OBSERVATIONS ON *ARCHIPS CERASIVORANUS* (FITCH) (TORTRICIDAE: LEPIDOPTERA) AND CERTAIN PARASITES (DIPTERA: HYMENOPTERA)[1]

W. V. BALDUF

University of Illinois, Urbana, Illinois[2]

ABSTRACT

The ugly-nest caterpillar, *A. cerasivoranus* completes one cycle in a year at Eaglesnest Lakes near Ely, in northeastern Minnesota. The egg masses, laid on *Prunus virginiana* L., from early July to mid-August, constitute the wintering stage. Caterpillars hatch about June 1 and complete their growth by late July, with pupation occurring from late June to August 10.

Seven insect parasites attacked the moth in 1959–1961. The Tachinid, *Actia diffidens* Curran, inhabited as many as 88 per cent of the caterpillars. The second instar attaches itself to the host mesopleura, and the third matures in the prepupal host in its cocoon. Pupariation occurs on the ground. Seven adults of *Dichaetoneura leucoptera* Johnson, Tachinidae, were reared from nests. The larvae and pupae of an unidentified egg parasite were found about June 1.

Two species of Ichneumonidae, *Labrorychus prismaticus* (Nort.) and *Exochus albifrons* Cress., parasitize the larger caterpillars, and pupate in the host chrysalises. A third, *Itoplectis conquisitor* (Say) probably oviposits in the prepupae. It completes its development in the chrysalis. Females of *Ancistrocerus antilope* (Panz.), Vespidae, paralyzed the larger caterpillars.

In the summers of 1959–1961, the ugly-nest caterpillar, *Archips cerasivoranus*, was common on choke cherry, *Prunus virginiana* L., in the vicinity of the Eaglesnest Lakes situated between Tower and Ely, St. Louis county in northeastern Minnesota. Further study in 1962 was prevented by the complete lack of the life stages of the host.

The following insect enemies were present attacking the moth: *Actia diffidens* Curran, *Dichaetoneura leucoptera* Johnson, Tachinidae; an undetermined hymenopterous parasite of the eggs; *Labrorychus prismaticus* (Norton); *Itoplectis conquisitor* (Say); *Exochus albifrons* Cress., Ichneumonidae; and *Ancistrocerus antilope* (Panz.), Vespidae.

LIFE HISTORY OF *A. cerasivoranus*

My observations on the seasonal distribution of the life stages at Eaglesnest agree generally with those made by Baird (1918) at Fredericton, New Brunswick, Canada. For this reason, I present only a summary of my findings on this aspect of the life history.

The moth completes one cycle in a year. The adults emerged from the chrysalises during June 28 to August 7; oviposition took place from early July to mid-August; the eggs constituted the winter stage and hatched about the first of the following June; all larvae grew to maturity by July 20, and the chrysalises occurred during late June to about August 10. Limited observations by Allen (1953) in northern California agree with the life history as described by Baird (lc.) for New Brunswick, and Dudley (1918) for Maine. The observations of Dudley pertained only to the advanced larvae and the nests.

Behavior of the stages.—Oviposition may be anticipated by dissecting samples of advanced chrysalises, since these were found to contain sizable eggs in the eight ovarian tubules.

[1]Manuscript received June 9, 1963.

[2]*Archips* and *Actia* were identified by Messrs. T. N. Freeman and J. F. McAlpine, respectively, Canadian Department of Agriculture, Ottawa; the Hymenoptera by specialists at the United States National Museum, Washington, D.C. All have my sincere thanks for their services.

The egg masses were glued vertically to the main stems of small cherry trees two to three ft high and a quarter inch in diameter, and two to three inches above ground. The small size of the cherry was due to annual cutting by maintenance crews. The individual masses are elongate-oval, depressed-convex, sepia brown, and apparently covered with a semitransparent rubbery secretion. A sample of masses submerged in water for 20 days still adhered firmly to the bark. Ten masses averaged 10.6 mm in length by 4.8 mm in maximum diameter, and consisted of about 85 to 145 eggs each. According to Baird (lc), they may contain anywhere from 25 to 200 eggs.

