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J. E. McPherson
Southern Illinois University

D. L. Tecic
Southern Illinois University

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NOTES ON THE LIFE HISTORIES OF *ACROSTERNUM HILARE* AND
COSMOPEPLA BIMACULATA (HETEROPTERA: PENTATOMIDAE)
IN SOUTHERN ILLINOISJ. E. McPherson and D. L. Tetic¹

ABSTRACT

The life histories of *Acrosternum hilare* and *Cosmopepla bimaculata* were studied in southern Illinois from May 1972 to September 1974 and from September 1992 to June 1995. Both species were bivoltine, overwintered as adults, and became active in early spring. The subsequent generations were characterized by marked overlapping of the nymphal instars. No active adults were found after early November.

Acrosternum hilare (Say) and *Cosmopepla bimaculata* (Thomas) are common phytophagous stink bugs that occur over much of America north of Mexico (Froeschner 1988, McPherson 1982); both are common in southern Illinois (McPherson 1982). Much has been published on their biology, including annual life cycles, food plants, laboratory rearing, immature stages, and predators and parasites (McPherson 1982). However, the life cycles have not been documented thoroughly throughout the bugs' geographic ranges.

Acrosternum hilare, the green stink bug, is of major economic importance, particularly as a pest of agricultural crops (e.g., soybeans) in the midwestern, southern, and southeastern United States (McPherson 1982). As would be expected, its annual life cycle has been studied in relation to its damage to these crops. However, it has been listed as both uni- and bivoltine, with reports of two generations per year from studies in more southern locations. For example, it has been reported as univoltine in Canada (Javahery 1990), Utah (Sorenson and Anthon 1936), central Illinois (Esselbaugh 1948), Ohio (Whitmash 1917), and Virginia (Underhill 1934); and bivoltine in Kansas (Wilde 1969), Arkansas (Miner 1966), and South Carolina (Jones and Sullivan 1982). Presuming this reported difference is correct, and reflects the geographic locations of these earlier studies, then southern Illinois would appear to be in a transition zone between these broad geographic areas.

The annual life cycle of *C. bimaculata* is poorly understood. Information consists primarily of scattered notes, although it apparently is univoltine in Alberta, Canada (McDonald 1968).

From May 1972 to September 1974, one of us (JEM) was involved in a survey of the Pentatomoidea of the LaRue-Pine Hills Ecological Area (now LaRue-Pine Hills Research Natural Area) (hereafter referred to as Pine Hills), which is located in Union Co. in southern Illinois (McPherson and Mohlenbrock 1976; also see same publication for description of Pine Hills). Two of the 49 species recorded were *A. hilare* and *C. bimaculata*. Both were

¹Department of Zoology, Southern Illinois University, Carbondale, IL 62901.

common as adults, but low numbers of nymphs made determination of the life cycles difficult. *A. hilare* was listed as apparently bivoltine and *C. bimaculata* as probably bivoltine.

From September 1992 to June 1995, the Pine Hills pentatomoids were resurveyed to ascertain changes that had occurred in this fauna during the intervening years. Once again, *A. hilare* and *C. bimaculata* were found to be common as adults. However, nymphs for each species also were collected in substantial numbers. As the data from the earlier survey still were available, they were combined with those from the resurvey to gain a better understanding of the annual life cycle of each species. Presented here, then, are the results of the combined surveys, including host plants.

MATERIALS AND METHODS

Collecting trips were taken weekly from September to November 1992, March to December 1993 and 1994, and May to June 1995. The March and November/December collecting periods were before the bugs had emerged from and after they had entered overwintering sites, respectively. Specimens were collected by hand-picking and sweeping. The disappearance of the insects in the fall generally corresponded to the senescence of host plants.

Host plants were identified primarily with keys by Mohlenbrock (1986) but also by Britton and Brown (1913), Gleason and Cronquist (1991), Jones (1963), and Mohlenbrock and Voigt (1959). The SIUC herbarium served as

