

GENERAL NOTES

INSECT PARASITES AND PREDATORS OF HACKBERRY BUTTERFLIES (NYMPHALIDAE: *ASTEROCAMPA*)

During the course of collecting and rearing immature stages of hackberry butterflies (Nymphalidae: *Asterocampa*) over the past five years, a number of arthropod parasites and predators were encountered. These arthropods have been preserved or their behaviors recorded in hopes of understanding some of the selective pressures which might affect the courses of evolution for *Asterocampa* species. This note is a report of insect species which have a greater or lesser effect on survival of the various stages of the butterflies.

Identifications were made by the author with the aid of the cited references and the reference collection at Texas A&M University. Help in the collection or identification of specimens, or review of the manuscript was provided by L. G. Friedlander, P. Davis, D. and D. Paschley, and Drs. H. R. Burke, J. C. Schaffner, and R. Wharton.

The most frequently encountered parasites of hackberry butterflies are the scelionid egg parasites, which occur in all *Asterocampa* observed. Stink bugs, such as the one figured by Langlois and Langlois (1964, Ohio J. Sci. 64:1-11, fig. 11), are the most common predators. Only one other insect (at the generic level) has been positively reported to attack *Asterocampa*, the larval parasite, *Hyposoter fugitivus* (Say) (Hym.: Ichneumonidae) (Townes, 1945, Mem. Amer. Entomol. Soc. No. 11, Pt. II, pp. 479-925).

Parasites Reared from Eggs

1. Hym.: Eulophidae: *Tetrastichus* spp. (Boucek, 1977, Bull. Entomol. Res. 67:17-30): *A. clyton* (Boisduval & Leconte) egg masses (TEXAS: Brazos Co., 14-VII-79; Menard Co., 20-VI-79).

2. Hym.: Scelionidae: *Telenomus* spp. (Masner, 1976, Mem. Entomol. Soc. Canada No. 97, 87 pp.): *A. argus* (Bates) egg mass (MEXICO: Oaxaca, 11-VII-81); *A. celtis* (Boisduval & Leconte) eggs (TEXAS: Hidalgo Co., 4-VI-81); *A. clyton* egg masses (ARIZONA: Pima Co., 23-VIII-80; TEXAS: Brazos Co., 14-VII-79; Menard Co., 20-VI-79; San Patricio Co., 3-VI-81; Travis Co., 14-X-77; Waller Co., 8-VII-79; VIRGINIA: Westmoreland Co., 22-VI-80); *A. leilia* (Edwards) eggs (TEXAS: Starr Co., 6-VI-81).

Parasites Reared from Larvae

1. Dip.: Tachinidae: *Euphorocera* prob. *floridensis* Townsend (Aldrich and Webber, 1924, Proc. U.S. Natl. Mus. 63:1-90; Cole, 1969, The flies of western North America, Univ. Calif. Press, Berkeley and Los Angeles, 693 pp.): *A. celtis* last stage larva (TEXAS: Austin Co., 6-VIII-79).

2. Dip.: Tachinidae: *Lespesta* prob. *aletiae* (Riley) (Beneway, 1963, Univ. Kansas Sci. Bull. 44:627-686; Cole, 1969, loc. cit.): *A. clyton* late stage larvae (TEXAS: Gonzales Co., 30-IX-79).

3. Hym.: Braconidae: *Cotesia* spp. (Mason, 1981, Mem. Entomol. Soc. Canada No. 115, 147 pp.): *A. clyton* third stage larvae (TEXAS: Gonzales Co., 21-IX-79; Hidalgo Co., 13-XI-77; Jeff Davis Co., 15-VIII-81; Uvalde Co., 23-IX-79).

4. Hym.: Braconidae: *Meteorus* spp. (Tobias, 1966, Entomol. Rev. 45:348-358): *A. clyton* larvae¹ (TEXAS: Goliad Co., 6-VI-81; Travis Co., 29-V-78, 20-VII-79).

5. Hym.: Eulophidae: *Elachertus* sp. (Peck et al., 1964, Mem. Entomol. Soc. Canada No. 34, 120 pp.): *A. celtis* last stage larva (TEXAS: Travis Co., 21-VI-78); *A. clyton* middle stage larvae (TEXAS: Brazos Co., 14-VII-79; Travis Co., 28-X-77).