Baird observed also tnat the larvae of an egg mass hatch, as a rule, within 20 min, then crawl to the top of the tree where they congregate in the opening leaves, spin a web about themselves and commence to feed. Of the six instars, the first three "merely skeletonize tne leaves in feeding," whereas the rest "devour the entire leaf tissue." Also at Eaglesnest, the newly-hatched larvae moved to the tops of the small trees before spinning themselves in. As tney grew, and consumed the leaves, these very active yellowish-green caterpillars gradually extended their webs and enclosed more and more fresh foliage. In the case of small cherry, the colonies of advanced instars denuded the trees, and their copious silk bound the bared branches closely to the stem. While the spinning larvae mostly work within the nest envelope, they commonly poke their cephalic ends through the web and, not rarely, have been seen working fully exposed on the outer surface of the nest. It is these larger conspicuous nests, present during late June and early July, that cause concern among casual observers.

The full-grown larvae, with lengths of about 17 to 19 mm, migrate to the main stem or branch of the cherry involved in the nest. Here each spins its elongate whitish cocoon parallel with the stem, leaving the cephalic end loosely open for subsequent emergence of the moth. Each successive caterpillar spins its shelter adjacent to, or upon those previously prepared. Thus a sizable mass of cocoons is formed around the stem or branch. Since fecal pellets are dropped profusely by the still-immature larvae, these lodge among the cocoons and become enmeshed in them.

Cocoons, opened to determine their contents, housed not only prepupae and chrysalises but smaller larvae whose subnormal size proved, on dissection, to be due to parasitism by the tachinid, *Actia diffidens*. Baird (1918) found the "pupal stage" lasts about 10 days. Then the mature pupae wriggle out of their cocoons, aided by spiny scales on the segments of their skins, and become attached to the outside of the web by hooks on the end of the abdomen. The empty skin persists here for some time after the moths have emerged.

The moths are bright ochre-yellow, with brownish marks and transverse bands of pale blue on the front wings, and vary from little less to little more than one inch in wing expanse. My observations on behavior of the newly-emerged adults coincide essentially with those of Baird (lc). For example, on the quiet sunny mid-morning of July 23, 1960, numbers of new moths were seen at Eaglesnest on patches of wild cherry. Mostly they remained at rest, some on the lower stems, others on the undersides of leaves, and several on the upper sides, fully exposed to the bright sun. When disturbed, they run quickly down the plant to hide near the ground. Numbers of vacated chrysalises protruded from the open ends of the cocoons in the nests. According to Baird (lc), the adults, on emergence, do not tend to disperse very far unless carried by high winds, and mating takes place soon after the females emerge. Oviposition follows within a few hours.

Distribution and host plants.—In his recent taxonomic monograph of the Archipinae of North America, Freeman (1958) records *A. cerasivoranus* as occurring in all the border provinces of Canada and in the United States. The southern limit coincides approximately with north latitude 40 degrees. The collection of the Illinois Natural History Survey contains specimens from Salt Lake City,

Utah, Lansing, Michigan, and, in Illinois from Algonquin in the north and Urbana in the central area. Allen (1953) reports the moth from McCloud and Mt. Shasta city in Siskiyou county in the mountainous north central part of California.

