for *S. anchorago* in life history studies.

Female adults lived an average of 46.0, 29.6, and 12.6 days; males 38.2, 24.8, and 22.4 days at constant temperatures of 18.3, 26.7, and 32.2° C, respectively. Mean numbers of eggs per female were 12.6, 57.3, and 15.0 at 18.3, 26.7, and 32.2° C, respectively.

The immature stages (eggs and instars) completed development in 42.8, 24.6, and 22.6 days at 18.3, 26.7, and 32.2° C, respectively.

Eggs laid by field collected females and held at 26.7° C were more viable (88.5%) than eggs from laboratory reared females (19.0%). Only infertile eggs were produced by females fed *Galleria mellonella* (L.) larvae exclusively.

Stiretrus anchorago (F.) has been reported to be the most numerous pentatomid attacking the Mexican bean beetle, *Epilachna varivestis* Mulsant, in Mexico and the southern part of the United States (Howard 1936). It has also been found in the central, Middle Atlantic, and New England states. Plummer and Landis (1932) found *S. anchorago* widely distributed in Mexico. Blatchley (1926) listed *S. anchorago* and *S. fimbriatus* (Say) as the only 2 species of *Stiretrus* found in the eastern U. S. The 2 species are easily separated as *S. anchorago* is black and red, black and orange-yellow, or violet while *S. fimbriatus* is brown-bronzed and dull yellow (Blatchley 1926).

Oetting and Yonke (1971) described the immature stages and biology of *S. fimbriatus,* and Howard (1936) briefly mentioned development and feeding of *S. anchorago.*

In order to better understand the biology and predatory potential of *S. anchorago,* laboratory studies were conducted from July until December, 1973.

MATERIALS AND METHODS

S. anchorago nymphs and adults were collected from soybean fields at Clemson University, Edisto Experiment Station, Blackville, S. C., and were returned to the laboratory for life history studies. Field collected adults were maintained in pint cardboard containers with screened lids and were fed *E. varivestis* larvae. Water was provided in a moist cotton ball placed on top of

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the screened lid. Approximately 5 pairs of adults were held per container. The stock colony was kept in a rearing room at 26.7±1.1° C, 60±10% RH, and a photoperiod of LD 14:10. Additional environmental chambers were set at 18.3±1.1 and 32.2±1.1° C, 60±10% RH and a photoperiod of LD 14:10.

Longevity and fecundity of adult *S. anchorago* were studied by placing a single pair of newly emerged adults in a plastic dish (7.8 cm diam × 4.6 cm). The dish contained a 2-ml vial glued in a vertical position to the dish bottom and filled with water which supported a single lima bean leaf. The leaf provided moisture for the pentatomids and foliage for the four 4th-stage Mexican bean beetle larvae which were provided daily as food. The bottom of each dish was covered with a thin layer of cotton to provide better footing for *S. anchorago*. Data were recorded every 24 hr.

Duration and survival of the nymphal stages were determined by placing individual nymphs in plastic containers as previously described. Nymphs were fed either 3rd or 4th-stage *E. varivestis*.

Duration of the egg stage was determined by placing individual egg masses in 100 × 15 mm plastic petri dishes which contained a moist cotton ball. The petri dish was then placed in the appropriate temperature regime and inspected daily until eclosion.

Results and Discussion

Females lived slightly longer than males at 18.3 and 26.7° C (Table 1). However, males appeared to be more tolerant of 32.2° C. Longevity of both sexes was extended with decreasing temperatures. Extreme temperatures (18.3 and 32.2° C) reduced egg production per female by ca. 75% below production at 26.7° C, although the number of days between oviposition and the preoviposition period was reduced as temperature was increased. *S. anchorago* produced only about 1/6 as many eggs as reported for *Podisus maculiventris* (Say) (Warren and Wallis 1971), another commonly-occurring predaceous pentatomid in S. C. soybeans.

Adults fed voraciously on *E. varivestis* larvae, but were reluctant to feed on larvae of *Galleria mellonella* L. When only *G. mellonella* larvae were supplied as food, *S. anchorago* produced very few eggs, none of which were viable. We also found that if starved, adults and immatures fed on larvae of the soybean looper, *Pseudoplusia includens* (Walker). This apparent preference for Mexican bean beetle larvae may partially explain the low relative abundance of *S. anchorago* although their numbers were greater late in the season which coincided with an increase in the numbers of Mexican bean beetles.

Male and female adults differed markedly in their weights, with males averaging 47 mg and females 74 mg (20 replicates each). Males were also easily recognized by depressed pubescent patches on either side of sternal segments 4-6.

