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*Choristoneura houstonana* (Lepidoptera: Tortricidae) on  
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# Parasites, Predators, and Other Arthropods Associated with *Choristoneura houstonana* (Lepidoptera: Tortricidae) on *Juniperus* Species in Kansas<sup>1</sup>

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## Abstract

One parasitic dipterous species and 27 parasitic hymenopterous species were collected. Parasites were primarily collected by mass-rearing host larvae on cut host plant foliage in the laboratory or by rearing larvae on artificial diet. The tachinid *Nemorilla pyste* (Walk.) and five hymenopterous species, *Glypta* n. sp. (Ichneumonidae), *Campoplex* sp. (Ichneumonidae), *Agathis acrobasis* (Cushman) (Braconidae), *Elasmus atratus* How. (Eulophidae), and *Catolaccus aeneoviridis* Girault (Pteromalidae), were definite parasites, and biological notes are given. Collection data are also given for the other 22 species.

One reduviid predator, *Zelus socius* Uhler, and six spiders were observed feeding on *C. houstonana*.

## Introduction

While the biology of *Choristoneura houstonana* (Grote), a pest of juniper in windbreak and ornamental plantings in western Kansas, was being studied, a number of parasites, predators, and associated arthropods were collected. Some were definite parasites and predators, while the relationship between *C. houstonana* and the others, termed “associates,” was not determined.

Powell (1962) listed four parasites of *C. houstonana* in California: one eulophid, *Tetrastichus coeruleus* Ashm., and three ichneumonids, *Glypta* sp., *Campoplex* sp. nr. *hyalinus* (Prov.), and *Pristomerus* sp.

## Materials and Methods

Foliage infested with larvae and pupae of *C. houstonana* was collected periodically in the summer of 1965 and placed in a screen wire cage, and parasites were collected when they emerged. More intensive parasite collecting began in March 1966. Overwintering larvae were collected, removed from hibernacula within mined juniper leaves, and reared on artificial diet in plastic jelly cups.<sup>2</sup> When parasitic larvae were observed, notes on their biology were taken daily. Foliage infested with late instar larvae and eggs was collected in May, June, July, and August, 1966, and placed in 20-gal garbage cans or cardboard boxes with a glass jar attached near the top, into which newly emerged parasites were attracted by light.

In July 1966, parasites hovering over juniper trees heavily infested with *C. houstonana* pupae were collected with an insect net.

Parasites were identified by specialists of the Insect Identification and Parasite Introduction Research Division, Entomology Research Division, Agricultural Research Service, U.S. Department of Agriculture. Ichneumonidae were identified by L. M. Walkley; Chalcidoidea by B. D. Burks; Scelionidae, Braconidae, and Platygasteridae by P. M. Marsh; and Tachinidae by C. W. Sabrosky.

Insect predators feeding on *C. houstonana* larvae on foliage in the laboratory were collected. The Reduviidae were identified by R. C. Froeschner of the Smithsonian Institution. Spiders were collected from infested foliage brought to the laboratory for *C. houstonana* and parasite rearing or were shaken into a white cloth placed around the base of an infested tree and placed in ethanol. They were identified by Harriet Exline of Rolla, Mo.

## Results

One dipterous and 27 hymenopterous parasite species were collected. Six were observed parasitizing *C. houstonana*. One insect and 22 spider predators were collected. The insect and six species of spiders were seen preying upon *C. houstonana*.

### *Parasites*

#### **Diptera, Tachinidae**

*Nemorilla pyste* (Walk.): 1,000+ males and females ex mass rearing material, and larvae reared on artificial diet, collected in Smith, Phillips, Rooks, Pawnee, Barton, and Pratt counties, 3 June–7 July 1966; emerged June–August 1966. As many as eight white, macrotype eggs were deposited on one larva. Host larvae with one to eight eggs each were reared in the laboratory to determine how many adults would emerge per host larva. Two adults emerging from one larva was the only instance of more than a single parasite per host. Parasite eggs were deposited mostly on late instar larvae, present in early June. Eggs were first observed in Pawnee County in 1966 on 3 June when 3.85% of the larvae were infested. On 8 June, 22.8% were infested and by 16 June, 54% of the larvae had parasite eggs.

Eggs were deposited mostly on the head (12.6%), prothorax (42.4%), and mesothorax (33.6%) (Table I). Eggs were laid on the ventral, lateral, and dorsal areas in approximately

equal numbers. Eggs were attached to the larval cuticle with the long axis parallel to the surface of the host skin. An *N. pyste* larva, upon hatching, emerged from a break at one end of the egg just above the area where it was attached. Infested host larvae had dark spots in the epidermal area, which appeared to be damaged tissue. Apparently these were areas where the parasite larvae entered the body of the host. The fully grown *N. pyste* larva left the host pupa through a break which it made between two abdominal segments on the host dorsum. It then moved to a location between the host pupa and the cocoon wall and pupated. Pupation lasted about 1 week. Occasionally a parasite destroyed the last larval stage in the laboratory and then pupated, but usually it emerged from the host pupa. The life cycle on *C. houstonana* requires about 1 month.

