

LIGHT TRAP COLLECTIONS OF *CULICOIDES* (DIPTERA: CERATOPHOGONIDAE) IN THE FRASER VALLEY OF BRITISH COLUMBIA

ROBERT A. COSTELLO

British Columbia Ministry of Agriculture & Food
17720 - 57th Avenue, Cloverdale
British Columbia

ABSTRACT

Because information was lacking about *Culicoides* spp. occurring in British Columbia, a survey was carried out to determine the species present in the Fraser Valley. Seven light traps sampled adult *Culicoides* from June 5 to August 30, 1976. Ten species and one species group were collected, of which six were not previously known to occur in British Columbia. *C. obsoletus* (Meigen) comprised 99.3 percent of the total catch of 15,863 adults. *C. occidentalis* (Wirth and Jones) and *C. variipennis* (Coquillett), proven vectors of bluetongue virus in North America, were not collected.

INTRODUCTION

Studies of *Culicoides* in British Columbia have been few and regional. Twelve species of this genus have been reported in the province prior to this investigation. Dyar, in 1903, collected *C. obsoletus* (Meigen) at Kaslo (Hoffman, 1925). Curtis, in 1941, added seven species collected mostly around Kamloops. Wirth (1952) reported on the occurrence of *C. jamesi* (Fox) from an unspecified location in British Columbia.

Renewed interest in *Culicoides* was stimulated by the discovery in 1975 of the bluetongue virus disease of cattle in the South Okanagan. This resulted in a survey of *Culicoides* spp. in this area during 1976 which yielded 12 species, three previously unreported, including *C. occidentalis* (Wirth and Jones), a proven vector of bluetongue disease (McMullen, 1978). The bluetongue outbreak also brought attention to the lack of information about *Culicoides* in the Fraser Valley. Spuzzum, about 65 km north of the eastern-most extremity of the Fraser Valley, is the closest published collection record (Curtis, 1941).

The objectives of this study, conducted in the summer of 1976, were to determine the species of *Culicoides* present in the Fraser Valley and their abundance.

METHODS

Unmodified New Jersey type light traps equipped with 60 watt incandescent light bulbs were used to sample populations of adult *Culicoides* at seven locations. Automatic timers turned the traps on at 7 p.m. and off at 7 a.m. The collecting jars utilized dichlorvos, in sawdust below a layer of perforated plaster of Paris, as a killing agent. Traps were collected thrice weekly. Trapping began on June 5 and ended August 30.

LIGHT TRAP LOCATIONS

Chilliwack sewage treatment plant

This trap was located within 1 km of a large freshwater slough with banks covered with dense grass and reeds.

Chilliwack Mountain

A trap was placed on the Martin farm on Chilliwack Mountain Road. A low, muddy area on the farm that remained wet throughout the collection period provided a possible *Culicoides* breeding area.

Mission sewage treatment plant

This trap was situated within 0.5 km of a large freshwater slough with shallow, weedy margins. The slough was about 2 km south of the city of Mission. No livestock were present within 5 km of the trap but large numbers of waterfowl were observed in the area.

Mitten farm

The trap at the Mitten farm, 2 km west of Fort Langley, was located within 10 m of a mud-lined freshwater seepage pond used daily by farm livestock as a watering hole.

Fort Langley pump house

The trap was on Whyte Road, 9 km north-west of Fort Langley, located beside a deep, slow-moving, mud-lined drainage ditch on pasture land. However, within 8 days of installing the trap, rising levels of the nearby Fraser River caused the ditches to overflow, resulting in extensive flooding. Water levels returned to normal by the second week of August.

Haney sewage treatment plant

The Fraser River, 0.5 km away, was the only naturally occurring water in the vicinity of this trap which was located on the southern town boundary.

Colony Farm

A trap on Colony Farm in the Municipality of Coquitlam was placed adjacent to a swine barn. The outdoor pens remained muddy throughout the collection period. A weed-free drainage ditch passed within 20 m of this trap.

RESULTS AND DISCUSSION

15,863 *Culicoides* representing ten species and one species group were taken in the seven light traps. Table 1 shows the species and numbers taken at each trap site. In addition 59 specimens were collected that could not be identified to known species.