Freeman (lc) treats *A. rileyanus* Grote, a southern form, as a subspecies that intergrades in intermediate localities with the typical form. On the other hand, Obraztsov (1959) regards *A. rileyanus* and *A. cerasivoranus* as two species, on morphological characters. Excepting *Prunus*, the known food plants of the two forms, as cited by Freeman (lc), are different. At Eaglesnest, Minn., and also at New Brunswick, Canada (Baird, 1918), and Maine (Dudley, 1917), choke cherry (*Prunus virginiana*) was the food plant of *A. cerasivoranus*. Johnson (1916) reported the nests from wild cherry in Vermont, New Hampshire, and Massachusetts. In California (Allen, 1953), the larvae fed on the wild cherry, *P. emarginata* (Dougl.). Beside *Prunus*, *A. cerasivoranus* is said to feed on *Salix* and *Fraxinus*, whereas *A. rileyanus* utilizes also *Carya*, *Symphoricarpus*, *Juglans*, *Vernonia*, and *Aesculus* (Freeman, lc).

PARASITES OF *Archips cerasivoranus* AT EAGLESNEST, MINN.

Actia diffidens CURRAN, TACHINIDAE

This fly was not among the parasites of *A. cerasivoranus* studied by Baird (1918) at New Brunswick, Can. or by Thompson (1953) in Ontario. Prebble (1935) found it attacking the black-headed budworm, *Peronea variana* (Fernald), Tortricidae, at Cape Breton, Nova Scotia, the only host then known, and described its instars, attachment to the host, puparia, and life history. Small numbers of *A. diffidens* were reared by Prentice (1955) from the large aspen tortrix, *Choristoneura conflictans* (Wlkr.), Tortricidae, collected in Manitoba and Saskatchewan. The chief tachinid found at Eaglesnest, *A. diffidens*, was by far more numerous than all the parasitic Hymenoptera combined. The type specimens from which Curran (1933) described *A. diffidens* originated at Kentville and St. Peters, Nova Scotia, and Chatham, New Brunswick, Can. These records suggest that *A. diffidens* occurs along the border common to Canada and the United States, and may limit its attack to caterpillars of the family Tortricidae.

The life cycle.—Like its host, *Actia diffidens* completes one cycle in a year, but passes the winter as a puparium. My efforts to rear adults in 1960 and 1961 met with failure. However, Mr. J. F. McAlpine, at the Canadian Department of Agriculture, Ottawa, readily identified the species from larvae and puparia. Also Prebble (lc) failed to obtain adults in 1930 and 1931, but succeeded in 1932. Nothing is known to date about the habits of the adult, and particularly its parasitization of the host.

The season of parasitization, whether by oviposition or larviposition, may be estimated from the following considerations about the maggots. First, dissection of 91 *A. cerasivoranus* one-third to one-half grown on June 18 and 21, 1960, yielded no *A. diffidens*. This indicates that the flies were not yet reproductively functional. Second, four first instars were found in caterpillars one-half to three-fourths grown, between June 24 and July 20, 1960. This low rate of parasitism indicates that the first flies had only recently commenced parasitization. Failure to obtain additional first instars in samples of hosts, dissected subsequently at somewhat regular intervals, suggests also that this stadium of *A. diffidens* is brief compared with the second stadium. The above evidences coincide with the observation by Prebble (lc) to the effect that this fly commences its attack on *Peronea variana* late in June. Third, evidence cited below (Rate of parasitism) indicates that parasitization increased sharply early in July, then continued to do so but at a moderate rate until late in July. Accordingly, reproducing flies occurred through late June to late July at Eaglesnest in 1960.

The maggots obtained from *A. cerasivoranus* were identified as to instars by reference to the descriptions and drawings of *A. diffidens* provided by Prebble

(lc). All measurements herewith were made on living maggots. A sample of 101 parasites cleared in KOH proved to comprise 4 first, 55 second, and 42 third, instars. The 4 first instars varied from 0.5 to 0.8 mm in length. Prebble (lc) reported lengths of 0.5 to 0.7 mm for first instars from *P. variana*. The 55 seconds ranged from 0.9 to 3.5 mm long; they inhabited caterpillars of *A. cerasivoranus* estimated to be two-thirds grown to full-grown, and occurred between June 24 and July 22, 1960. The 42 third instars represented sizes from 4.0 to 8.6 mm, and were taken from (a) mature, yet free-living caterpillars and (b) prepupae in their cocoons during the period July 7 and 22, 1960. As employed here, the term "prepupa" signifies full-fed, full-grown larviform individuals in the early phase of pupation within their cocoons.

