OBSERVATIONS ON HOST PLANT RELATIONSHIPS AND LARVAL NUTRITION IN *CALLOSAMIA* (SATURNIIDAE)[1]

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The genus *Callosamia* Packard is comprised of three closely related species that occur in eastern North America. *Callosamia promethea* (Drury) ranges from Canada to Florida and west to the Great Plains and accepts a wide range of hosts. *Callosamia angulifera* (Walker) occurs east of the Mississippi River, most commonly from Pennsylvania to Georgia, and feeds exclusivcly on tuliptree (*Liriodendron tulipifera* L.). *Callosamia securifera* (Maassen) is found only in swamps and pine woods in the coastal areas of the Southeast (Peigler, 1975) and feeds exclusively on sweetbay (*Magnolia virginiana* L.).

The purpose of the present paper is to discuss briefly some of my observations regarding the hosts of these moths. Because the Saturniidae are popularly reared, I have attempted to discover alternate foods for the two monophagous species so that they might be reared where the preferred foods are not available. Information is also presented on the acceptability of these host plants as a function of larval age.

Host Plants of *Callosamia promethea*

The wide variety of host plants of *C. promethea* accounts for the much wider geographical distribution of this species when compared with its congeners. This variety is also a factor in the ability of *C. promethea* to exist in many different types of habitat. Although the host range is comparatively wide, a preference for Lauraceae is evident, and no conifers or monocots are known hosts. Most of the *C. promethea* foods are aromatic plants such as sassafras (*Sassafras albidum* (Nutt.) Nees.), horse sugar (*Symplocos tinctoria* (L.) L'Her.), sweetgum (*Liquidambar styraciflua* L.), spicebush (*Lindera benzoin* (L.) Blume) and wild black cherry (*Prunus serotina* Ehrhart). Such plants may possess an important olfactory stimulus which initiates oviposition by females or feeding by newly eclosed larvae.

Callosamia promethea on horse sugar in coastal South Carolina was thought to represent a host-specific population (Ferguson, 1972), such as the population on lilac (*Syringa vulgaris* L.) around Milwaukee,

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Wisconsin. However, I have found cocoons in the former area on wild black cherry. I have also found cocoons on horse sugar and other more common hosts in Oconee Co., South Carolina. It is interesting to note the corresponding disjunct ranges of *C. promethea* and horse sugar (Radford *et al.*, 1964) in South Carolina, where both occur in the mountains and near the coast but are absent for over 100 mi. between. *Callosamia promethea* is not recorded on horse sugar anywhere else, except where I have found it in Brunswick Co., North Carolina.

Certain hosts given by Packard (1914) and cited by later authors need to be verified and may have been based on cocoons of larvae that did not spin on the actual food plant. These are barberry (*Berberis*), maple (*Acer*), azalea, birch (*Betula*) and arbor-vitae (*Thuja*), the latter two seeming especially questionable. I have tried to rear Pennsylvania *C. promethea* on azalea and *Acer rubrum* L., but the larvae died in first instar.

An unpublished host of *C. promethea* is sweetbay. Dale Schweitzer (pers. comm.) found *C. promethea* cocoons on sweetbay in Longwood Gardens, Kennett Square, Pennsylvania, where the tree is not native, and in the pine barrens of Burlington and Atlantic counties, New Jersey. However, I have tried several times to rear *C. promethea* (Pennsylvania stock) on sweetbay; the larvae always grew slowly and died within 15 days, usually in the second instar.

Host Plants of *Callosamia angulifera* and *C. securifera*

A brood of *C. angulifera* ♂ × *C. securifera* ♀ was reared on tuliptree and sweetbay, the two respective parent foods. The larvae on tuliptree matured faster and spun their cocoons almost two weeks before their siblings on sweetbay, although the size of adults in both groups was the same. The physiological advantage of tuliptree over sweetbay was also shown in broods of pure *C. angulifera* and *C. securifera.* Newly hatched larvae did not survive on the host plant of the opposite species, although some *C. securifera* were once reared from ova to adults on tuliptree (Jones, 1909). Later instar larvae of *C. angulifera* completed their larval development on sweetbay in most cases. However, *C. securifera* that fed for the first two weeks on sweetbay readily completed their larval life on tuliptree. For comparison, larvae from these same broods were reared exclusively on their preferred hosts.

