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OBSERVATIONS OF THE HABITS OF *LYGAEUS KALMII ANGUSTOMARGINATUS* (HEMIPTERA: LYGAEIDAE) IN SOUTHERN MICHIGAN[1]

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Lygaeus kalmii Stål (Hemiptera: Lygaeidae) is an insect found throughout the eastern United States and Canada. There is extensive taxonomic literature on this insect (Stål, 1874; Townsend, 1887; Parshey, 1919, 1923; Slater and Knopf, 1969), but very little attention has been given to the rest of its biology. This study describes the habits of *kalmii* populations in southern Michigan.

Lygaeus kalmii angustomarginatus (Parshley) is the subspecies of *kalmii* common in the northeastern United States and southern Canada from the Atlantic Ocean to the 100th meridian. Its taxonomy was extensively reexamined by Slater and Knopf (1969). All observations described in this paper are based on populations of *angustomarginatus*, hereafter referred to as *Lygaeus kalmii.*

While the sub-specific descriptions of this insect have caused much discussion among taxonomists, I have found that the common name is more often misinterpreted by casual observors. *L. kalmii* is known as the lesser milkweed bug. Despite the assumptions suggested by this trivial name, *kalmii* is not limited to *Asclepias* in its food plants in Livingston, Monroe, St. Joseph, and Washtenaw counties in Michigan.

L. kalmii is a member of a variety of mid-succession communities. *Verbascum thapsus* L., *Rhus typhina* L., *Carduus* spp., and a variety of grasses and sedges are commonly present along with one to several species of *Asclepias.* Several species of annual angiosperms are also usually present.

When *kalmii* feeds upon milkweed, it is most often *Ascelpias syriaca* L. Nonmilkweed species which have been observed to serve as food sources include *Prunus arnoldiana* Rehd. (Townsend, 1887), *Ambrosia* sp. (Townsend, 1887), *Poa pratensis* (Simanton and Andre, 1935), *Rhus* sp., *Helianthus* sp., *Phaseolus* sp. and *Eranthis hyemalis* (L.), one of the earliest of spring flowers in southern Michigan.

Unlike *Oncopeltus fasciatus* (Dallas), the greater milkweed bug, *L. kalmii* is not a migratory insect. It overwinters in its usual habitat in quiescent state, having no true diapause. Simanton and Andre (1935) asserted that only adults overwinter and that they do not begin reproduction until the following April. Caldwell (1969) concurred, although he found nymphs in James County, Iowa, as late as December and fertile females as early as 1 March. Laboratory studies by Caldwell and Dingle (1971) indicated that *kalmii* is sterile at temperatures below 25°C. Were this the case in nature, the breeding season would be limited to four to five months each year in Michigan populations and fertile adults should not be found in the other months. While this life history fits the *O. fasciatus* populations found in southern Michigan, my observations indicated it is not accurate for the *L. kalmii* there.

As shown in Table 1, adult *kalmii* can be found any time of year when the ground is not covered with dense vegetation (July) or snow (December). The collections made during the winter months were made on sunny days when the adults can be found basking. It was noted that females were receptive to males in all seasons, being found in coitu or establishing this relationship within two minutes after having been placed with a male (observations made in the field). When winter-collected animals were placed under

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Table 1. Seasonal life history data on *Lygaeus kalmii* gathered in 1975 at selected sites in southern Michigan.

Date	Air Temp. in °C	Number Observed/10 m²		Females Receptive	First Eggs
		Adults	Nymphs		
29/1	10	21	0	yes	9/2
21/2	8	40	0	yes	23/2
20/3	–5	51	0	yes	28/3
30/4	12	8	0	yes	–
30/5	18	2	35	–	–
15/6	21	9	25	yes	16/6
15/8	30	75	37	yes	17/8
4/9	16	60	25	yes	6/9
6/10	23	8	3	–	–
3/11	16	10	0	yes	–
29/11	4	13	0	yes	–

laboratory conditions (20°C, 50% rel. hum.) with the natural photoperiod, they produced eggs within one week (Table 1). Newly emerged females reared at 25°C in the laboratory required a minimum five days to produce their first clutches (Hunt, 1975). These data suggest that the process of egg production is an on-going one, even during the winter months. Thus, although an ambient temperature below 25°C may retard egg production in the laboratory (Dingle and Caldwell, 1975), it does not block it completely in nature. This phenomenon may have one of several explanations. A brief exposure to the limiting temperature may be sufficient to complete the process, or the basking behavior of the adults may elevate their body temperatures above the ambient limiting temperature.