**Table I.** Per cent of *Nenzorilla pyste* eggs on the head, thoracic and abdominal segments 1–10 of *C. houstonana* larvae, collected in Kansas, 1966

Date	County	Location of eggs								
		Head	Thorax			Abdomen				
			Pro-	Meso-	Meta-	1	2	3	4	5–10
June 8	Pawnee	29.7	46.0	18.9	5.4	0.0	0.0	0.0	0.0	0.0
June 16	Pawnee	18.3	25.1	45.9	8.9	0.8	0.0	0.8	0.0	0.0
June 23	Pawnee	10.0	71.0	13.0	6.0	0.0	0.0	0.0	0.0	0.0
June 23	Smith	5.0	20.0	40.0	15.0	15.0	0.0	0.0	5.0	0.0
June 23	Pratt	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
Average		12.6	42.4	33.6	7.1	3.1	0.0	0.2	1.0	0.0

### Hymenoptera, Ichneumonidae

*Glypta* n. sp.: 14 ex mass rearing material and host larvae reared on artificial diet collected in Pawnee and Pratt counties, 25 March–15 July 1966; emerged 1 June–2 July (host on artificial diet) and 7 July–1 August 1966 (mass rearing). Parasite larvae emerged from either eighth or ninth instar host larvae. The parasite in preparation for pupation spun a few strands of silk and attached the posterior end of the abdomen to it. It pupated 4 days after leaving the body of the host larva. Four days after molting to the pupal stage, the pupa darkened in color. The pupal stage lasted 8 days. This may be the same *Glypta* sp. Powell (1962) reared from *C. houstonana* in California.

*Campoplex* sp.: 2 ex mass rearing material and larva reared on artificial diet collected in Smith and Pawnee counties, 11 April and 23 June 1966; emerged 8 July 1966. The parasite reared from the host on artificial diet died in the pupal stage. It emerged from a seventh instar host larva and pupated in a two-layered silken cocoon. A *Campoplex* sp. nr. *hyalinus* (Prov.) was reared from a penultimate instar *C. houstonana* by Powell (1962).

### Braconidae

*Agathis acrobasis* (Cushman): 64 ex mass rearing material larvae on artificial diet and larvae reared on seedling juniper collected in Rooks, Pawnee, and Pratt counties, 25 March–15 July 1966; emerged 17 May 1966 (host on artificial diet) and 1 July–2 August 1966 (mass rearing). This parasite apparently overwinters in *C. houstonana*. The two parasites reared

from hosts feeding on diet and a seedling juniper in the laboratory destroyed seventh instar larvae. The pupal stage lasted about 10 days.

### **Eulophidae**

*Elasmus atratus* How.: 9 males and 8 females ex mass rearing material and larvae reared on artificial diet, collected in Pawnee and Pratt counties, 16 May–8 June 1966; emerged 3 June (host on artificial diet)–16 June 1966 (mass rearing). One parasite emerged from a fifth and another from a seventh instar larva. Pupal stage lasted 7 days.

### **Pteromalidae**

*Catolaccus aeneoviridis* Girault: 11 males and 3 females ex mass rearing material and host larvae reared on artificial diet, collected in Pawnee and Pratt counties, 16 May–15 July 1966; emerged 24 June–15 July 1966. This species was considered a secondary parasite of *C. houstonana* because one adult parasite emerged from what appeared to be a dipterous pupa, probably *N. pyste*, which was located within a *C. houstonana* pupa. The adult emergence hole measured 0.87 × 0.68 mm and was located in the center of the *C. houstonana* pupa and nearest to the posterior end of the primary parasite pupa.

### *Associated Parasites*

### **Ichneumonidae**

*Itopectis conquisitor* (Say): 32 ex mass rearing material collected in Rooks and(or) Pawnee County, June–July 1965; emerged June–July 1965. *I. conquisitor* was a very common parasite in 1965, but no specimens were collected in 1966. It is parasitic on many lepidopterous larvae.

*Pimpla aequalis* (Prov.): 2 females ex mass rearing material collected in Rooks County, 15 July 1966; emerged prior to 10 August 1966.

*Temelucha* sp. (? or spp.): 12 ex mass rearing material collected in Smith, Rooks, Pawnee, and Pratt counties, 1 June–15 July 1966; emerged 6 June–4 August 1966.

