

A REVISED LIST OF THE MOSQUITOES OF BRITISH COLUMBIA

PETER AND E. M. BELTON

Pestology Centre, Department of Biological Sciences
Simon Fraser University, Burnaby, B.C.

ABSTRACT

The distribution of 46 currently recognized species are listed in 6 biotic zones with localities for confirmed records since 1927 and some observations on their habits.

INTRODUCTION

The following list of the mosquitoes of British Columbia follows that of Hearle (1927). He listed the known localities of 42 different culicids, 39 of which are now considered true species. He incorporated the provincial localities published in *The Mosquitoes of Canada* (Dyar's 1921 list), many of which were published earlier in *The Mosquitoes of British Columbia and Yukon Territory, Canada* (Dyar's 1920 list). More recently, Curtis (1967) described 42 species from the province and 5 more that might be expected to occur. He discussed the general distribution of each species but mentioned few actual localities. Since then, one species new to Canada, *Aedes togoi* has been found on our coast. *Ae. nevadensis*, now recognised as a species distinct from *Ae. communis*, and two of the species Curtis expected, *Ae. melanimon* and *Culiseta minnesotae*, have also been collected, bringing the total number of mosquitoes found in the province to 46. Several more species found close to our borders may be here unnoticed.

A number of species names have been changed since 1927 and these are noted in the present list. The additional localities were obtained from the following collections:— the Canadian National, Ottawa; the Spencer, University of B.C.; the Provincial Museum, Victoria; and private collections of P. Belton, R. A. Costello and others. Information about several species was kindly provided by the following: N. Angerilli, J. Barlow, K. Bennett, R. and S. Cannings, B. Gillespie, D. Regan, M. Trimble, G. Scudder and P. Wood. Other details were found in papers cited in the bibliography, particularly those of Gibson on mosquito suppression in Canada (published annually 1926-41) and the reports of the anopheline survey (Twinn 1945) and the northern insect survey (Freeman 1952).

The distribution maps of Wood et al. (1979) show many of the localities given here, but have some inaccuracies, e.g. *Ae. campestris* is shown at Mission in the lower mainland and *Ae. implicatus* in Vancouver. These localities are, in fact, Mission Flats (near Kamloops) and Fairview (near Osoyoos) and there are no confirmed records of *Anopheles punctipennis* east of Boston Bar (D. M. Wood, 1981, personal communication).

Many of the identifications required were made by the senior author, others by Dr. D. M. Wood and his colleagues at the Biosystematics Research Institute, Ottawa. Dr. Wood and Mr. L. Forster also checked some of the localities in the Canadian National Collection.

ECOLOGICAL BACKGROUND

Compared with other provinces, B.C. has a rich mosquito fauna. To some extent, this is because we have a number of species that are only found west of the Rocky Mountain barrier. It probably also reflects the varied habitats that occur here, from timberline to flood plain and desert to rain forest.

Munro & Cowan (1947) divided the province into 13 biotic zones on the basis of their distinctive species of plants, birds and mammals. Lyons (1965) condensed these to 9 biotic or life zones, listing their common native trees, shrubs and flowering plants. Mobile forms of life, however, show less discrimination than plants and mosquitoes can fly or be blown long distances so that small and specific habitats or microzones suitable for their immature stages are often more important than the larger life zones that affect the distribution of plants and animals. On the basis of their mosquito fauna, we have reduced Munro & Cowan's 13 biotic zones to 6; (Fig. 1). At least 4 species of mosquito inhabit every zone and about 12 others are almost as widespread. Seven species were taken in a single zone only. Some are specialised to develop in particular habitats. For example, *Ae. campestris* and *Ae. dorsalis* can tolerate highly concentrated alkaline pools in dry regions where the salty ground-water seepage exceeds the rainfall.

BIOTIC ZONES

Zone A, Osoyoos arid

This is a small dry region in the interior, on the southern border of the province, characterised by shrubby desert plants. Developing in weedy back waters or floodplains, species such as *Anopheles freeborni*, *Aedes vexans*, *Ae. spencerii*, *Ae. dorsalis*, *Ae. melanimon*, *Culiseta inornata* and *Culex tarsalis* can be found. Irrigation seepage and alkaline pools here and in dry forest also provide an ideal habitat for many of these species, particularly if cattle or horses graze nearby.



Fig. 1. Biotic zones of British Columbia, adapted from those of Munro & Cowan (1947) and Lyons (1965).