Late in the period July 7 to 22, a number of larval exuviae of the host occurred in their cocoons, i.e., the maggots had matured, emerged, and crawled from the host cocoons to pupariate elsewhere. This shows that the parasitized *A. cerasivoranus* is permitted to spin its cocoon and develop to the prepupal state before it is overcome and its internal substance consumed by the maggot. In other words, the maturation of the maggot may be coincident with, or even dependent on, prepupation of the host. That this appears to be a fact is indicated also by the performance of second instars in caterpillars of *A. cerasivoranus* isolated for days to a week without food enough to permit growth. When dissected, such hosts invariably contained second instars about 1.2 mm long and persisted after normally-fed caterpillars of the same age had been destroyed by the maggots. These observations suggest that the second instars of *A. diffidens* may enter upon a diapause that endures so long as the host remains a caterpillar, and that termination of the diapause requires a factor, possibly hormonal, inherent in the transforming prepupal host.

Following this theoretical reactivation of development in the prepupal host, the parasite attains the third stadium. The instar feeds and grows rapidly, utilizing the readily ingested, histolyzed substance that occurs normally even in the parasite-free prepupal host, and thereby precludes the attainment of the host to the true pupal state. Prebble (lc) found that the first and second instars do little damage to the caterpillar of *P. variana*, but during the last two or three days within the host, the advanced maggots feed at a destructive rate, consuming nearly all the organs and tissues.

Attachment to the host.—The first instars of *A. diffidens* found in larvae of *A. cerasivoranus* remained unattached and motile, as did also the first instars found by Prebble (lc) in *Peronea variana*. Moreover, the second instars in both these hosts remained free during their early phase, and, like the first instars, occurred in all the three body regions of the host. However, in *A. cerasivoranus* the posterior part of the abdomen contained relatively few second instars. Most of the smaller maggots 0.9 to 1.2 mm in length, seemed to occur in the head and the prothorax. This observation suggested the possibility that the progeny of *A. diffidens*, whether as egg or first instar, might enter the host by way of the mouth or conjunctiva of the cephalo-prothoracic area.

When the second instars have gained somewhat in size, they become attached to the inner surface of either the right or left mesopleuron by means of a funnel-shaped mechanism that envelops the caudal region. The smallest second instars found attached in *A. cerasivoranus* were 2.0 to 2.5 mm long. Also all larger, as well as all third instars had become anchored to the host. These observations coincide essentially with those of Prebble (lc) concerning *A. diffidens* in *P. variana*. Prebble made a special study of the funnel, and showed it is formed by the host caterpillar in response to irritation caused by certain caudal spinules of the parasitic maggot. In addition to attaching somewhat equally to either mesopleuron, the maggots consistently selected a very restricted point on this aspect of the segment. In the case of *A. cerasivoranus*, this point was the approximate center

of the pleura. In *P. variana*, Prebble (lc) found the maggots secured themselves slightly above or below the horizontal line between seta *theta* and the *kappa* group of setae, or, in some cases, right on the pinaculum which bears the setae.

Rate of parasitism.—Between June 18 and July 31, 1960, and July 5 and 20, 1961, 760 caterpillars and prepupae of *cerasivoranus* were dissected to obtain data on the percent of parasitism by *Actia diffidens*. The number included 91 parasite-free larvae processed in June 18 and 21, 1961, which, it now appears, antedated the season of parasitization. Subtracting these, leaves 669 potential hosts that fall within the known period of attack. Of this number, 289, or 43.19 per cent contained *diffidens*. The 590 *cerasivoranus* processed in 1960 were parasitized to the extent of 40 per cent, whereas 64.05 per cent of 79 examined in 1961 contained maggots. The component lots or samples dissected in 1960 reflect a sharp seasonal increase in per cents of parasitism, as follows: June 28, 0.38; July 2, 1.0; July 3, 65.0; July 12, 73.0; July 16, 73.0; July 28, 88.8; and July 31; 83.3 per cent. As pointed out above, these data indicate that the flies began performing at a near-maximum rate early in July, but increased the parasitization moderately throughout the month.

