

Chapter 12

Aphids (Hemiptera: Aphidoidea) of the Prairies Ecozone of Canada

R.G. Foottit* and E. Maw

Invertebrate Biodiversity (National Environmental Health Network)
and Canadian National Collection of Insects
Agriculture and Agri-Food Canada, K.W. Neatby Building, 960 Carling Avenue
Ottawa, Ontario, Canada, K1A 0C6

*Corresponding author e-mail: Robert.Foottit@agr.gc.ca

Abstract. Three hundred fifty-seven species of aphids are found in the Prairies Ecozone, of which 81 are adventive. The distribution of aphids in the region is determined by the availability of host plants and has been strongly affected by agricultural practices. The faunal elements unique to this ecozone relative to the rest of Canada represent the northern limits of species feeding on dryland shrubs centred in the Great Basin of the United States.

Résumé. On dénombre dans l'écozone des prairies 357 espèces de pucerons, dont 81 sont adventives. La répartition de ces insectes dans la région dépend de la disponibilité des espèces végétales hôtes, qui est fortement influencée par les pratiques agricoles. Les éléments fauniques uniques à cette écozone par rapport au reste du Canada représentent la limite nord des espèces qui se nourrissent d'arbustes dans les zones arides du Grand Bassin des États-Unis.

Introduction

In general, a particular aphid species feeds on a restricted range of hosts, usually constituting a single genus or tribe, but sometimes a single species of plant (Dixon 2005). Furthermore, a number of species alternate between plant species; a perennial (tree or shrub) serves as the overwintering primary host on which sexual reproduction occurs, and a secondary host (frequently an herbaceous plant) is used in summer. Therefore, these aphid species require both hosts to be available in the same area (although some species can persist without a sexual phase on the secondary host in the absence of their normal primary host). Aphid distributions are thus limited by the host distributions. On the other hand, if local conditions are appropriate for the persistence of the host plant, the aphids will usually find and use them. Differences in life history strategies among host plants are reflected in differences in strategies among aphids. Two groups of aphids may be distinguished: those that are associated with reliable perennial hosts, and those that depend on environmental disturbances that encourage the propagation of weedy host plants and that are usually more adept at long-distance dispersal. The major disruption of the Prairies Ecozone by agriculture has favoured the latter so that the most commonly encountered aphids in the region today belong to widespread species associated with crop plants and their weeds.

The scope of the current work includes all aphids found within the Prairies Ecozone as outlined in Shorthouse (2010), including the contained highlands and the Parkland

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Ecoregion. Harper and Bradley (1987) provided a list of 147 aphid species with their host associations for Alberta, and Robinson and Lamb (1991) listed 324 species found in Manitoba. The only treatment of aphids for Saskatchewan is included in Maw *et al.* (2000). A significant number of the species in the Alberta list are from montane habitats. For example, 22% of the species listed are in the conifer-feeding genus *Cinara*. About 15% of the species from Manitoba were collected only in the far southeastern part of the province (Boreal Plains and Boreal Shield, especially Sandilands Provincial Forest and Whiteshell Provincial Park), or from the Hudson Bay Lowlands (Churchill), and thus are outside the region being considered here. Material in the Canadian National Collection of Insects, Arachnids, and Nematodes was examined and previously undetermined material identified. This material includes the collection of the late A.M. Harper and representative slides of almost all specimen series from the collection of the late A.G. Robinson.

Aphid classification (Table 1) follows Remaudière and Remaudière (1997) as updated by Nieto Nafria *et al.* (1998). Angiosperm family names follow APG III (Angiosperm Phylogeny Group 2009). Among the plant genera included in Table 2, this classification differs from the familiar available floral references mainly in the transfer of some Scrophulariaceae to Orobanchaceae and of *Sambucus* and *Viburnum* from Caprifoliaceae to Adoxaceae; the placement of Aceraceae within Sapindaceae, Asclepiadaceae within Apocynaceae, and Chenopodiaceae within Amaranthaceae; and the arrangement of the lily-like monocots.