Above average precipitation levels during the trapping period may have affected the abundance of some or all species. During the trapping period precipitation totalled 27.2 cm compared to the 1941 to 1970 mean of 16.3 cm. The combined mean

temperature for June, July and August was 15.6°C during 1976 and 16.8°C from 1941 to 1970. In 1976 the Fraser River peaked at 5.79 m, very close to the average peak level of 5.85 m for the years 1960 to 1975, and is unlikely to have resulted in significant population shifts. All data reported above pertains to Mission, the approximate geographic centre of the survey area.

Undoubtedly the early and late seasonal occurrence of some species was not determined in this survey. McMullen (1978) reported the earliest and latest trap records of five common *Culicoides* spp. in the southern Okanagan area of British Columbia. The earliest collection date was April 18, and all species were taken by May 16th. All five species were found until September 9th, and the latest collection date was October 5th.

TABLE 1. Number and species of *Culicoides* trapped in the Fraser Valley 5 Jun. to 30 Aug. 1976.

<u>SPECIES</u>	Chilliwack sewage plant	Chilliwack Mountain	Mission sewage plant	Mitten farm	Fort Langley pump house	Haney sewage plant	Colony Farm	<u>TOTALS</u>
<i>C. biguttatus</i>			3	10			1	14
<i>C. chiopterus</i> *	6	2	1	2			4	15
<i>C. cockerellii</i>	1	1					1	3
<i>C. crepuscularis</i>			5	3	4			12
<i>C. downesi</i> *			3	6	7			16
<i>C. hirtulus</i> *			5	12				18
<i>C. kibunensis</i> *	4				3	5		12
<i>C. obsoletus</i>	4906	725	6288	3090	87	403	248	15,747
<i>C. piliferus</i> group	1					4	11	16
<i>C. sphagnumensis</i> *				6	3			9
<i>C. tristriatulus</i> *							1	1

* New British Columbia record.