The increased rate of parasitism in 1961 over that of 1960 identifies *A. diffidens* as a principal factor that contributed to the lack of *A. cerasivoranus* at Eaglesnest in 1962. Allen (1953) calls attention to the sporadic appearance of the ugly-nest caterpillar as reported in the literature, and comments it "may be due to numerous parasites."

Instances of atypical parasitism.—With few exceptions described herewith, *Actia diffidens* performed as a solitary parasite in *Archips cerasivoranus*.

On July 3, 1960, two normal living second instars were found in a 16 mm-long caterpillar. One maggot 1.0 mm long inhabited the head, the other, 1.1 mm long, lay in the abdomen. On the same day, four small maggots occurred close together in a caterpillar 12 mm long. Three were dead, and apparently destroyed by the living fourth, a second instar 1.2 mm long. The recently-killed maggots had contracted to 0.5 mm, but were probably second instars. Cannibalism is indicated.

Phagocytosis.—On July 15, 1960, a caterpillar about one-half grown, contained a maggot smaller than the usual early-phase second instar, but dead and enveloped in a jelly-like transparent substance.

Multiparasitism.—In several instances, a single larva of *A. cerasivoranus* contained either a small maggot of *A. diffidens* and a first instar of *Itoplectis conquisitor*, or such a maggot and a first instar of *Labrorychus prismaticus*. The latter ichneumonid occurred the more often because it was the more numerous species, and also because it oviposits in the immature caterpillars whereas *I. conquisitor* is believed usually to attack the prepupal host in its cocoon.

In this relationship, the ichneumonid larvae are quite certainly victimized by the maggots, since both *I. conquisitor* and *L. prismaticus* require the host chrysalis for completion of their life cycles, whereas *A. diffidens* attains maturity in the prepupa of *A. cerasivoranus*.

Pupariation.—Observations on nests caged in jars and others placed in paper bags on the food plant in the field showed that the mature maggots emerged from the host cocoons and went to the ground to pupariate. Very few became entangled in the webs of the nest. Pupariation is known to have occurred mostly between July 7 and 31, in 1961. A sample of 32 puparia averaged 5.12 mm long by 2.09 in maximum diameter, and ranged in size from 4.4 x 1.85 to 5.2 x 2.25 mm. They are oval in dorsal outline, yet evidently depressed.

Dichaetoneura leucoptera JOHNS., TACHINIDAE

Seven adults were reared on July 26, 1961 from nests of *cerasivoranus* at Eaglesnest. No other stages were observed. Baird (1918) gives original notes on its biology, and Thompson (1953) describes the larval stages, adult reproductive system and wings, and discusses the systematic relationships.

An egg parasite.—Small white living full-grown larvae, and white pupae with red eyes were discovered in the eggs of *A. cerasivoranus* at Eaglesnest on May 27, 1961. The host eggs had been taken from a small cherry tree in August, 1960. Since adults were not obtained, it remains uncertain whether this parasite is the chalcid *Trichogrammatomyia tortricis* Gir. reared from this host by Blair (1918) in New Brunswick, and from the eggs of *Archips argyrospila* (Wlkr.) by Chapman. Pearce and Avens (1941) in New York. Allen (1953) reported an abundant, yet unidentified chalcid parasite of *A. cerasivoranus* from California. However, since it originated in the nests. it cannot have attacked the host eggs.