Because of the strong association between aphids and their host plants, the list of aphid species in the ecozone (Table 2) is organized by host taxa. A summary of number of species associated with various host groups, habitat types, and life cycle characteristics is given in Table 3. The following discussion highlights or expands on information presented within Table 2.

Grasslands

The most characteristic aphids of North American grasslands are those associated with dryland shrubs. Several genera of aphids are restricted to *Artemisia* hosts or contain a preponderance of species on *Artemisia*. *Epameibaphis*, *Pseudoepameibaphis*, *Artemisaphis*, *Flabellomicrosiphum*, and *Microsiphoniella* (all restricted to *Artemisia*) are endemic to the dry basins of western North America. Two species of *Pseudoepameibaphis* are found in the southern parts of all three Prairie Provinces; two species of *Epameibaphis* and one each of *Artemisaphis*, *Flabellomicrosiphum*, and *Microsiphum* are known to occur in southern Alberta (the latter also in Manitoba). Species of *Obtusicauda* (five in western North America, with one of these known to occur in the Canadian prairies, and several species in Asia) are also restricted to *Artemisia*. The *Aphis* subgenus *Zyxaphis* is endemic to western North America on plants of the genera *Artemisia*, *Chrysothamnus*, and *Ericameria*. At least one species of *Zyxaphis* (*A. canae*) has been collected in Alberta and Saskatchewan. The genus *Pleotrichophorus* has radiated extensively on shrubs of the family Asteraceae in the Great Basin. Of the approximately 60 species worldwide, most are found in the Great Basin and other dry basins of western North America, with 16 species occurring on shrubby Astereae (*Chrysothamnus*, *Ericameria*, *Gutierrezia*, and *Haplopappus*), 18 species on *Artemisia*, and four on *Achillea*. In the Canadian Prairie Provinces, seven species of *Pleotrichophorus* have been collected on *Artemisia* and two on *Achillea*. In addition, *P. villosae*, found on *Heterotheca villosa* (= *Chrysopsis villosa*), is known only from southern Manitoba, and an unidentified species has been collected on *Iva axillaris* at Regina, Saskatchewan.

Table 1. Classification of aphid genera found in the Prairies Ecozone, according to the scheme of Remaudière and Remaudière (1997) with updated nomenclature by Nieto Nafria *et al.* (1998).