Zone B, Dry Forest

A southern interior zone which lies to the north and east of Zone A and is on average slightly higher in altitude. It comprises two areas separated by wet forest and mountain ranges. All the species of the previous zone are found here although several that are found in this zone do not occur in Zone A. *Ae. campestris* is locally more abundant than *Ae. dorsalis* in the Kamloops and Shuswap areas and *Ae. flavescens*, a species commonly associated with them, is also found in the north of this zone. Timbered floodplains along rivers yield *Ae. increpitus* and *Ae. sticticus* even though these species are more common in luxuriantly

forested zones. *Ae. hendersoni* and *Ae. sierrensis* whose larvae develop in water-filled, rot cavities in trees overlap in this zone, the eastern limit of the latter's range.

Zone C, Cariboo and Peace River Parklands

Although widely separated, both the Cariboo which is centrally situated in the southern half of the province and the Peace River country in the northeast quarter, are similar to much prairie terrain. They are mainly flat or undulating parklands with occasional clumps of trees or open forest and with many sloughs and small lakes. Prairie species like *Ae. flavescens* and *Ae. campestris* are found here in open alkaline

pools, along with the more widespread *Ae. cataphylla*, *Ae. euedes* and *Ae. mercurator*. Widely distributed in the prairies, *Ae. riparius* is found in this zone where it is frequently accompanied by the prairie form of *Ae. spencerii* (*idahoensis*), and in boreal forest adjacent to the Peace River region.

Zone D, Columbia Forest

This is an area of luxuriant rain forest in the southern interior, lying between the two regions of Dry Forest (Zone B) and separated from them by the Monashee and Purcell Mountain ranges.

Many of the species in this zone are also found in coastal forest, most commonly, *Ae. sticticus*, *Ae. vexans*, *Ae. punctor* and *Cs. impatiens* and species of permanent swamps, *Mansonia perturbans* and *Cs. morsitans*. The treehole mosquitoes, *Ae. hendersoni* and *Ae. sierrensis*, overlap in the zone, which is apparently the western limit of the former's range.

Zone E, Alplands, Subalpine and Boreal Forest

This zone comprises much of the northern half of the province, the central plateau and high regions in the south. Summers are brief, winters long and cold.

Collections were made by Dyar (1920) in boreal forest around Teslin and Atlin Lakes. He found that *Ae. communis* was the most abundant mosquito breeding in snow-melt pools, followed by *Ae. cataphylla*, and *Ae. hexodontus* and less commonly, *Ae. pionips*. Hearle (1932) found the arctic species, *Ae. impiger*, *Ae. nigripes* and *Ae. hexodontus*, characteristic of subalpine regions of the Rocky Mountains. The northern insect survey (Freeman 1952) had traps at Fort Nelson, Lower Post and Muncho L. which collected 12 species of mosquitoes. Surprisingly, of these *Ae. impiger*, was the only truly arctic species.

Zone F, Coast Forest, Puget Sound Lowlands and Gulf and Queen Charlotte Islands

A mainly wet and heavily forested region comprising most of the coast line, the islands and the lower Fraser Valley. Five species are restricted to this zone. Three of them, *Ae. togoi* in rock pools, *Ae. aboriginis* and *Ae. aloponotum* in wet forest, are found nowhere else in Canada. *An. punctipennis* and *Cs. minnesotae*, although widely distributed in North America have been found only in this zone in British Columbia. As in California, the coastal form of *Ae. dorsalis* that is confined to salt marsh and rock pools is geographically isolated from the form found in the interior.

The number of zones in which each species of mosquito is found and the number of localities that it has been reported from in each zone are shown (Table 1).

LIST OF DISTRIBUTIONS

The mosquitoes are listed by genus, the locali-

ties for each species by zone. The number of localities (in parentheses) given by Hearle, for a particular zone, is followed by the names of recent ones which are pinpointed in Table 2.

Aedes species

aboriginis Dyar

Zone F, (7), Burnaby L., Chilliwack, Langley, Port Coquitlam, Kwinita

Apparently confined to this zone, its typical habitat is coastal rain forest. It has been collected from Vancouver Is. to Chilliwack in the south and north to Prince Rupert.

aloponotum Dyar

Zone F, (9), Burnaby L.

Found only on Vancouver Is. and in the lower mainland so far, its larvae develop in woodland pools often associated with those of *Ae. aboriginis*, *Ae. cinereus* and *Cs. morsitans*.