Labrorychus prismaticus (NORTON), ICHNEUMONIDAE

On June 27, July 9 and 23, females were seen apparently engaged in oviposition at nests of *A. cerasivoranus*. Caterpillars about two-thirds grown were busy reinforcing the walls of their nest, thereby sometimes thrusting their cephalic ends more or less through the web. With antennae vibrating rapidly, the female *L. prismaticus* waited intently just outside the nest. When a caterpillar came near, she quickly curved the abdomen ventrad and forward between the legs to the head, and flicked the extensible terebra at it, striking the dorsum of the body. One such ichneumon was captured and identified as *L. prismaticus*.

Baird (1918) apparently knew the larvae of *L.* (*Erigorgus*) *prismaticus* in New Brunswick, and traced their remarkable development, but did not describe them. He found the eggs generally in the fourth or fifth segment of caterpillars about two-thirds grown. Larvae which I suppose to be first instars of *L. prismaticus* inhabited *A. cerasivoranus* 14 to 16 mm long, or about three-fourths grown, on July 5 to 20, 1960 and 1961. They are slender, subcylindrical, bare and smooth-bodied, tend to assume a semicircular form when at rest, and bear a small yet distinct fleshy, sometimes J-shaped, appendage on the last ventral segment. In an exceptional instance, a caterpillar contained two such instars. In most cases observed, caterpillars harboring such parasites contained also a second instar of *Actia diffidens*.

Baird (lc) found that the larva of *L. prismaticus*, on hatching, feeds a little and grows very slowly until after the host has pupated. Then the parasite greedily devours the histolyzed host substance and becomes grown in a few days. The larva attains maturity in the chrysalis of *A. cerasivoranus*, and, after a pupal period of about a week to 10 days, the adult issues, probably to pass the winter. This developmental pattern suggests that *L. prismaticus* conforms to the type of host relation pointed up in my recent article (Balduf, 1963). Short (1959) characterized the final instar of *L. prismaticus*, and also those of *Itoplectis conquisitor* and *Exochus albifrons*, whose life habits are treated below.

Johnson (1916) reared 26 adult *L. prismaticus* between July 6 and 12 from six nests of *A. cerasivoranus* taken at Remington, Vt., and reports considerable numbers bred also from this host at Winchendon, Mass. At Eaglesnest, Minn., I removed seven pupae from chrysalises of the same moth on and about July 27, 1960. A series of 74 adults emerged from masses of cocoons. Fifty of these, 17 females and 34 males, issued between July 9 and August 3, 1960, and July 13 and August 5, 1961. Two additional females and one male were netted on flowering vegetation in the vicinity of old nests on August 16 and 31, 1960. A second generation seems unlikely since the host has but one annual cycle and winters in its egg stage.

Itoplectis conquisitor (SAY), ICHNEUMONIDAE

This common species is widely distributed in North America. At Eaglesnest, Minn., it ranked third after *Actia diffidens* and *Labrorychus prismaticus* as a parasite of *Archips cerasivoranus*. A host list of 88 species, mostly Lepidoptera, with references to its biology, is contained in the Synoptic Catalog (Muesebeck et al., 1951). The most recent summary of its bionomics covers the literature to 1958

(Allen, 1962). It performs as a primary solitary endoparasite in lepidopterous pupae and, in a few cases, as a hyperparasite through Braconidae and other Ichneumonidae. The female is said to introduce the eggs into the prepupae or pupae concealed in cocoons and other kinds of cover. The parasite, according to some observers, appears to prefer the soft prepupae. However, Doner (1936) found eggs placed on the case-inhabiting fourth and fifth instars of *Coleophora pruniella* Clem. Johnston (1913) and Doner (lc) have observed the female puncture the host with the ovipositor and feed on the released body fluid.

I have not seen a description of the first instar. Three larvae dissected from advanced larvae or prepupae of *A. cerasivoranus* in July may be this stage. They are simple in structure, straight, moderately depressed, with a stout tapering caudal process. Howard (1897) and Fiske (1903) figure the full-grown larva and the pupa in lateral view. Short (1959) includes *I. conquisitor* in his excellent work on the final instars of Ichneumonidae.