While I have found nymphs only during the warm weather months, the following observations lead me to conclude that nymphs are probably present year round. First, most adults taken during the winter months have bright, unscratched, clean cuticles. Second, two individuals taken on 22 February were found not to have completed teneral cuticle deposition, which normally takes place during the first five days post-metamorphosis in laboratory stocks reared at 25°C. Third, one individual taken on 13 April was in the process of cuticle tanning, which occurs immediately after metamorphosis. These three observations can best be explained by the assumption that all of these adults had very recently metamorphosed, having overwintered as nymphs. My laboratory observations confirm that fifth instar nymphs can survive temperatures as low as 0°C for periods of up to two weeks and as low as 7°C for period of up to two months. Also, normal development from embryo to fifth instar can occur at 20°C although it requires two months to complete (Hunt, 1975).

The adults and nymphs which leave their sub-surface hibernacula and become active during January through May have two major problems: where to find food and shelter. The solution to these is often the same, *Verbascum thapsus* L., the mullein plant, which is often found in milkweed communities in southern Michigan. Its thick, fuzzy leaves serve as an insulator for many insects, and they are also excellent traps for milkweed seeds. Thus they provide insulation, protection, and food during the months before *Asclepias* breaks ground.

Besides foraging for last year's milkweed seeds, *kalmii* feeds on other plant materials as they become available. *Eranthis hyemalis* blooms in mid-February in my collecting area. This is at a time when *Asclepias* seeds are difficult to find because of the snow cover which is usually present. In 1975, Thomas Friedlander and I observed adult *kalmii* systematically moving from nectary to nectary of this flower, stopping at each to feed and becoming coated with pollen in the process. This sort of opportunistic foraging

behavior continues throughout the spring and summer months, *kalmii* switching from host to host as each flowers. Such reliance upon flowers was not anticipated, inasmuch as *kalmii* is usually thought of as a seed feeder. When feeding upon seeds, *kalmii* first saws a hole through the seed coat using its four rasp-like stylets. Salivary enzymes are secreted onto the endosperm, and the liquidified material is then pumped into the esophagus through the beak's long food channel (Newcomer, 1948). My observations indicate that other liquids (water, nectar, sap) are also pumped in this manner, thus expanding the food choices of *kalmii* considerably. It is not until late June that the insect becomes common on *Asclepias* spp. and it cannot be considered abundant there until July and August. During these months, *kalmii* feeds on both the fluids and the developing seeds of *Asclepias*.

While adults are found on the upper foliage of plants as well as on the ground, the nymphal instars are most commonly restricted to either the ground or the lower shoots of plants. One exception is seen at the time of metamorphosis. At this time fifth instar nymphs leave the shelter of the ground cover and climb to the terminal buds of *Asclepias*. This behavior may have evolved as a protection from conspecifics. *L. kalmii* are usually phytophagous fluid-feeders. However, when the opportunity presents itself, cannibalism is not uncommon. Examples of opportunities include the presence of a freshly molted nymph or adult or a clutch of eggs. Within a clutch, nymphs develop synchronously until the fifth instar, but the onset of metamorphosis often varies as much as three days. While aposematic coloration works as a defense mechanism against other predators, it is ignored by conspecifics. Thus, the climbing behavior, only exhibited immediately to metamorphosis, removes the possible prey from the vicinity of its siblings.

CONCLUSIONS

Lygaeus kalmii angustomarginatus is a multivoltine resident of mid-succession plant communities of southern Michigan. It is mainly phytophagous, feeding on the fluids and seeds of a variety of angiosperms. It gives preference to *Asclepias* spp. when they are available and forages for dormant seeds during the winter. Nymphs and adults of *kalmii* are probably present in all seasons. During the winter, adults and probably nymphs as well utilize sub-surface hibernacula and the protection of *Verbascum* for surviving periods of temperature-regulated quiescense.

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