Dyar referred to 3 specimens as *fletcheri* possibly because Hearle (1920) called them *fletcheri alopnotum*.

campestris Dyar & Knab

Zone A, Oliver, Osoyoos; Zone B, (2), Kamloops, Lillooet, Marble Canyon, Merritt, Mission Flats, Salmon Arm, Tranquille, Trout Cr.; Zone C, (1), Cariboo area, Hanceville, Westwick L.; Zone D, (1); Zone E, Atlin

Found mainly in the southern interior, this is a grassland species that breeds in somewhat alkaline pools as soon as the snow has melted. Hearle (1932) found it one of the dominant mosquito pests on the Chilcotin plateau and Gibson (1929) one of the main pests around Kamloops.

canadensis (Theobald)

(This species was accidentally omitted from Curtis's book, 1967)

Zone B, (1), Kamloops; Zone C, Fort Nelson; Zone D, (1), Kitchener; Zone E, (1), Lower Post; Zone F, (3), Parksville

A typical woodland species breeding in temporary pools, it has a widespread distribution from Vancouver Island to Kaslo in the south and north to Lower Post.

cataphylla Dyar

Zone A, (1); Zone B, (4), Kamloops, Lac Du Bois, Pemberton L., Pinantan L.; Zone C, (1), Cariboo area, Chezacut, Riske Cr., Westwick L.; Zone D, (1); Zone E, (5), Manning Pk., Mt. Seymour, Pothole; Zone F, (2, as *pacificensis* Hearle), Indian R.

Widespread in the province, it is one of the predominant species of dry interior grassland. Hearle (1932) found it, with *Ae. campestris*, the main pest on the Chilcotin plateau. It develops here in open grassy snow-melt pools and is abundant in river flood pools in mountains and forests.

	Total records/zone						Remarks	
	Zones	A	B	C	D	E		F
Aedes								
aboriginis							12	one zone
aloponotum							10	one zone
campestris	2	10	4	1	1			interior
canadensis		2	1	2	2	4		
cataphylla	1	8	5	1	8	3		all zones
cinereus	2	4	1	2	5	15		all zones
communis	1	4	1	1	8	9		all zones
diantaeus			1				2	
dorsalis	2	7					14	
euedes	1	1	2		1	1		
excrucians	1	8	1		1	2		
fitchii		5	3		4	4		
flavescens	2	2	4		2	1?		
hendersoni		1		1				treeholes
hexodontus			1		6	3		
impiger		1		1	1			
implicatus	2	3	1		6			dry or high areas
increpitus	2	7	3		2	6		
intrudens		7	4			4		
melanimon	1	7						dry
mercurator		5	4					dry
nevadensis				1				one zone
nigripes					1			one zone
pionips		1	1		3	2		
provocans		1	4	2	1			
pullatus			1	2	5	2		
punctor		2	1	4	7	11		
riparius			2		2			dry or high
sierrensis	1	1		3	1	21		treeholes
spencerii	2	6	1		1			dry or high
sticticus	1	8	2	7	6	17		all zones
togoi						9		one zone
vexans	2	11		5	5	22		
Anopheles								
earlei	1	8	4	1		6		
freeborni	3	2		1	1			
punctipennis						24		one zone
Culex								
pipiens		1				9		
tarsalis	2	8			1	9		
territans	1	2				11		
Culiseta								
alaskaensis	1	2	4		3	5		
impatiens		2	2	4	3	18		
incidens	1	5			3	16		
inornata	1	4	3		1	7		
minnesotae						1		one zone
morsitans		1		1		3		
Mansonia								
perturbans				2		8		wet areas

TABLE 1. Number of localities in each zone from which mosquitoes have been collected. Hearle's records have been included although many of his specimens were not seen by us. His localities are not included in Table 2.

cinereus Meigen

Zone A, (1), Keremeos; Zone B, (1), Cache Creek, Kamloops, Tranquille; Zone C, Fort Nelson; Zone D, (2); Zone E, (2), Lower Post, Fort St. John; Grand Forks; Zone F, (13), Burnaby L., Harrison

This species has been recorded from every part of the province. It is often found in or near woodland. The larvae inhabit open or shaded flood water, rain pools or swamps.

communis (Degeer)

Zone A, (1); Zone B, (3), Kamloops; Zone C, Fort Nelson; Zone D, (1); Zone E, (3), Craigellachie, Eagle Valley, Malakwa, Lower Post, Muncho L.; Zone F, (8), Elk Mt.

Collected all over the province, most records are from subalpine, boreal and coast forest, although subalpine specimens identified from adults may have been *Ae. nevadensis*. Dyar (1920) found it one of the commonest species in the mountains and the dominant species in the Skeena Valley, right down to tide level. The larvae live mainly in shaded pools.

diantaeus Howard, Dyar & Knab

Zone C, Fort Nelson; Zone F, (2)

Dyar (1920) found it "not uncommon" in the Skeena Valley and, so far as we know, this species has only been found in northern B.C. There are, however, records of it in the southern Rocky Mountain foothills on the Alberta side of the border.

dorsalis (Meigen)