Eggs produced by laboratory-reared females were less viable than eggs produced by field-collected females (Table 2). The highest temperature (32.2° C) reduced egg hatch as only 1.4% hatched while 19.0 and 25.0% hatched when held at 26.7 and 18.3° C, respectively.

First instars did not require food to develop to the second instar, but soon died if water was not provided. This was also noted by Oetting and Yonke (1971) in their study of *S. fimbriatus* and by Mukerji and LeRoux (1965) with *P. maculiventris*.

TABLE 1. LONGEVITY AND FECUNDITY OF ADULT *S. anchorago* AT CONSTANT TEMPERATURES.*

Temp. (°C)	N	Longevity (days)		Eggs/ ♀	No. egg masses/ ♀	Days between masses	Preoviposition period (days)	Oviposition period (days)
		♂	♀					
18.3	5	38.2±8.5	46.0±4.4	12.6±11.9	2.6±2.3	4.8±0.3	25.6±6.2	33.0±8.7
26.7	8	24.8±10.0	29.6±7.9	57.3±25.9	7.1±3.5	2.6±0.5	11.4±2.5	26.5±8.9
32.2	5	22.4±7.8	12.6±8.0	15.0±15.6	1.6±1.2	1.4±2.0	9.5±2.3	13.0±5.8

*Data in table are means ± standard deviations.

TABLE 2. DURATION OF EGG STAGE AND PERCENT ECLOSION OF *S. anchorago* HELD AT CONSTANT TEMPERATURES.

Source of females	Temp. (°C)	N	% Hatch	Mean time to eclosion ±SD (days)
	18.3	80	25.0	8.2±0.7
Lab	26.7	100	19.0	6.3±0.5
Reared	32.2	68	1.4	4.0±0.0
Field Collected	26.7	391	88.5	6.2±0.6

Duration and percent survival of the 5 instars are presented in Table 3. First instars had a higher survival rate (90%) than 5th instars (77.7%) at 18.3° C. However, at 32.2° C, 5th instar survivorship was considerably higher (63.6%) than that for 1st instars (30.4%).

Total duration of the nymphal stages was 34.6, 18.4, and 18.6 days for the temperatures 18.3, 26.7, and 32.2° C, respectively (Table 3). The time spent in each immature stage agrees in general with the report of Howard (1936), although his experiments were not conducted at constant temperatures. Time required for development of *S. anchorago* was also similar to that of *S. fimbriatus* (Oetting and Yonke 1971).

Further studies on prey consumption and preference will aid in understanding the role of *S. anchorago* as a predator in the soybean agroecosystem.

LITERATURE CITED

Blatchley, W. S. 1926. Heteroptera or true bugs of Eastern North America. Nature, Indianapolis. 116 p.

Howard, N. F. 1936. Parasites and predators of the Mexican bean beetle in the United States. USDA Circ. 418:1-12.

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(1):40-60.

Oetting, R. D., and T. R. Yonke. 1971. Immature stages and biology of *Podisus placidus* and *Stiretrus fimbriatus* (Hemiptera: Pentatomidae). Can. Ent. 103:1505-16.

Plummer, C. C., and B. J. Landis. 1932. Records of some insects predaceous on *Epilachna corrupta* Muls. in Mexico. Ann. Ent. Soc. Amer. 25:695-708.

Warren, L. O., and G. Wallis. 1971. Biology of the spined soldier bug, *Podisus maculiventris* (Hemiptera: Pentatomidae). J. Georgia Ent. Soc. 6(2):109-16.

TABLE 3. DURATION (DAYS ± SD) AND PERCENT SURVIVAL OF NYMPHAL INSTARS OF *S. anchorago* AT CONSTANT TEMPERATURES.

Instar	Temperature (°C)								
	18.3			26.7			32.2		
	N	Duration	% Survival	N	Duration	% Survival	N	Duration	% Survival
1	20	5.9 ± 0.7	90.0	27	3.0 ± 0.0	81.5	23	2.7 ± 0.5	30.4
2	8	7.4 ± 1.3	87.5	22	2.9 ± 0.4	90.9	23	3.2 ± 0.6	73.9
3	11	4.9 ± 0.7	90.9	20	3.6 ± 1.1	95.0	17	3.2 ± 1.0	76.5
4	10	5.4 ± 0.5	90.0	19	3.5 ± 1.1	94.7	13	3.5 ± 1.0	84.6
5	9	11.0 ± 2.4	77.7	18	5.4 ± 0.8	100.0	11	6.0 ± 2.2	63.6
	Total = 34.6			Total = 18.4			Total = 18.6		