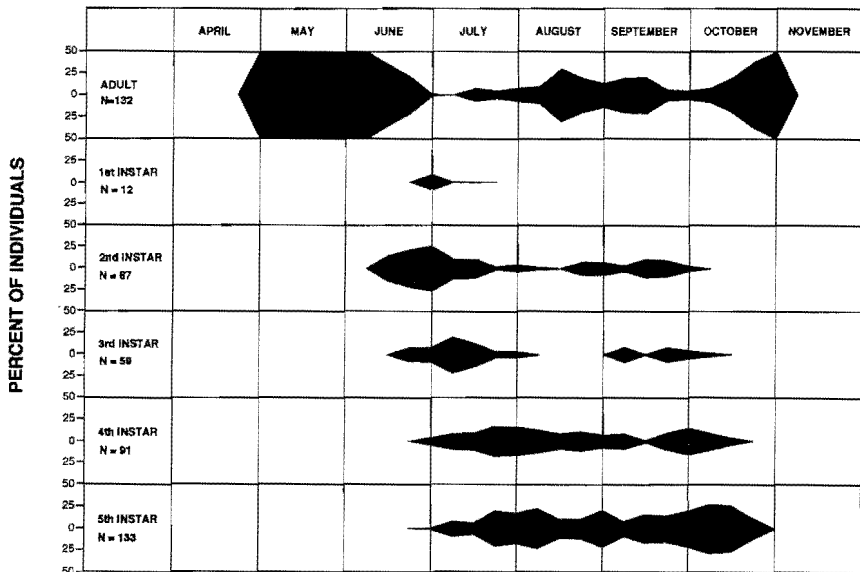


Fig. 1. Field life cycle of *A. hilare*. Percentage of individuals of each stage per sample collected during 1972–1974 and 1992–1995 seasons in Union County, IL.

reference for key characters and confirmation of species identification. Letter designations following host plants are as follows: A, adults; F, feeding; C, copulation; E, eggs; N, nymphs.

RESULTS AND DISCUSSION

Acrosternum hilare (Say)

Adults emerged from overwintering sites in late April–early May and were found continuously until late October–early November (Figs. 1–2). Although the subsequent nymphal instars were not found in perfect chronological sequence, their times of occurrence, numbers collected, and associated peaks of abundance indicate that *A. hilare* is bivoltine in southern Illinois. Thus, its life cycle is similar to that reported for the southern United States.

Host plants recorded during both surveys combined included *Allium canadense* L. (A), *Ambrosia trifida* L. (N), *Ceanothus americanus* L. (N), *Celtis occidentalis* L. (N), *Cercis canadensis* L. (A,N), *Cornus drummondii* Meyer (F,N), *Elymus virginicus* L. (A), *Eupatorium rugosum* Houttuyn (N), *Hybanthus concolor* (Forster) (A), *Impatiens capensis* Walter (A,F,N), *Impatiens pallida* Nuttall (A,F,N), *Perilla frutescens* Britton (F,N), *Rhus glabra* L. (A, F), *Rubus allegheniensis* Porter (N), *Teucrium canadense* L. (A), *Tradescantia subaspera* Ker (N), *Ulmus rubra* Muhlenberg (A), *Verbascum thapsus* L. (A, E, N), *Verbesina alternifolia* Britton (N), *Vicia villosa* Roth (F,N), and *Vitis aestivalis* Michaux (A, N).

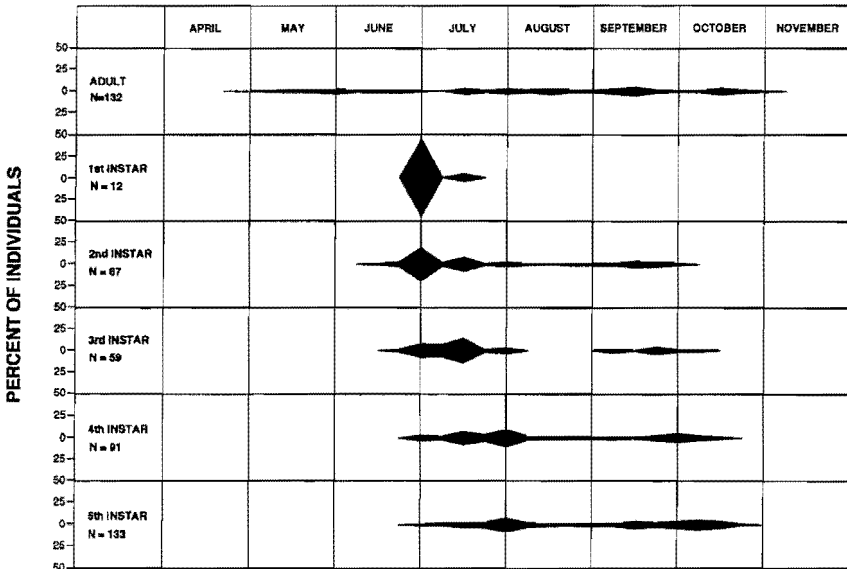


Fig. 2. Field life cycle of *A. hilare*. Percentage in each sample of total individuals of same stage collected during 1972–1974 and 1992–1995 seasons in Union County, IL.