*Toxophoroides albomarginatus albomarginatus* (Cress.): 5 ex mass rearing material collected in Smith, Rooks, Pawnee, and Pratt counties, 23 June–6 July 1966; emerged 12 July–30 July 1966.

*Pristomerus* sp.: 1 female ex mass rearing material collected in Smith County 23 June 1966; emerged prior to 10 August 1966. Powell (1962) reared one female from *C. houstonana*-infested juniper foliage.

### **Braconidae**

*Hypomicrogaster zonaria* (Say): 1 ex mass rearing material, collection locality unknown, 16 May 1966; emerged 26 May 1966.

*Apanteles canarsiae* Ashm.: 1 ex mass rearing material collected in Pawnee County, 16 May 1966; emerged on an undetermined date during May or June 1966.

*Apanteles griffini* Vier.: 5 ex mass rearing material collected in Pawnee and Pratt counties, 16 May–16 June 1966; emerged 23 May–24 June 1966.

*Chelonus (Microchelonus) sp.*: 2 ex mass rearing material collected in Pawnee County, 1 June 1966; emerged 11 June 1966.

### **Chalcididae**

*Brachymeria hammri* (Cwfd.): 4 males and 1 female ex mass rearing material and collected with an insect net in Rooks and Pawnee counties 15 July 1966; mass-reared insects emerged 23 July 1966.

*Brachymeria ovata* (Say): 18 males and 3 females ex mass rearing material and collected with an insect net in Smith, Pawnee, Rooks, and Pratt counties, 6 July–15 July 1966; emerged 11 July–15 July 1966. *B. ovata* was collected with an insect net over *J. virginiana* infested with *C. houstonana* pupae, 15 July 1966, at 2 p.m. in Rooks County.

*Brachymeria compsilurae* (Cwfd.): 1 male ex mass rearing material collected at either Rooks or Pawnee County, June 1965; emerged on an undetermined date during June or July 1965.

*Spilochalcis flavopicta* (Cress.): 2 males and 3 females ex mass rearing material collected in Smith and Rooks counties 7 July–15 July 1966; emerged 13 July–23 July 1966.

### **Encyrtidae**

*Chrysophagus compressicornis* Ashm.: 1 female ex mass rearing material collected in Pawnee County, 16 May 1966; emerged 31 May 1966.

*Copidosoma sp.*: 1 ex mass rearing material collected in Smith County, 15 July 1966; emerged prior to 10 August 1966.

### **Eurytomidae**

*Eurytoma sp.*: 4 males and 6 females ex mass rearing material collected in Smith, Rooks, and Pawnee counties, 15 July 1966; emerged 18 July–23 July 1966.

### **Eulophidae**

*Elachertus marylandicus* Girault: 4 females ex mass rearing material collected in Pawnee County, 15 July 1966; emerged prior to 10 August 1966.

*Dimmockia incongrua* (Ashm.): 6 ex mass rearing material collected in Pawnee County, 10 May 1966; emerged on an undetermined date during May or June 1966.

*Tetrastichus coerulescens* Ashm.: 1 female ex mass rearing material collected in Pratt County, 1 June 1966; emerged 11 June 1966. Powell (1962) reared *T. coerulescens* from *C. houstonana* and he stated that according to Dr. B. D. Burks it probably was a secondary associate.

*Tetrastichus sp.*: 1 female ex mass rearing material collected in Pawnee County, 16 May 1966; emerged 31 May 1966.

### **Pteromalidae**

*Dibrachys cavus* (Wlkr.): approximately 52 ex mass rearing material collected in Pawnee County, 23 June–15 July 1966; emerged 7 July–19 July 1966.

### **Torymidae**

*Torymus ebrius* (O.S.): 2 females ex mass rearing material collected in Pawnee County, 16 May 1966; emerged 27 May 1966.

*Torymus* sp.: 4 males ex mass rearing material collected in Pawnee County, 16 May 1966; emerged 23 May–5 June 1966.

### **Eupelmidae**

*Eupelmus* sp.: 1 male ex mass rearing material collected in Pratt County, 16 May 1966; emerged 19 June 1966.

### **Mymaridae**

*Acropolynema bifasciatipennis* (Girault): 1 male ex mass rearing material collected in Pratt County, 16 June 1966; emerged 19 June 1966.

### **Scelionidae**

*Telenomus* sp.: 4 ex mass rearing material collected in Smith and Rooks counties, 7 July–17 July 1966; emerged 11 July–20 July 1966.

*Idris* sp.: 6 ex mass rearing material collected in Pawnee County, 30 July 1966; emerged prior to 10 August 1966.

