

DISPERSAL OF BLOOD-FED *CULISETA INORNATA* AND *CULISETA ALASKAENSIS* AT EDMONTON, ALBERTA

J. E. HUDSON

Department of Entomology, University of Alberta, Edmonton, Alberta T6G 2E3, Canada¹ and

J. D. EDMAN

Florida Medical Entomology Laboratory, P. O. Box 520, Vero Beach, Florida 32960²

ABSTRACT. Fifty-one of 57 blood-fed female *Culiseta inornata* (Williston) and 21 of 23 *Culiseta alaskaensis* (Ludlow) collected near the center of the city had fed on ruminants, though

the nearest such hosts (cattle, sheep and deer) were 2.5 km away. The appearance of the abdomens suggested that 20 of 71 females (28%) had fed less than 24 hr before capture.

INTRODUCTION

Edman and Bidlingmayer (1969) presented evidence that, in Florida, mosquitoes of several species moved at least 1.6 km during the first 24 hr after a blood meal. Evidence that blood-fed *Culiseta inornata* (Williston) and *Culiseta alaskaensis* (Ludlow) disperse even farther than this emerged during a study of their feeding habits at Edmonton, Alberta, during 1974–76.

STUDY AREA AND METHODS

The collection site was a series of windrows on the University of Alberta campus, located just south of the Saskatchewan River valley, close to the center of the city, (Fig. 1). The plain near the city center has little natural vegetation, but the river valley, approximately 50 m deep, is mostly parkland or woodland dominated by aspen and spruce. Klassen and Hocking (1964) have argued that the river valley system facilitates the penetration of adult mosquitoes to the center of the city. Each summer from 1974–76 the Edmonton Parks and Recreation Department applied larvicides, mostly Dursban® (chlorpyrifos) to all known or suspected breeding sites out to about 3 km beyond city

limits (at least 10 km from the collection site) and occasionally applied ULV malathion in the river valley to kill adult mosquitoes.

Females were collected in the mornings by aspirator, anaesthetized and sorted. Those in stages 2 to 5 of Sella (Detinova 1962) were dried, either by smearing the gut contents on filter papers, or by putting them intact into a desiccator over a commercial drying agent (Drierite®) and leaving them there several weeks at room temperature (22–24°C). Dried specimens were posted to the Florida Medical Entomology Laboratory, Vero Beach, where host blood sources were identified by a precipitin test method (Edman 1971).

RESULTS AND DISCUSSION

At Edmonton most of the identified meals were from ruminants, (Table 1), a group which includes cattle, sheep and deer. On a farm 60 km northwest of Edmonton, 35 of 37 identified meals from *Cs. inornata* and all 9 identified meals from *Cs. alaskaensis* were from ruminants. The results from the farm were not surprising because cattle and sheep were abundant there, and because most *Cs. inornata* females tested in other parts of North America have fed on cattle (Tempelis 1975). At Edmonton, however, the nearest ruminants, (cattle, sheep, and others), were at a zoo in the river valley, 2.5 km SW of the collection site (Fig. 1). The nearest ruminants on the plain were cattle and sheep at the university experimental farm,

¹ Present address: Pest Research Unit, National Council for Scientific Research, P. O. Box 49, Chilanga, Zambia.

² Present address: Department of Entomology, University of Massachusetts, Amherst, Massachusetts 01002.

Table 1. Blood meal identifications from *Culiseta* females collected on windows at Edmonton, Alberta, 1974-76.

Host	<i>Cs.</i> <i>inornata</i>	<i>Cs.</i> <i>alaskaensis</i>	Total	% (of positives)
Ruminant	51	21	72	90
Leporid	1	2	3	4
Unidentified mammal	3	0	3	4
Passerine bird	2	0	2	2
Negative	8	8	16	—
Total	65	31	96	100

2.8 km SSW, and cattle at a meat packing plant, 3.7 km ESE of the collection site.

White-tailed deer occasionally enter the city, but have only rarely been recorded within 2.5 km of the collection site. Most records of deer in the city are from September to November, but ruminant-fed *Cs. alaskaensis* were taken from April 24 to June 19 and ruminant-fed *Cs. inornata* regularly from June 21 to August 23.