Higher Taxon	Genera
Adelgidae	<i>Adelges</i> , <i>Pineus</i>
Phylloxeridae	<i>Phylloxera</i>
Aphididae ¹	
Anoeciinae	<i>Anoecia</i>
Aphidinae	
Aphidini	<i>Aphis</i> , <i>Asiphonaphis</i> , <i>Brachyunois</i> , <i>Hyalopterus</i> , <i>Hysteroneura</i> , <i>Misturaphis</i> , <i>Rhopalosiphum</i> , <i>Schizaphis</i>
Macrosiphini	<i>Abstrusomyzus</i> , <i>Acyrtosiphon</i> , <i>Amphorophora</i> , <i>Aphthargelia</i> , <i>Artemisiaphis</i> , <i>Aspidaphis</i> , <i>Atarsos</i> , <i>Brachycaudus</i> , <i>Brachycorynella</i> , <i>Brevicoryne</i> , <i>Cachryphora</i> , <i>Capitophorus</i> ² , <i>Carolinaia</i> , <i>Catamergus</i> , <i>Cavariella</i> ² , <i>Ceruraphis</i> , <i>Chaetosiphon</i> , <i>Coloradoa</i> , <i>Cryptaphis</i> , <i>Cryptomyzus</i> , <i>Diuraphis</i> , <i>Epameibaphis</i> , <i>Ericaphis</i> , <i>Hayhurstia</i> , <i>Hyadaphis</i> , <i>Hyalomyzus</i> , <i>Hyperomyzus</i> , <i>Illinoia</i> , <i>Liosomaphis</i> ² , <i>Lipaphis</i> , <i>Macrosiphoniella</i> , <i>Macrosiphum</i> , <i>Metopolophium</i> , <i>Microlophium</i> , <i>Microsiphoniella</i> , <i>Muscaphis</i> , <i>Myzaphis</i> , <i>Myzodium</i> , <i>Myzus</i> , <i>Nasonovia</i> , <i>Nearctaphis</i> , <i>Obtusicauda</i> , <i>Ovatus</i> , <i>Pleotrichophorus</i> , <i>Pseudacaudella</i> , <i>Pseudocercidis</i> , <i>Pseudoepameibaphis</i> , <i>Pseudacaudella</i> , <i>Rhopalomzyus</i> , <i>Sitobion</i> , <i>Uroleucon</i> , <i>Utamphorophora</i>
Calaphidinae	
Calaphidini	<i>Betulaphis</i> , <i>Boernerina</i> , <i>Calaphis</i> , <i>Euceraphis</i> , <i>Oestlundiella</i> , <i>Symydobius</i>
Panaphidini	<i>Myzocallis</i> , <i>Hoplochaitophorus</i> , <i>Neosymydobius</i> , <i>Therioaphis</i> , <i>Tinocalli</i>
Chaitophorinae	
Siphini	<i>Sipha</i>
Chaitophorini	<i>Chaitophorus</i> , <i>Periphyllus</i> , <i>Pseudopterocomma</i>
Drepanosiphinae	<i>Drepanaphis</i>
Eriosomatinae	
Eriosomatini	<i>Colopha</i> , <i>Eriosoma</i> , <i>Tetraneura</i>
Pemphigini	<i>Clydesmithia</i> , <i>Mordwilkoja</i> , <i>Neoprociphilus</i> , <i>Pachypappa</i> , <i>Pemphigus</i> , <i>Prociphilus</i> , <i>Thecabius</i>
Fordini	<i>Forda</i> , <i>Geoica</i> , <i>Smynthurodes</i>
Hormaphidinae	<i>Hamamelistes</i>
Lachninae	
Eulachnini	<i>Cinara</i> , <i>Essigella</i> , <i>Eulachnus</i>
Lachnini	<i>Lachnus</i> , <i>Longistigma</i> , <i>Maculolachnus</i>
Tramini	<i>Trama</i>
Mindarinae	<i>Mindarus</i>
Phyllaphidinae	<i>Stegophylla</i>
Pterocommatinae ²	<i>Fullawayia</i> , <i>Pterocomma</i>
Saltusaphidinae	<i>Izypia</i> , <i>Subizypia</i> , <i>Subsaltusaphis</i> , <i>Thripsaphis</i>
Tamaliinae	<i>Tamalia</i>

¹ Other schemes divide Aphididae into several families, with family Aphididae composed of Aphidinae and Pterocommatinae only. However, there is a dispute about the relationships among some of the subfamilies and their assignment to the more narrowly defined families. Thus, we choose here to follow the current aphid catalogue (Remaudière and Remaudière 1997).

² Recent molecular evidence (von Dohlen *et al.* 2006) suggests that Pterocommatinae are most closely related to certain genera within Macrosiphini (*Cavariella* in particular, likely also *Capitophorus* and *Liosomaphis*), but a revised classification has not been formally proposed.

Table 2. Aphids on host plants with a summary of ecoregion associations. Aphids with host alternation between overwintering (primary) hosts on which sexual reproduction occurs and summer (secondary) hosts are listed under both host taxa. Host family-level classification follows APG III (Angiosperm Phylogeny Group 2009). Abbreviations: Cyc = life cycle relationship of aphid to host: 0 = can complete all phases of life cycle on single host; 1 = plant is a primary (winter) host; 2 = plant is a secondary (summer) host; 2* = plant is sole host in Prairies Ecozone (life cycle is incomplete (lacks sexual generations) in absence of primary host). Distribution: G = grassland; (G) = in depressions and other shrubby protected areas in grassland; P = parkland; V = river valley forest; E = eastern parkland; long-grass prairie and eastern forest elements (southern Manitoba and eastern Saskatchewan (Assiniboine drainage)); U = eastern uplands (southern Manitoba uplands and Moose Mountain, Saskatchewan); C = Cypress Hills; W = persistent wetlands within grassland zones; A = agricultural systems (on both crops and weeds); H = horticultural contexts, including shelterbelts, abandoned homesteads, and urban forests; a = adventive species. Square brackets indicate species or ecoregion associations expected, but not yet recorded.