6. Hym.: Ichneumonidae: *Microcharops tibialis* (Cresson) (Townes, 1969, Mem. Amer. Entomol. Inst. No. 13, 307 pp.; Townes and Townes, 1966, Mem. Amer. Entomol. Inst. No. 8, 367 pp.): *A. clyton* third stage larva (LOUISIANA: St. Tammany Parish, 30-III-82).

Parasites Reared from Pupae

1. Hym.; Chalcididae: *Brachymeria* sp. (Howard, 1885, U.S. Dept. Agric., Bur. Entomol., Bull. No. 5, 47 pp.): *A. clyton* pupa (TEXAS: Gonzales Co., 15-X-77).
2. Hym.; Ichneumonidae: *Itoplectis conquisitor* (Say): *A. clyton* pupa (TEXAS: Dimmit Co., 21-IV-79).

Predators

1. Hem.: Pentatomidae: *Apateticus cynicus* Say (Slater and Baranowski, 1978, How to know the true bugs (Hemiptera-Heteroptera), Wm. C. Brown Co. Publ., Dubuque, Iowa, 256 pp.): *A. clyton* early stage larvae (TEXAS: Travis Co., 26-III, 24-V, 18-X, 31-X-77).
2. Hem.: Pentatomidae: *Apateticus lineolatus* (Herrick-Schaeffer) (det. J. Eger): *A. clyton* larvae (TEXAS: Cameron Co., 13-III-79).
3. Hem.: Pentatomidae: *Podisus maculiventris* (Say) (Slater and Baranowski, 1978, loc. cit.): *A. clyton* early stage larvae (TEXAS: Travis Co., 24-V, 1-VI, 23-28-X-77, 23-V-78).
4. Hem.: Reduviidae: *Sinea* prob. *sanguisuga* Stal: *A. clyton* second stage larva (TEXAS: Travis Co., 29-V-78).
5. Hem.: Reduviidae: *Sinea spinipes* (Herrick-Schaeffer) (Slater and Baranowski, 1978, loc. cit.): *A. clyton* early stage larvae (TEXAS: Travis Co., 28-X-77).
6. Hym.: Vespidae: *Polistes exclamans* Viereck: *A. celtis* fifth stage larva (TEXAS: Travis Co., 24-IV-78); *A. clyton* third stage larvae (TEXAS: Travis Co., 25-X-77).
7. Hym.: Vespidae: *Vespa* sp.: *A. clyton* third stage larvae (TEXAS: Travis Co., 31-X-77).

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¹ None were reared from larvae. One female *Meteorus* was observed to oviposit in *A. clyton* larvae. One female hyperparasite of *Meteorus* was observed to oviposit in larvae of the same species. One of these hyperparasites was reared from *Meteorus* cocoons taken in close association with *A. clyton* larvae.

ITHOMIINE BUTTERFLIES ASSOCIATED WITH NON-ANTBIRD DROPPINGS IN COSTA RICAN TROPICAL RAIN FOREST

Adult females of *Mechanitis* and the allied genus *Melinaea* (Brown, 1977, Syst. Entomol. 2:161-197) feed on the fresh droppings of birds (primarily antbirds) that follow swarms of army ants through tropical rain forest in Costa Rica (e.g., Ray and Andrews, 1980, Science 210:1147-1148). These authors conclude that bird droppings resulting from birds following army ant swarms provide a predictable nutrient resource for these female butterflies, and that the exploitation of this resource may be related, in some yet to be studied way, to egg production. In this note I extend the findings of Ray and Andrews (op. cit.) to the association of female ithomiines of various genera to fresh droppings of bird species not associated with army ant swarms in Costa Rican tropical rain forest. I conclude that fresh bird droppings of any kind in such a habitat provide a resource exploited by ithomiines on an opportunistic basis.

Between 1972 and 1980, I conducted several studies of various butterfly species in a small parcel of relatively undisturbed mixed primary and secondary-growth tropical rain forest (premontane tropical wet forest) at "Finca La Tigra", near La Virgen (220 m elev.), Heredia Province, Costa Rica. The site is about 20 km from the "Finca La Selva"