Of 71 ruminant-feds classified by stage of Sella, 20 (28%) were in stage 2 (Table 2). Laboratory-reared *Cs. inornata* females fed on the first author took, on average, 9.4 day-degrees C to reach stage 3, 29 day-degrees to reach stage 4, 47 to reach stage 5, and 69 to reach stage 7 (gravid), assuming a lower temperature threshold of 5°C. (Day-degrees = number of days × (Ambient temperature—Lower temperature threshold)). The average of normal daily mean temperatures at Edmonton from June 20 to August 22 is 16.7°C, (Environment Canada, data for 1941-70). At this temperature *Cs. inornata* females would take 0.74 days to reach stage 3, thus

Table 2. Numbers of ruminant-fed *Culiseta* females in different stages of Sella collected on windows at Edmonton, Alberta, 1974-76.

Mosquito species	—Sella stage—				Total
	2	3	4	5	
<i>Cs. inornata</i>	17	20	14	0	51
<i>Cs. alaskaensis</i>	3	3	12	2	20
Total	20	23	26	2	71
%	28	32	37	3	100

it appears that those in stage 2 had fed and flown at least 2.5 km the night before they were collected.

Edman and Bidlingmayer (1969) suggested that the mosquitoes they collected on a wooded island had flown there because there were no suitable daytime resting sites in the feeding areas, open fields. At Edmonton, however, if the mosquitoes fed on ruminants at the nearest known site, the zoo in the river valley, and then flew up onto the plain, they left the habitat with the more favorable microclimate and more nectar sources, resting and oviposition sites. According to Klassen and Hocking (1964), mosquitoes accumulate in valleys because they orient towards the lowest point on the horizon and because night-time winds blow down into valleys. Truck-trap and biting catches of *Cs. inornata* in the Edmonton region suggest that the females are nocturnal, and would therefore be unlikely to come out of the river valley once they had gone in. The most likely feeding site of the ruminant-fed females would then be the University farm, 2.8 km from the collection site.

These findings not only shed more light on the flight capacity of blood-engorged mosquitoes, but also indicate the need for further studies on the dispersal of *Cs. inornata* females at Edmonton. Females either flew at least 10 km into the insecticide-treated zone, or developed within it.

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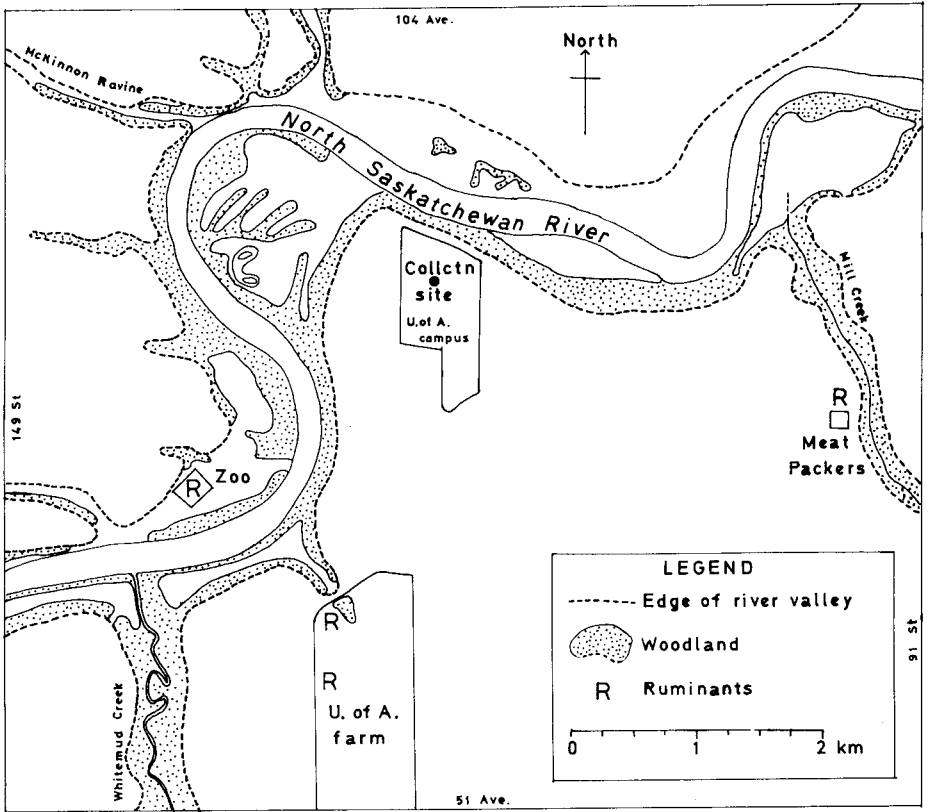


Fig. 1. Sketch map of part of Edmonton, Alberta, showing location of mosquito collection site in relation to known locations of ruminants.

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