### **Platygasteridae**

*Amblyaspis* sp.: 2 ex mass rearing material collected in Smith County, 15 July 1966; emerged prior to 10 August 1966.

### **Predators**

#### **Insecta, Reduviidae**

*Zelus socius* Uhler: 2 nymphs and 1 adult ex foliage returned to the laboratory from Pawnee County, 29 March and 7 July 1966. Nymphs were observed feeding on half-grown *C. houstonana* larvae. Adult was feeding on an adult *C. houstonana*.

#### **Arachnida, Thomisidae**

*Xysticus ferox* (Hentz.): 1 female, collection locality and date unknown. It was feeding on an adult in a parasite collection jar in the laboratory.

### **Dictynidae**

*Dictyna bellans* Chamberlin: 3 males, 19 females, and 7 immatures collected in Smith, Pawnee, and Rooks counties ex trees and ex foliage returned to the laboratory, 14 April–23 June 1966. Two females and one immature were observed feeding on half-grown larvae in the laboratory.

*Dictyna volucripes* Keyserling: 6 females and 1 immature collected in Pawnee County ex trees and ex foliage returned to the laboratory, 16 May–23 June 1966. One immature was observed feeding on a half-grown larva in the laboratory.

### **Epeiridae**

*Eustala ? anastera* (Walckenaer): 1 immature collected in Pawnee County ex tree, July 1966. It was feeding at night on an adult caught in a spider web.

### **Salticidae**

*Eris vitis* (Cock.): 1 male, 1 female, and 3 immatures collected in Smith, Rooks, and Pawnee counties ex trees and ex foliage; returned to the laboratory, 8 June–23 June 1966. One immature was observed feeding on a half-grown larva in the laboratory.

*Phidippus rimator* (Walckenaer): 3 immatures ex foliage returned to the laboratory from Smith, Pawnee, and Pratt counties, collection date unknown. One specimen was observed feeding on a half-grown larva in the laboratory.

### **Associated Predators**

#### **Arachnida, Therididae**

*Theridion murarium* Emerton: 6 males, 16 females, and 7 immatures collected in Pawnee County ex trees, 15 March–15 June 1966.

*Theridion* sp.: 1 immature collected in Pawnee County ex tree, 2 May 1966.

#### **Thomisidae**

*Misumenops* sp.: 3 immatures collected in Pawnee and Pratt counties ex trees, 16 May–16 June 1966.

*Philodromus cespiticolis* (Walckenaer): 1 female and 5 immatures collected in Rooks and Pawnee counties ex trees, 16 May–23 June 1966.

*Philodromus keyserlingi* Marx: 2 females and 1 immature collected in Smith and Pawnee counties ex trees, 2 May–23 June 1966.

#### **Argiopidae**

*Argiopidae* sp.: 1 immature collected in Pawnee County ex trees, 16 May 1966.

#### **Clubionidae**

*Chiracanthium inclusum* (Hentz): 1 immature ex foliage returned to the laboratory from Pratt County, 16 June 1966.

#### **Dictynidae**

*Dictyna reticulata* Gertsch and Ivie: 1 male, 1 female, and 1 immature collected in Rooks and Pawnee counties ex trees, 15 June–23 June 1966.

#### **Gnaphosidae**

*Drasyllus ?* sp.: 1 immature collected in Pawnee County ex trees, 2 May 1966.

#### **Oxyopidae**

*Oxyopes scalaris* Hentz: 3 males and 1 female collected in Pawnee County ex trees, 5 May–1 June 1966.



### **Salticidae**

*Gertschia noxiosa* (Hentz): 1 male collected in Pawnee County ex trees, 16 May 1966.

*Habrocestum pulex* (Hentz): 1 male ex foliage returned to the laboratory from Pawnee County, 16 May 1966.

*Metahidippus galathea* (Walckenaer): 2 females collected in Pawnee County ex trees, 1 May–26 June 1966.

*Phidippus audax* (Hentz): 2 immatures ex foliage returned to the laboratory from Pawnee and Pratt counties, 23 June–25 June 1966.

*Phidippus incertus* Peckham: 1 immature ex foliage returned to the laboratory, collection locality unknown, 24 June 1966.

### **Linyphiidae**

*Frontinella communis* (Hentz): 1 immature ex foliage returned to the laboratory from Rooks County, 14 April 1966.

### **Notes**

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2. Premium Plastics Co., 2440 S. Indiana Ave., Chicago, Ill., No. 6916.

### **Reference**

- Powell, J. A. 1962. Host-parasite relationships of California Tortricinae (Lepidoptera: Tortricidae). *The Pan-Pacific Entomologist* 38: 131–140.