Zone A, (1), Keremeos; Zone B, (3), Kamloops, Trout Cr., Tranquille, Merritt; Zone F, (8), Richmond, Saanich, Saltspring Is., Telegraph Bay, Tsawwassen, White Rock

Found in the southern half of the province, this multivoltine species is our principal salt marsh mosquito on the coast and can be a pest on neighbouring beaches. We have occasionally found the larvae in rock pools along with those of *Ae. togoi* and *Cs. incidens*. In the interior, it behaves like a typical grassland species, thriving in alkaline swamps and pools and in the fresh water of irrigation seepage.

euedes Howard, Dyar & Knab

Zone A, Oliver; Zone B, Kamloops; Zone C, Fort Nelson, Westwick L.; Zone E, Telegraph Cr.; Zone F, Popkum

Because of the similarity of their adult females (before the recognition of the tarsal claw as a taxonomic character) some of the localities listed for *excrucians* may in fact apply to *euedes*.

excrucians (Walker)

Zone A, (1); Zone B, (4), Cache Creek, Kelowna, Kamloops, Tranquille; Zone C, Pouce Coupe; Zone E, Lower Post; Zone F, (1), Chilliwack

Found locally throughout the province in woodland or open grassland, the larvae inhabit temporary pools. Some of Hearle's localities may refer to *Ae. euedes*.

fitchii (Felt & Young)

Zone B, Kamloops, Kelowna, Lac Du Bois, Princeton, Tranquille; Zone C, Cariboo area, Chilcotin plateau, Fort Nelson; Zone E, Atlin, Kootenay Ntl. Pk., Lower Post, Prince George; Zone F, (2), Saltspring Is., Skagit V.

Although the larvae are easily identified, the adult females can be confused with those of *Ae. euedes* and *Ae. mercurator*. Consequently some of the above localities may have been wrongly attributed to *fitchii*. This widespread species is common in open woods and transition areas between forest and grassland, it is one of the main pest mosquitoes in the southern interior. The larvae inhabit snow-melt pools, often associated with *Ae. increpitus*.

flavescens (Müller)

Zone A, (1), Osoyoos; Zone B, Kamloops, Rose Hill; Zone C, (1), Cariboo area, Chezacut, Fort Nelson; Zone E, (1), Fort St. John; Zone F, Richmond(?)

Collected at widely separated points in B.C., it develops mainly in alkaline pools in open grassland in the southern interior. In Alaska, *Ae. flavescens* has been found in coastal salt marsh and there is a recent, unconfirmed, record of a biting female from salt marsh at Richmond.

The specimen collected on Mt. Cheam in 1899 by the Dominion Entomologist, J. Fletcher, was described as a new species, *fletcheri*, by Coquillett in 1902. Unfortunately, Hearle (1920) used the name *fletcheri alopnotum* for some specimens that were actually *alopnotum* making previous interpretations of *fletcheri* uncertain.

hendersoni Cockerell

(Hearle's *triseriatus*)

Zone B, (1); Zone D, Sirdar

The two confirmed records are from the southern interior. The larvae inhabit water-filled rot cavities in deciduous trees.

hexodontus Dyar

(Hearle's *leuconotips* and *cyclocerculus*)

Zone C, Fort Nelson; Zone E, Field, Michel, Hollyburn, Kootenay Ntl. Pk., Manning and Mt. Seymour Provincial Pks., Zone F, (1), Kwinitsa, Tenquille L.

A variable species with arctic and southern forms, it extends its range down the Cordilleras and out to the northern coast. On the southern border of the province, we have found it only in the mountains where its larvae are abundant in alpine pools.

***impiger* (Walker)**
(Hearle's *nearcticus*)

Zone B, Cranbrook; Zone D, Revelstoke; Zone E, (1)

One of the major mosquito pests of the high arctic, its range extends southwards in the Rocky Mts. where the larvae develop in alpine pools, sometimes along with those of *Ae. pullatus* and *Cs. alaskaensis*.

***implicatus* Vockeroth**(Hearle's *impiger*)

Zone A, (2); Zone B, (2), Kamloops; Zone C, Fort Nelson; Zone E, (4), Lower Post, Michel

Scattered over much of the province, it is mainly a woodland mosquito developing in temporary snow-melt or rain pools. It is found in coastal salt marsh in Alaska so may occur in similar habitats west of the coast range in B.C.

***increditus* Dyar**

(Some of Hearle's localities were for a synonym, *inequitus*)

Zone A, (1), Osoyoos; Zone B, (3), Kamloops, Louis L., Pass L., Salmon Arm; Zone C, Cariboo area, Hanceville, Westwick L.; Zone E, Manning Pk., Vavenby; Zone F, (2), Chilliwack Lake Errock, Piers Is., Skagit V.