Host	Cyc	Distribution	Comment
Bryophyta			
<i>Muscaphis escherichi</i> Börner 1939	2	[P]E	
<i>Muscaphis utahensis</i> C.F. Smith & Knowlton 1965	0	P	
<i>Myzodium modestum</i> (Hottes 1926)	1	[P]	
<i>Pseudacaudella rubida</i> (Börner 1939)	0	[P]	
Pteridophyta			
<i>Onoclea sensibilis</i> L., <i>Matteuccia struthiopteris</i> (L.) Todaro	0	PE	
<i>Pteridium aquilinum</i> (L.) Kuhn	0	PE	
Pinophyta			
Cupressaceae			
<i>Juniperus communis</i> L.	0	P	
<i>Juniperus horizontalis</i> Moench	0	E	
<i>Thuja</i> , <i>Juniperus</i> spp.	0	E	
Pinaceae			
<i>Abies</i> spp.	0	H, a	
<i>Abies balsamea</i> (L.) Mill.	0	H	
<i>Larix laricina</i> (Du Roi) K. Koch	0	H	past records as <i>M. abietinus</i>
<i>Picea</i> spp.	2	PH	
<i>Picea abies</i> (L.) Karst.	0	H	roots
<i>Picea glauca</i> (Moench) Voss	1	PH	
<i>Adelges cooleyi</i> (Gillette 1907)	1	H	
<i>Cinara coloradensis</i> (Gillette 1917)	0	C	

	<i>Cinara fornacula</i> Hottes 1930	0	CPUEH
	<i>Cinara hottesi</i> (Gillette & Palmer 1924)	0	UEH
	<i>Cinara obscura</i> Bradley 1953	0	CPUEH
	<i>Mindarus obliquus</i> (Cholodkovsky 1896)	0	CPH
	<i>Pineus similis</i> (Gillette 1907)	1	H
	<i>Pineus</i> sp.	1	CH
	<i>Cinara nigra</i> (Wilson 1919)	0	CP
	<i>Cinara pergandei</i> (Wilson 1919)	0	E
	<i>Essigella knowltoni</i> Hottes 1957	0	C
	<i>Eulachnus rileyi</i> (Williams 1911)	0	H
	<i>Cinara pinea</i> (Mordvilko 1895)	0	H, a
	<i>Eulachnus agilis</i> (Kaltenbach 1843)	0	H, a
	<i>Adelges coolleyi</i> (Gillette 1907)	2	H
	<i>Aphis middletonii</i> Thomas 1879	0	GPVEAH roots
	<i>Forda formicaria</i> von Heyden 1837	2*	GPVEAH, a roots
	<i>Forda marginata</i> Koch 1857	2*	GPVEAH, a roots
	<i>Geotica utricularia</i> (Passerini 1856)	2*	GPVEAH, a roots
	<i>Aphis fabae</i> Scopoli 1763 (<i>sensu lato</i>)	2	PVEAH, a several subspecies
	<i>Aphis gossypii</i> Glover 1877	0	AH, a
	<i>Aphis nasturtii</i> Kallenbach 1843	2	PVEAH, a
	<i>Aphis spiraeicola</i> Patch 1914	2	PVEAH, a
	<i>Prociphilus erigeronensis</i> (Thomas 1879)	2	PE roots
	<i>Smynthuroides betae</i> Westwood 1849	2*	GP, a roots
	<i>Longistigma caryae</i> (T.W. Harris 1841)	0	EH on bark of large trees
	<i>Macrosiphum euphorbiae</i> (Thomas 1878)	2	GPVEA
	<i>Myzus persicae</i> (Sulzer 1776)	2	AH, a irruptive
	<i>Aphis mimuli</i> Oestlund 1887	2	EW
	<i>Rhopalosiphum nymphaeae</i> (Linnaeus 1761)	2	W, a
	<i>Aphis sambuci</i> Linnaeus 1758	0	H, a
	<i>Pinus banksiana</i> Lamb.,		
	<i>Pinus contorta</i> Douglas ex Loudon		
	<i>Pinus contorta</i>		
	<i>Pinus nigra</i> Arnold		
	<i>Pinus sylvestris</i> L.		
	<i>Pseudotsuga menziesii</i> (Mirb.) Franco		
Magnoliophyta			
	polyphagous on various monocots and dicots		
Dicots			
	various dicots		
	emergent aquatic dicots		
Adoxaceae			
	<i>Sambucus racemosa</i> L.		