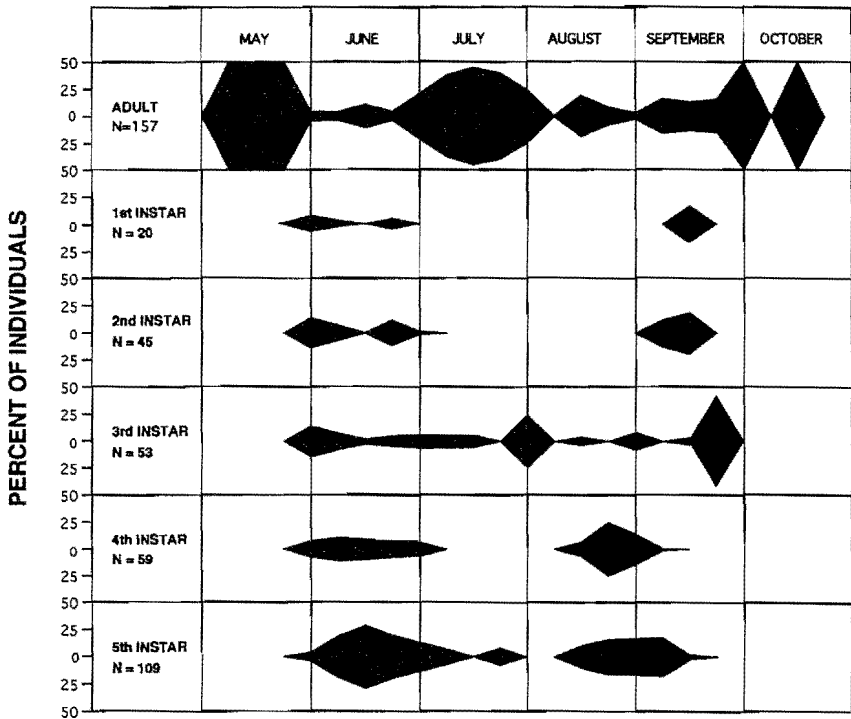


Fig. 3. Field life cycle of *C. bimaculata*. Percentage of individuals of each stage per sample collected during 1972–1974 and 1992–1995 seasons in Union County, IL.

Cosmopepla bimaculata (Thomas)

The annual life cycle of this species was not as clear as that found for *A. hilare*. Adults emerged from overwintering sites in early May and were found until mid-late October (Figs. 3–4). The subsequent occurrences of eggs and nymphs indicate this species is bivoltine. Eggs clusters were found from late May to early June on *V. thapsus* (n=7) and *Geranium carolinianum* L. (n=5) and from mid-to late August on *Scrophularia marilandica* L. (n=18). Nymphs of the first generation were found approximately from late May through late July, primarily on *V. thapsus* and *G. carolinianum*, with a peak of fifth instars (most frequently collected of the instars) in late June-early July. Nymphs of the second generation were found approximately from early August to late September, primarily on *S. marilandica* and *T. canadense*, with a peak of fifth instars in early September. The collection of young instars (1sts–3rds) concurrent or subsequent to the collection of the last fifth instars of the second generation may indicate a partial third generation but probably is the result of sampling error.

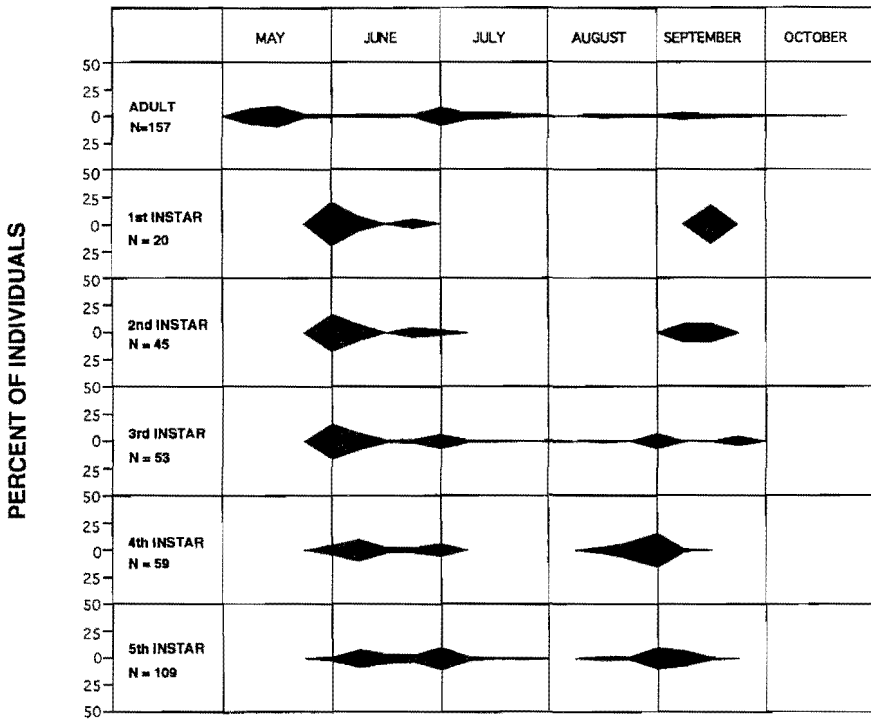


Fig. 4. Field life cycle of *C. bimaculata*. Percentage in each sample of total individuals of same stage collected during 1972–1974 and 1992–1995 seasons in Union County, IL.

Additional host plants recorded during both surveys combined included *Bromus inermis* Leyser (A), *Bromus secalinus* L. (A,F), *Campsis radicans* (L.) (A), *Daucus carota* L. (A,F), *Phleum pratense* L. (A), *Plantago lanceolata* L. (F,N), *Rumex crispus* L. (A,F), and *Veronica arvensis* L. (A,F,C).

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