Some data are at hand relative to the postovipositional development of *I. conquisitor*. The larva hatched 24 hours after the egg was laid in *Elliopia fiscillaria* Hbn., and development to emergence of the adult from the chrysalises in Canada required 15 to 27 days, according to Schedl (1931). This development took about 20 days with *Malacosoma americana* as the host in New Hampshire (Fiske lc), and 19 to 23 days in *M. americana* at Cornell University, New York (Liu, unpublished thesis, 1926: data given by Townes, 1940). Fiske (lc) found the adults emerged from June 20 to July 15, the males appearing, on the average, four days earlier than the moth. Johnson (1916) had *conquisitor* from nests of *A. cerasivoranus* taken at Milford, New Hampshire on July 5, 1914.

At Eaglesnest, three female pupae of *I. conquisitor* were removed from chrysalises of *A. cerasivoranus* on July 27, 1960. Four adults emerged from other chrysalises through July 27 to August 3. Also 14 adults, seven males and seven females, issued from cocoons of this moth between July 23 and August 3, 1960, and July 12 and 17, 1961. Baird (1918) reported *I. (Scambus) conquisitor* at New Brunswick, Can, in less than five percent of the chrysalises of *cerasivoranus*.

The ratio of females to males was three to one in the 96 adults reared by Liu (lc). Schedl (lc) reported 74.4 per cent females in 257 adults. Both Fiske (lc) and Schedl (lc) obtained two generations in a year. My data indicate that only one generation occurs annually in *A. cerasivoranus* at Eaglesnest, and that the emerged adult carries the species through the winter. Schedl concluded it winters as adult, outside the chrysalis, whereas Fiske believed it winters within this stage of the host.

Exochus albifrons CRESS., ICHNEUMONIDAE

According to the Synoptic Catalog, Hymenoptera of America north of Mexico (Muesebeck et al., 1951), two species of *Exochus*, namley *E. albifrons* Cress. and *E. pallipes* Cress. are known to parasitize *Archips cerasivoranus*. The Metopiinae, of which *Exochus* is a member, are said to utilize Lepidoptera as hosts, the adults emerging from the chrysalises. *E. pallipes* was not among the parasites reared from *cerasivoranus* at Eaglesnest, Minn., and *E. albifrons* was represented by nine adults. These emerged in cages stocked with many cocoons containing chrysalises of *A. cerasivoranus*. Two of the series issued on July 29 and 31, 1960, and seven between July 21 and 27, 1961.

Ancistrocerus antilope (PANZ.), VESPIDAE

On July 9, 1960, I found three half-grown caterpillars of *A. cerasivoranus* hanging limp on branchlets of cherry adjacent to a small opening in the silken envelope of a nest. Presently a female *A. antilope* alighted at the opening, but instead of carrying the limp caterpillars away, as expected, she enlarged the opening slightly with the mandibles and stood with her head in it. Soon a caterpillar exposed it-

self at the opening and was quickly seized by the wasp, pulled out as the attacker backed out, and was stung several times. In doing so, the wasp curled the abdomen ventrad and forward between the legs in the manner of many Ichneumonoidea as they parasitize their hosts. The victim soon became limp, and was then maxillated. At this point in the procedure, I captured the wasp for identification. On another occasion, a wasp of this kind was seen to enter a short distance into a nest of this moth, obviously seeking prey.

Other specimens of *A. antilope* were taken at large at Eaglesnest in 1955–1959, as follows: three females, July 25–27, and nine males during the period July 23 to September 20. This was the most numerous of several species of *Ancistrocerus* taken there.

REFERENCES CITED

Allen, H. W. 1962. Parasites of the oriental fruit moth in the eastern United States. U. S. Dept. Agr. Tech. Bul. 1265: 1–139.