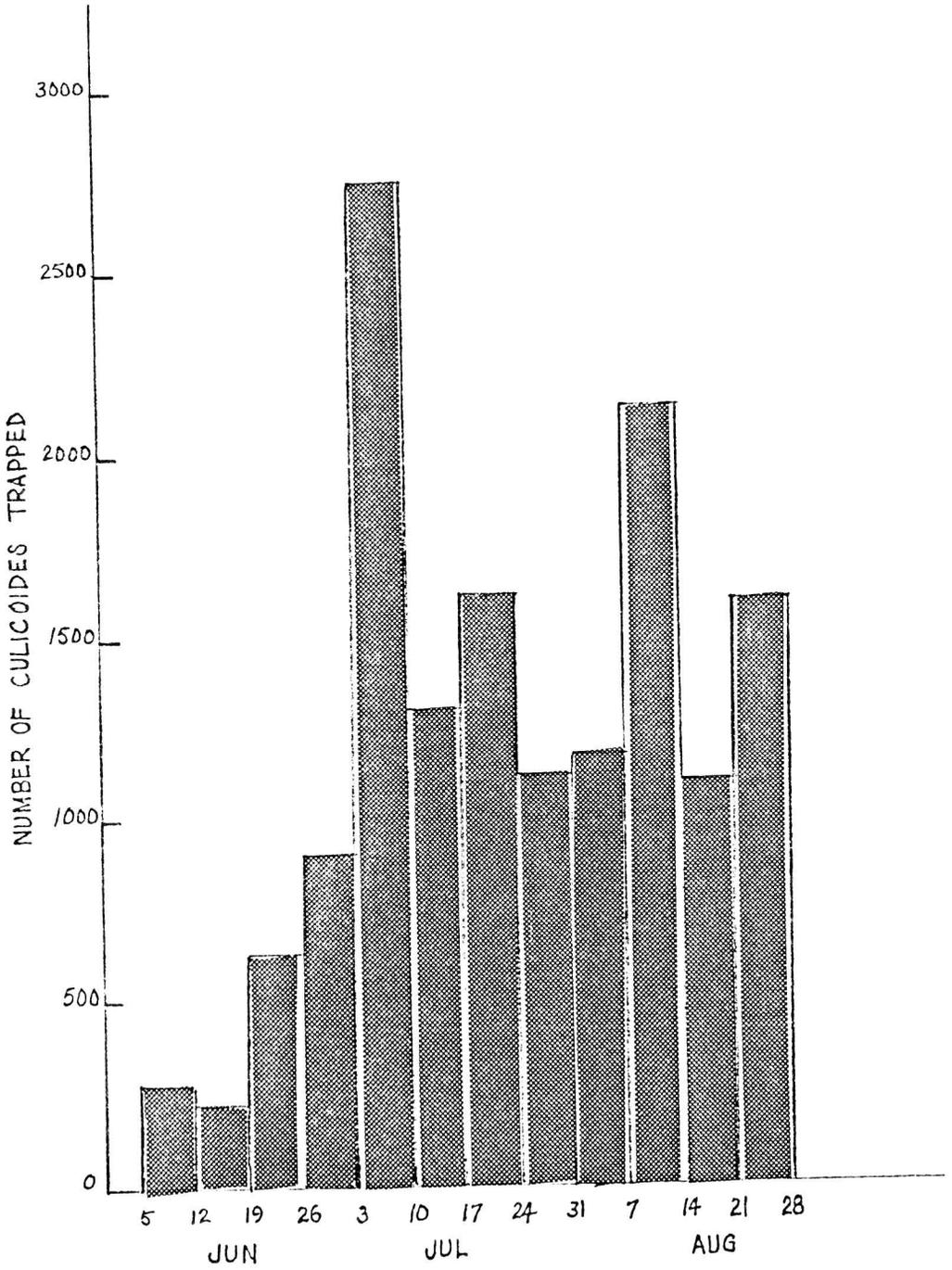


Fig. 1. Seasonal distribution of *C. obsoletus* adults collected in light traps in the Fraser Valley in 1976.

SPECIES DISCUSSION

C. biguttatus (Coquillett)

Fourteen specimens were collected from June 21 to July 28. *C. biguttatus* is a general feeder, biting man, cattle, and fowl (Downes, 1958; Hair and Turner, 1968; Pickard and Snow, 1955). Livestock were present within a few metres of the Colony Farm and Mitten farm trap sites where this species was collected, and waterfowl were abundant near the other collection site, the Mission sewage plant.

C. chiopterus (Meigen)

This species was not previously known to occur in British Columbia. The immature stages develop in cow dung (Downes, 1958), and the adults feed on cattle (Kettle, 1977). *C. chiopterus* appears to be widespread in the Fraser Valley as it was collected in 5 of the 7 traps, including the eastern and western-most traps. The 15 specimens were collected from June 16 to August 11.

C. cockerellii (Coquillett)

Three specimens of this species were trapped within a 6 day period. The Chilliwack sewage plant and Chilliwack Mountain specimens were taken on July 28, and the Colony Farm specimen on August 3. McMullen (1978) found *C. cockerellii* most abundant near pastures with slow, meandering streams, a situation that was apparent only at the Chilliwack Mountain location.

C. crepuscularis Malloch

The first specimen was taken on June 7, the date when the traps were first collected. This species continued to be trapped sporadically until August 16. This is similar to the observations of McMullen (1978), who found a broad level of peak abundance, from mid-June through to early September, for this species in the south Okanagan region. *C. crepuscularis* is largely ornithophilic (Hair and Turner, 1968; Messersmith, 1965), but has been reported as a man-biter (Pickard and Snow, 1955). It has been found breeding in a wide range of sites, usually high in organic matter, including marshy areas associated with lakes and ponds, drainage ditches, and mud around freshwater ponds (Jorgensen, 1969; McMullen, 1978; Rowley, 1967).

C. downesi Wirth and Hubert

Little is known about the habits of this species. Downes (pers. comm.) describes it as a feeder on wild and domestic fowl. All of the 16 specimens collected in this survey were trapped between June 11 and July 5, suggested that this species has a narrow peak of abundance. *C. downesi* has not been previously reported in British Columbia.

C. hirtulus (Coquillett)

C. hirtulus was first taken on June 21 and specimens regularly appeared in traps until August 27. The survey was discontinued on August 30 so the period of occurrence of this species may have ex-

tended beyond the last date when it was collected. This is a new species record in British Columbia.

C. kibunensis Tokunaga

Twelve specimens were collected from June 23 to August 9. The species was not previously known to occur in British Columbia. Little is known of the habits of *C. kibunensis*.

C. obsoletus (Meigen)

C. obsoletus was by far the most commonly trapped species at every location, representing 99.3% of the total catch. It was collected throughout the trapping period but two distinct population peaks were apparent. During the week starting July 3 (Fig. 1) 2760 specimens were collected, and an other 2150 were trapped during the week of August 7. It is unlikely that significant *C. obsoletus* adult populations were present prior to the commencement of trapping as only 280 specimens were collected during the first week. However, there is little doubt that adults were present after trapping ended because 1600 specimens were trapped during the final week. *C. obsoletus* can be a serious biting pest of humans and horses (Shemanchuk, 1972; Pickard and Snow, 1955). This species is commonly found breeding in leafy humus (Downes, 1958). However, the large number of *C. obsoletus* trapped at the Chilliwack and Mission sewage plants suggests that nearby freshwater sloughs were probable breeding areas.