Widespread and numerous, it is found mainly in the southern interior. The larvae inhabit rain or snow-melt pools, flood water or irrigation seepage.

***intrudens* Dyar**

Zone B, (1), Douglas Lake, Kamloops, Merritt, Pass L., Salmon Arm, Tranquille; Zone C, Fort Nelson, Hanceville, Lone Butte, Tin Cup L.; Zone F, (3)

Found predominantly in the dry interior, its localities are scattered throughout the province as far west as Vancouver Island and north as Fort Nelson. The larvae develop in bogs and in rain or snow-melt pools in woodland or in the open.

***melanimon* Dyar**

Zone A, Keremeos; Zone B, Douglas Lake, Kamloops, Merritt, Nicola, O'Keefe, Quilchena, Summerland

Found in the dry southern interior, the adult females are very similar to *Ae. dorsalis* so that it may be more widespread than the localities above indicate.

***mercurator* Dyar**(Hearle's and Curtis's *stimulans*)

Zone B, (1), Kamloops, Lac Du Bois, Pass L., Tranquille; Zone C, Chilcotin plateau, Fort Nelson, Riske Cr., Williams Lake

This grassland species is found mainly in the parkland zones in the interior of the province.

***nevadensis* Chapman & Barr**

Zone D, Sheen L.

A sibling of *Ae. communis*, it may be fairly widely distributed along the southern interior border.

***nigripes* (Zetterstedt)**

Zone E, Moosehorn L.

This arctic species does not extend far southwards in the mountains. It was found at 1,500m at Moosehorn L. and there is one dubious record from the north west corner of B.C.

***pionips* Dyar**

Zone B, (1); Zone C, Fort Nelson; Zone E, (2), Lower Post; Zone F, (2)

This northern mosquito is found mainly in our boreal forest and in mountains further south. The larvae develop in snow-melt and rain pools, often associated with *Ae. communis*.

***provocans* (Walker)**(Hearle's and Curtis's *trichurus*)

Zone B, Pass L.; Zone C, Fort Nelson, Lac Le Jeune, Montney, Pouce Coupe; Zone D, (1), Lost Cr.; Zone E, Vavenby

Confined to the interior of the province, the larvae inhabit snow-melt pools in woods and open flooded areas.

***pullatus* (Coquillett)**

Zone C, Fort Nelson; Zone D, (1) Sheen L.; Zone E, (2), Chilkat Pass, Grand Forks, MacGregor; Zone F, (1), Skagit V.

Found predominantly in boreal forest, it occurs on or near mountains in the southern interior. The larvae develop in snow-melt pools and the flooded margins of streams.

***punctor* (Kirby)**

Zone B, (1), Kamloops; Zone C, Fort Nelson; Zone D, (4); Zone E, (4), Eagle Valley, Muncho L., Steamboat Mt.; Zone F, (6), Vancouver, Chilliwack, Hope, Kitimat, Maple Ridge

Ae. punctor adults and larvae are very similar to those of *Ae. hexodontus* so that some of the above records may refer to the latter. Widespread in the province, this species can be a serious pest of man and livestock near wooded areas. The larvae inhabit snow-melt pools.

***riparius* Dyar & Knab**

Zone C, Dempsey L., Fort Nelson; Zone E, Lower Post, Fort St. John

This prairie species has been found in the Cariboo area, the Peace River area and adjacent boreal forest in the northeast quarter of the province.

***sierrensis* (Ludlow)**(Hearle's *varipalpus*)

Zone A, Keremeos; Zone B, Kelowna; Zone D,

(1), Kootenay L., Mara L.; Zone E, Bear L.; Zone F, (17), Burnaby L., Indian R., Point Atkinson, Queen Charlotte Is.

Quite common in wooded areas across the south west of the province, the most northerly record is Terrace. The larvae develop in tree-holes, or occasionally in artificial containers.

spencerii (Theobald)

(Now regarded, on somewhat tenuous evidence, as forms of the same species, Hearle attributed some of the localities below to *idahoensis* which he considered distinct).