In addition to the trials of *C. angulifera* and *C. securifera* on their two hosts, these species were tested on other species of Magnoliaceae, both American and Oriental. Newly hatched larvae of both species

were placed on potted seedlings or rooted cuttings of the two American plants, *Magnolia grandiflora* L. and *Illicium floridanum* Ellis., and the Asian *M. stellata* (Sieb. & Zucc.), *M. soulangeana* (*M. denudata* Desrouss. × *M. liliflora* Desrouss.), *Illicium anisatum* L. and *Kadsura japonica* (L.) Dun. All except the first of these plants have tender leaves. The larvae fed sparingly, wandered and, in all cases, died within a few days in the first instar. Unfortunately, none of the several American species of deciduous *Magnolia* were available.

The results obtained with these substitute hosts imply the lack of a phagostimulant rather than some essential nutrient(s). It is possible that the larvae would survive on such plants if they would feed freely. No evidence of toxicity was observed.

Further testing the following year gave an alternate host for *C. securifera*. Ten newly hatched larvae were put into a jar with leaves of wild black cherry, *Magnolia grandiflora*, sweetgum, buttonbush (*Cephalanthus occidentalis* L.) and more of the Magnoliaceae tried earlier. Again larvae fed sparingly and wandered, and all but two died within three days. Of the two that remained, one was a first instar which ate buttonbush and the other was a second instar which fed on *M. grandiflora*. Sweetgum also showed that feeding had occurred on it. Fresh leaves of buttonbush, *M. grandiflora*, and sweetgum were offered to these larvae, and they chose sweetgum. Soon after, they were sleeved outdoors on sweetgum. The smaller larva, which had eaten buttonbush, died in the third instar. The other larva produced a slightly undersized female moth the following month. If one attempts to rear *C. securifera* on sweetgum, most or all of the larvae would be expected to die early. I do not believe this tree ever serves as an alternate host in nature.

Lepidopterists have found that *C. angulifera* will sometimes accept spicebush, sassafras, and wild black cherry (Eliot & Soule, 1902). However, since these plants are inferior substitutes for tuliptree, larvae on them would probably not grow as rapidly or as large. I seriously doubt that these alternate hosts are ever utilized in nature.

DISCUSSION

The Magnoliaceae is a very old angiosperm family with fossils dating to the Cretaceous period. The widest ranging species of the family in North America is tuliptree, the food of *C. angulifera*. The nocturnalism of *C. angulifera* suggests that it is closest to the ancestral form of the genus. Tuliptree is the best choice for rearing any *Callosamia* hybrid and is presently the only "common denominator" food for all three

species. Therefore, it is probable that tuliptree is the original food for the genus.

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TIME VARIATIONS OF PUPAL STAGE OF *EUPACKARDIA CALLETA* (SATURNIIDAE)

In December 1971 a friend presented me with 16 pupae of *Eupackardia calleta* (Westwood) which he had found while trimming shrubbery in his yard. These pupae had undoubtedly come from the same egg hatch, probably in the early fall of 1971, because all were found on the same bush and several on the same limb. I was never able to find out from what plant he collected the pupae. All the pupae appeared to be alive and in good condition.

Eight of the pupae were sent to a friend and eight I kept for myself. Of the eight sent away two males emerged in September 1972, also one pupa produced several parasitic flies during the same month. In March 1973 one female emerged and one pupa had died and dried up. I have no record as to what has happened to the other three remaining pupae.

A record of the eight pupae I kept for myself is as follows. One male emerged in August 1972 and another male in September 1972. In March 1973 one female emerged and on 19 August 1974 one male emerged. It was at this time, August 1974, that I noted that one of the four remaining pupae had died. On 1 September 1975 one male emerged and on 25 September 1975 a large female emerged. Of the six adults which have emerged the development time from egg to adult ranged from approximately 1–4 years. The remaining pupa recently has lost some of its weight and probably has died.

All of my pupae have been kept in the same environmental conditions, and all of the adults have been normal and healthy.

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