Allen, R. P. 1953. Occurrence of ugly-nest caterpillar in California. Calif. St. Dept. Agr. Bul. 42(1): 165–170.

Baird, A. B. 1918. Some notes on the natural control of the cherry-tree ugly-nest Tortricid, *Archips cerasivorana* Fitch. Agr. Gaz. Canada 5(8): 766–771.

Balduf, W. V. 1963. A distinct type of host-parasite relation among insects. Am. Ent. Soc. Ann., 56(3): 386–391.

Chapman, P. J., G. W. Pearce, and **A. W. Avens.** 1941. The use of petroleum oils as insecticides, III. Oil deposit and the control of fruit tree leafroller and other apple pests. J. Eco. Ent. 34: 643–644.

Curran, C. H. 1933. The North American species of *Actia* in the American Museum of Natural History. Am. Mus. Novit. 614: 1–7.

Doner, M. H. 1936. Hymenopterous parasites of *Coleophora pruniella* Cl., and parasites from other species of *Coleophora*. Am. Ent. Soc. Ann. 29: 224–244.

Dudley, F. H. 1917. Cherry-tree ugly-nest Tortricid. Commissioner of Agr. St. of Maine, Sixteenth Ann. Rept., p. 45.

Fiske, F. W. 1903. A study of the parasites of the the american tent caterpillar. N. Hamp. Coll. Exp. Sta. Tech. Bull. 6: 189–198.

Freeman, T. N. 1958. The Archipinae of North America (Lepidoptera, Tortricidae). Can. Ent. 90, Suppl. 7: 1–89.

Howard, L. O. 1897. A study in insect parasitism. A consideration of the parasites of the white-marked tussock moth, with an account of their habits and interrelations, and with descriptions of new species. U. S. Dept. Agr. Div. Ent. Tech. Ser. 5: 1–57.

Johnson, C. W. 1916. Parasites of *Archips cerasivoranus* Fitch. Psyche 23, 81.

Johnston, F. A. 1913. On the feeding habits of *Pimpla* (*Itoplectis*) *conquisitor* Say. J. Eco. Ent. 6: 144–147.

Muesebeck, C. F. W., et al. 1951. Hymenoptera of America North of Mexico, Synoptic Catalog. U. S. Dept. Agr., Agr. Mon. 2: 1–1420. Govt. Printing Office, Washington.

Obraztsov, N. S. 1959. Characters separating *Archips rileyanus* and *cerasivoranus* as two species (Lepidoptera, Tortricidae). Ent. News 70(10): 263–267.

Prebble, M. L. 1935. *Actia diffidens* Curran, a parasite of *Peronea variana* (Fernald) in Cape Breton, Nova Scotia. Can. J. Res. 12: 216–227.

Prentice, R. M. 1955. The life history and some aspects of the ecology of the large aspen Tortrix, *Choristoneura conflictana* (Wlkr.) (n. comb.) (Lepidoptera, Tortricidae). Can. Ent. 87: 461–473.

Schedl, Karl. 1931. Der Hemlockspanner *Ellopia fiscellaria* Hbn. und seine natürlichen Feinde. Zeits. Angew. Entom. 18: 260–268.

Short, J. R. T. 1959. A description and classification of the final instar larvae of the Ichneumonidae (Insecta, Hymenoptera). No. 3419, Proc. U. S. N. Mus., 110: 391–511.

Thompson, W. R. 1953. The tachinid parasites of *Archips cerasivorana* Fitch, (1) *Dichaetoneura leucoptera* Johns. (Diptera). Can. Ent. 85: 19–30. (2) *Eusisyropa blanda* O.S. (Diptera). Can. Ent. 85: 393–404.

Townes, H. K. 1940. A revision of the Pimplini of eastern North America (Hym., Ichneumonidae). Am. Ent. Soc. Ann. 33: 283–323.

———. 1944. A catalogue and reclassification of the nearctic Ichneumonidae. Am. Ent. Soc. Memoir 11, I: 1–477.