Zone A, (1), Keremeos; Zone B, (3), Kamloops, Tranquille, Merritt; Zone C, Peace River area; Zone E, (1)

The *spencerii* form, one of the main pests in the prairies, has been found here only in the Peace River area, east of the Rockies. Hearle listed Kaslo where Dyar thought he found it in 1904. However, Dyar did not mention Kaslo when he discussed *spencerii* in 1919 and 1920. The *idahoensis* form, commoner than *spencerii* in B.C., occurs in the southern interior in open woodland and mountain areas where the larvae are sometimes found with those of *Ae. vexans* and *Ae. dorsalis*.

sticticus (Meigen)

(Hearle's *hirsuteron* and *aldrichi*)

Zone A, (1); Zone B, (4), Kelowna, Merritt, Salmon Arm, Tranquille; Zone C, Cariboo area, Chilcotin plateau; Zone D, (7); Zone E, (6); Zone F, (16), Rosedale

In years of heavy flooding this is one of the major pest species across the south of the province when it develops in enormous numbers in wooded river flats, particularly of cottonwood. The larvae are often found with *Ae. vexans* and *Ae. cinereus*.

togoi (Theobald)

Zone F, Agate Beach, N. and S. Pender Is., Britannia Beach, Point Atkinson, Horseshoe Bay, Earls Cove, Irvine's Landing, Roberts Cr.

Confined to rocky coastline, the larvae inhabit pools just above high tide level which they occasionally share with *Cs. incidens* and *Ae. dorsalis*.

vexans (Meigen)

Zone A, (2); Zone B, (7), Cache Creek, Merritt, Tranquille, Trout Cr.; Zone D, (5); Zone E, (3), Eagle Valley, Lower Post; Zone F, (13), Agassiz, Burnaby L., Esquimalt, Harrison, Port Mann, Ross L., Vancouver, White Rock, Yale

The worst mosquito pest in southern B.C., it is a rain and flood water species found both in open and wooded areas. The larvae are also found in irrigation run-off and woodland pools.

Anopheles species

earlei Vargas

(Hearle's *maculipennis*. Curtis's references to *An. occidentalis* in B.C. should also be to *earlei*) Zone A, (1), Hadwen's additional specimen from Keremeos should probably be attributed to *An. freeborni*; Zone B, (5), Kamloops, Knouff L., Penticton; Zone C, (1), Cariboo area, Fort Nelson, Westwick L.; Zone D, (1); Zone F, (5), Harrison

Widely distributed in southern B.C., it is less common than *An. punctipennis* in the lower Fraser Valley. The larvae breed in very cold water, often in sluggish streams or weedy ditches and in irrigation seepage in the interior.

freeborni Aitken

(Hearle's *quadrimaculatus*)

Zone A, (2 - including Keremeos), Fairview; Zone B, (2); Zone D, Revelstoke; Zone E, Kootenay Ntl. Pk.

Found mainly in the southern interior, Curtis's remark of its capture in the Fraser Valley may refer to the dry upper valley somewhere north of Lytton. The larvae develop mainly in clear water in open sunny situations such as irrigation seepage but can tolerate some pollution.

punctipennis (Say)

Zone F, (14), Boston Bar, Burnaby L., Chilliwack, Harrison, Hatzic, Fort Langley, Laidlaw, Maple Ridge, Royal Oak, Vancouver

The only anopheline found so far on Vancouver Is., it is commoner than *An. earlei* in the lower Fraser Valley. The larvae inhabit almost any kind of water.

Culex species

pipiens L.

Zone B, Penticton; Zone F, (1), Victoria, Patricia Bay, Burnaby L., Chilliwack, Harrison, Maple Ridge, Richmond, Tsawwassen

Rare in Hearle's time, he speculated that it had been recently introduced. It has spread and increased enormously in numbers and is now common across the south of the province from Vancouver Is. at least as far as Penticton. The larvae develop in any type of standing water, from clean natural pools to sewage lagoons and a great variety of artificial containers.

tarsalis Coquillett

Zone A, (1), Osoyoos; Zone B, (3), Cache Creek, Kamloops, Penticton, Pinantan L., Tranquille; Zone E, Little Fort; Zone F, (7), Burnaby L., Cheam View

Fairly common across the south of the province, the most northerly locality is Little Fort. The larvae inhabit flooded meadows, open ditches, sewage lagoons, etc.

TABLE 2. Localities where confirmed species of mosquitoes were collected. Biotic zone, shortest distance and direction from reference points are taken from the map (Fig. 1).