Host	Cyc	Distribution	Comment
<i>Fiburnum</i> spp.	0	E	
	1	PV	
Amaranthaceae (incl. Chenopodiaceae)			
<i>Atriplex</i> , <i>Chenopodium</i> spp.	0	GPVE, a	roots
<i>Chenopodium</i> spp., <i>Beta vulgaris</i> L.	2	PVEA	roots
	2	PVEA	roots
<i>Sarcobatus vermiculatus</i> (Hook.) Torr.	0	[G]	
Apiaceae			
various genera	0	PE	
	0	E	
	0	E	
	2	PVE, a	
	2	PE	
	2	P	
	2	PVAH, a	
	2	P	
	2	EVW	
	2	PV	
	2	E, a	
Poeynaceae [incl. Asclepiadaceae]			
<i>Asclepias syriaca</i> L.	2	E	
	0	E, a	irruptive
	0	E	
Asteraceae			
various genera	2	H, a	
	2	PE, a	
	0	E	
	0	E	
	0	E	
	0	GPVE	includes <i>U. escalantii</i>
	0	P	
	0	G	
	0	PE	
	0	E	

Host	Cyc	Distribution	Comment
<i>Uroleuon pepperi</i> (Olive 1965)	0	E	
<i>Brachycaudus cardui</i> (Linnaeus 1758)	2	PAH, a	
<i>Hyperomyzus sandilandicus</i> (Robinson 1974)	2	E	
<i>Uroleuon eupatoriicola</i> (Patch 1919)	0	E	
<i>Atarsos grindeliae</i> Gillette 1911	0	E[G]	
<i>Illinoia grindeliae palmerae</i> (MacGillivray 1958)	0	F[G]	
<i>Uroleuon richardsi</i> (Robinson 1964)	0	E[G]	
<i>Uroleuon helianthicola</i> (Olive 1963)	0	E	
<i>Uroleuon maximilianicola</i> (Robinson 1985)	0	E	
<i>Uroleuon obscuricaudatum</i> (Olive 1965)	0	E	
<i>Pleotrichophorus villosae</i> Robinson 1974	0	E[G]	
<i>Uroleuon carberriense</i> Robinson 1986	0	PE	
<i>Uroleuon hieracicola</i> (Hille Ris Lambers 1962)	0	E	
<i>Pleotrichophorus</i> sp.	0	G	
<i>Uroleuon ivae</i> (Robinson 1985)	0	GE	
<i>Pemphigus bursarius</i> (Linnaeus 1758)	2	H, a	
<i>Acyrtosiphon lactucae</i> (Passerini 1860)	0	(G)PAH, a	
<i>Uroleuon deltense</i> Robinson 1985	0	E	
<i>Hyperomyzus nabali</i> (Oestlund 1886)	2	E	
<i>Uroleuon rudbeckiae</i> (Fitch 1851)	0	PE	
<i>Aphis dacknountainensis</i> Rojanavongse & Robinson 1977	0	E	
<i>Aphis lugentis</i> Williams 1911	0	P	
<i>Cachryphora serotinae</i> (Oestlund 1887)	0	E	
<i>Uroleuon arnesense</i> Robinson 1985	0	E	
<i>Uroleuon brevitarsus</i> (Robinson 1974)	0	E	
<i>Uroleuon caligatum</i> (Richards 1966)	0	E	
<i>Uroleuon gigantiphagum</i> Moran 1984	0	PVE	
<i>Uroleuon nigrotibium</i> (Olive 1963)	0	E[G]	
<i>Uroleuon nigrotuberculatum</i> (Olive 1963)	0	PVE	
<i>Uroleuon pitelouti</i> (Richards 1972)	0	E	
<i>Hyperomyzus lactucae</i> (Linnaeus 1758)	2	AH, a	
<i>Hyperomyzus pallidus</i> Hille Ris Lambers 1935	2	AH, a	
<i>Macrosiphoniella tanacetaria</i> (Kaltenbach 1843)	0	H, a	
<i>Aphis knowltoni</i> Hottes & Frison 1931	0	GE	roots