C. piliferus group

This is a composite group consisting of specimens having wide variations in several characters.

Fifteen of the 16 *C. piliferus* group adults were trapped between June 7 and June 11. The other specimen, from the Chilliwack sewage plant, was taken on June 28. This suggests that the *C. piliferus* group occurs early, perhaps starting before the trapping began on June 7. Jorgensen (1969) reported freshwater seepage springs as breeding sites for this species group, but water bodies of this type were not apparent at the three collection locations.

C. sphagnumensis Williams

Nine specimens of *C. sphagnumensis*, previously unrecorded in British Columbia, were trapped at the Mitten farm and the Fort Langley pump house. These trap sites are about 4 km apart in an area where most of the potential breeding areas were mud-lined drainage ditches and seepage ponds. The first specimen was collected on June 11, the last on August 13.

C. tristriatulus Hoffman

A single specimen of *C. tristriatulus* was collected on July 26 at the Colony Farm trap site. Wirth (1952) described this species as a severe human biting pest in Alaska where it breeds in salt marshes. The nearest salt marsh to the trap site is 35

km and, although Downes (1958) states this species can fly several miles, it is improbable that this was the source of the specimen. Freshwater marshes occur within 2 km of the trap and may have produced the specimen. This is a new species record for British Columbia.

Biosystematics Research Institute, Agriculture Canada, Ottawa for identifying many specimens submitted to him. The assistance of Mr. E. Chu, British Columbia Ministry of Agriculture and Food, in this project is gratefully acknowledged.

ACKNOWLEDGEMENTS

My sincere thanks to Mr. Leo Forster,

REFERENCES

- Curtis, L. C. 1941. A preliminary list of the species of *Culicoides* in Western Canada. Proc. Ent. Soc. Br. Columb. 37:18-19.
- Downes, J. A. 1958. The genus *Culicoides* (Diptera: Ceratopogonidae) in Canada: an introductory review. Proc. 10th Int. Congs. Ent. 3:801 - 808.
- Downes, J. A. 1978. The *Culicoides variipennis* complex: A necessary realignment of nomenclature (Diptera: Ceratopogonidae). Can. Ent. 110: 63 - 69.
- Hair, J. A. and E. C. Turner, Jr. 1968. Preliminary host preference studies on Virginia *Culicoides* (Diptera: Ceratopogonidae). Mosq. News. 28:103 - 107.
- Hoffman, W. A. 1925. A review of the species of *Culicoides* in North and Central America and the West Indies. Amer. J. Hyg. 5:275 - 301.
- Jorgensen, N. M. 1969. The systematics, occurrence, and host preference of *Culicoides* (Diptera: Ceratopogonidae) in Southeastern Washington. Melanderia 3:1 - 47.
- Kettle, D. S. 1977. Biology and bionomics of bloodsucking Ceratopogonids. Ann. Rev. Entomol. 22:23-51.
- McMullen, R. D. 1978. *Culicoides* (Diptera: Ceratopogonidae) of the South Okanagan area of British Columbia. Can. Ent. 110:1053 - 1057.
- Messersmith, D. H. 1965. *Culicoides* (Diptera: Ceratopogonidae) associated with poultry in Virginia. Mosq. News. 25:321-324.
- Pickard, E. and W. E. Snow, 1955. Light trap collections of punkies (family Heleidae, genus *Culicoides*) McMinn County, Tennessee, April - September, 1952. J. Tenn. Acad. Sci. 30:15 - 18.
- Rowley, W. A. 1967. Observations on larval habitats and the winter bionomics of some common species of *Culicoides* (Diptera: Ceratopogonidae) in the Central Columbia basin. Mosq. News 27:499 - 505.
- Shemanchuk, J. A. 1972. Observations on the abundance and activity of three species of Ceratopogonidae (Diptera) in Northeastern Alberta. Can. Ent. 104:445 - 448.
- Wirth, W. W. 1952. The Heleidae of California. Univ. Calif. Pubs. in Entomol. 9:95 - 266.