Locality	Zone km	Dir.	Reference	Locality	Zone km	Dir.	Reference
Agassiz	F 90	E	Vancouver	Maple Ridge	F 40	E	Vancouver
Agate Beach	F 10	N	Victoria	Mara L.	D 90	E	Kamloops
Arrowhead	D 40	SE	Revelstoke	Marble Canyon	B 110	W	Kamloops
Atlin	E on map			Merritt	B 71	SW	Kamloops
Bear L.	E 26	NW	Kaslo	Michel	E 160	E	Kaslo
Boston Bar	F 54	N	Hope	Milner	F 35	SE	Vancouver
Britannia Beach	F 42	N	Vancouver	Mission Flats	B 5	N	Kamloops
Burnaby L.	F 12	E	Vancouver	Montney	C 27	N	Fort St. John
Cache Creek	B 68	W	Kamloops	Moosehorn L.	E 300	SW	Fort Nelson
Cariboo area	C	S of	Williams Lake	Mt. Seymour	E 20	NE	Vancouver
Castlegar	D on map			Muncho L.	E 16	W	Fort Nelson
Cheam View	F 100	E	Vancouver	Nicola	B 65	SW	Kamloops
Chezacut	C 126	W	Williams Lake	O'Keefe	B 80	E	Kamloops
Chilcotin plateau	C	W of	Williams Lake	Oliver	A 15	N	Osoyoos
Chilkat Pass	E 110	W	Atlin	Osoyoos	A on map		
Chilliwack	F 88	E	Vancouver	Parksville	F 120	NE	Victoria
Craigellachie	E 36	E	Revelstoke	Pass L.	B 63	N	Williams Lake
Cranbrook	B 160	E	Castlegar	Patricia Bay	F 20	NE	Victoria
Creston Bog	D 90	E	Castlegar	Peace River area	C	N of	Prince George
Dempsey L.	C 150	NW	Kamloops	Pemberton L.	B 27	NF	Kamloops
Douglas Lake	B 55	S	Kamloops	Pender Is.	F 45	N	Victoria
Eagle Valley	E 125	E	Kamloops	Penticton	B 52	N	Osoyoos
Earls Cove	F 90	NW	Vancouver	Piers Is.	F 50	N	Victoria
Elk Mtn.	F 87	E	Vancouver	Pinantan L.	B 24	NE	Kamloops
Esquimalt	F 10	W	Victoria	Point Atkinson	F 16	W	Vancouver
Fairview	A 18	NW	Osoyoos	Popkum	F 96	E	Vancouver
Field	E 150	E	Revelstoke	Port Coquitlam	F 18	E	Vancouver
Fort Langley	F 50	SW	Vancouver	Port Mann	F 18	E	Vancouver
Fort Nelson	C on map			Pothole	E 72	S	Kamloops
Fort St. John	E on map			Pouce Coupe	C 80	SE	Fort St. John
Grand Forks	E 50	SW	Castlegar	Prince George	E on map		
Hanceville	C 60	W	Williams Lake	Princeton	B 67	E	Hope
Harrison L.	F 105	E	Vancouver	Queen Charlotte Is.	F 161	SW	Prince Rupert
Hatzic	F 70	E	Vancouver	Quilchena	B 60	S	Kamloops
Hollyburn	E 15	N	Vancouver	Revelstoke	D on map		
Hope	F on map			Richmond	F 16	S	Vancouver
Horseshoe Bay	F 17	NW	Vancouver	Riske Cr.	C 30	SW	Williams Lake
Indian R.	F 30	NE	Vancouver	Roberts Cr.	F 45	NW	Vancouver
Irvine's Landing	F 80	NW	Vancouver	Rose Hill	B 3	SE	Kamloops
Kamloops	B on map			Rosedale	F 102	F	Vancouver
Kelowna	B 110	SW	Kamloops	Ross L.	F 48	SE	Hope
Keremeos	A 30	NW	Osoyoos	Royal Oak	F 5	NE	Victoria
King Salmon L.	E 110	S	Atlin	Ruskin	F 42	E	Vancouver
Kinnaird	D 3	W	Castlegar	Saanich	F 24	N	Victoria
Kitchener	D 99	E	Castlegar	Salmon Arm	B 70	E	Kamloops
Kitimat	F 110	E	Prince Rupert	Saltspring Is.	F 40	N	Victoria
Kitsumkalum	F 115	NE	Prince Rupert	Sheen L.	D 35	SW	Castlegar
Knouff L.	B 40	N	Kamloops	Sirdar	D 80	E	Castlegar
Kootenay L.	D 70	E	Castlegar	Skagit V.	F 30	S	Hope
Kootenay Ntl. PK.	E 115	NE	Kaslo	Steamboat Mt.	E 66	W	Fort Nelson
Kwinitsa	F 45	E	Prince Rupert	Summerland	B 68	N	Osoyoos
Lac Du Bois	B 10	N	Kamloops	Telegraph Cr.	E 18	N	Atlin
Lac Le Jeune	C 24	SW	Kamloops	Telegraph Bay	F 6	N	Victoria
Laidlaw	F 102	E	Vancouver	Tenquille L.	F 140	N	Vancouver
Lake Errock	F 69	E	Vancouver	Tin Cup L.	C 96	NW	Kamloops
Langley	F 33	SE	Vancouver	Tranquille	B 15	W	Kamloops
Lillooet	B 113	W	Kamloops	Trout Cr.	B 62	N	Osoyoos
Little Fort	E 155	SE	Williams Lake	Tsawwassen	F 28	S	Vancouver
Lone Butte	C 92	SE	Williams Lake	Vancouver	F on map		
Lost Cr.	D 96	S	Kaslo	Vavenby	E 110	NE	Kamloops
Louis L.	B 15	NE	Kamloops	Victoria	F on map		
Lower Post	E on map			Westwick L.	C 15	S	Williams Lake
MaeGregor	E 18	F	Prince George	White Rock	F 37	SE	Vancouver
Malakwa	E 40	W	Revelstoke	Williams Lake	C on map		
Manning Pk.	E 217	E	Vancouver	Yale	F 20	N	Hope

territans Walker
(Hearle's *apicalis*)

Zone A, (1); Zone B, (2); Zone F, (8), Esquimalt, Harrison, Hope

It has been found across the south of the province, mainly west of the coast range. It develops in pools, swamps and ditches but seldom in polluted water.

Culiseta species (Hearle's *Theobaldia*)
alaskaensis (Ludlow)

Zone A, (1); Zone B, (2); Zone C, (1), Fort Nelson, Pouce Coupe, Westwick L.; Zone E, (1), King Salmon L., Muncho L.; Zone F, (1), Patricia Bay, Victoria, Harrison, Vancouver

This species has been found at very widely scattered localities in the province but is sel-

dom common or annoying. The larvae inhabit weedy pools and ditches.

impatiens (Walker)

Zone B, (1), Kamloops; Zone C, Fort Nelson, Williams Lake; Zone D, (1), Arrowhead, Castle-gar, Kinnaird; Zone E, (2), Fort St. John; Zone F, (14), Horseshoe Bay, Kitsumkalum, Ruskin, Skagit V.

Salvus (Zone F), Taku and Atlin (Zone E) included in Dyar's 1920 list, were omitted from his 1921 list and from Hearle's, possibly an oversight. Widespread in the province, it is one of the few species recorded from the Queen Charlotte Is. The larvae develop mainly in shaded woodland pools.

incidens (Thomson)

Zone A, (1); Zone B, (4), Kamloops; Zone E, (3); Zone F, (11), Britannia Beach, Burnaby L., Milner, Tsawwassen, Queen Charlotte Is.

This mosquito, "the most widespread and commonest species in B.C." (Hearle 1932) is still common wherever we have collected mosquitoes in the lower mainland. Once found in nearly every rain barrel in the province, larvae can now be found in almost any type of standing water, from clear to polluted and in brackish coastal pools, occasionally shared with *Ae. togoi* and *Ae. dorsalis*.

inornata (Williston)

(Hearle's *inornatus*)

Zone A, (1); Zone B, (4); Zone C, Cariboo area, Peace R. area, Westwick L.; Zone E, Mt. Seymour; Zone F, (1), Burnaby L., Harrison, Hope, Maple Ridge, Richmond, Tsawwassen

It is widely distributed, mainly across the south of the province but nowhere very numerous. The larvae inhabit deep shaded woodland pools, irrigation seepage and polluted or brackish water.

minnesotae Barr

Zone F, Port Coquitlam

The only confirmed record for the province

was the capture of two females at a light trap (Costello 1977). The species is very similar to *Cs. morsitans* and some confusion of the localities may have occurred. In Manitoba and Minnesota the larvae inhabit permanent marshes.

morsitans (Theobald)

(Hearle's *dyari*)

Zone B, Cache Creek; Zone D, (1); Zone F, (1), Burnaby L., Richmond

Thought to be predominantly northern, this species has been very common in recent years around Burnaby L. The larvae develop in reedy swamps and woodland pools, sometimes in the lower mainland, associated with *Ae. aloponotum*.

Mansonia perturbans (Walker)

Zone D, (1), Creston Bog; Zone F, (4), Burnaby L., Chilliwack, Hope, Vancouver Is.

It is found in wet zones across the south of the province. The larvae, which remain attached to plants, develop in permanent marshes and swampy lakeshore where there are cattails or similar plants.

The following new localities have been confirmed since the manuscript was submitted.

Ae. communis — Zone E, Bear Glacier, Fort St. John

excrucians — Zone E, Cranberry Jct.

fitchii — Zone E, Cranberry Jct.

spencerii — Zone B, Kelowna, Quilchena; Zone C, Dawson Creek, Lone Butte; Zone D, Lost Cr.

CONCLUSIONS

As with many distribution lists, this one reflects the distribution of collectors more accurately than that of mosquitoes. Only the lower mainland and the Kamloops area have been searched systematically; it is thus an interim list. The centre, north eastern and north western borders of the province and the coastal islands will yield many more records.

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