<i>Xanthium strumarium</i> L.									
Berberidaceae									
<i>Berberis</i> spp.									
Betulaceae									
<i>Alnus</i> spp.									
<i>Betula</i> spp.									
	<i>Trama rara</i> Mordvilko 1908		0						roots; no sexual forms known
	<i>Uroleucon taraxaci</i> (Kaltenbach 1843)		0						
	<i>Capitophorus xanthii</i> (Oestlund 1886)		2						
	<i>Liosomaphis berberidis</i> (Kaltenbach 1843)		0						
	[<i>Boernerina variabilis</i> Richards 1961]		0						
	<i>Euceraphis gillettei</i> Davidson 1915		0						
	<i>Illinoia alni</i> (Mason 1925)		0						
	<i>Oestlundella flava</i> (Davidson 1912)		0						
	<i>Prociphilus tessellatus</i> (Fitch 1851)		0						
	<i>Pterocallis alnifoliae</i> (Fitch 1851)		0						
	[<i>Betulaphis quadratuberculata</i> (Kaltenbach 1843)]		0						
	[<i>Calaphis betulaccolens</i> (Fitch 1851)]		0						
	<i>Calaphis flava</i> Mordvilko 1928		0						
	<i>Calaphis manitobensis</i> Richards 1968		0						
	<i>Euceraphis betulae</i> (Koch 1855)		0						
	<i>Euceraphis papyrifericola</i> Blackman in Blackman & de Boise 2002		0						in past misidentified as <i>E. betulae</i>
	<i>Symydobius americanus</i> A.C. Baker 1918		0						
	[<i>Hamamelistes spinosus</i> Shimer 1867]		2*						present on adjacent boreal plain
Brassicaceae									
various genera	<i>Brevicoryne brassicae</i> (Linnaeus 1758)		0						
	<i>Lipaphis pseudobrassiccae</i> (Davis 1914)		0						
	<i>Pemphigus populitransversus</i> Riley 1879		2						
Caprifoliaceae									
<i>Lonicera</i> spp.	<i>Hyadaphis foeniculi</i> (Passermi 1860)		1						
	<i>Prociphilus xylostet</i> (DeGeer 1773)		1						
	<i>Rhopalomyzus lonicerae</i> (Siebold 1839)		1						
	<i>Rhopalomyzus poae</i> (Gillette 1908)		1						
	<i>Gyosoaphis oestlundii</i> Hottes 1930		0						
	<i>Rhopalomyzus grabhami</i> (Cockerell 1903)		1						
<i>Lonicera dioica</i> L.									
<i>Lonicera involucrata</i> (Richardson) Banks ex Spreng.									
<i>Lonicera tatarica</i> L.	<i>Hyadaphis tataricae</i> (Ajzenberg 1935)		1						
<i>Symphoricarpos occidentalis</i> Hook.	<i>Amphicercidius pulverulens</i> (Gillette 1911)		0						
	<i>Aphthargelia symphoricarpi</i> (Thomas 1878)		0						

Host	Cyc	Distribution	Comment
Comaceae			
<i>Cornus sericea</i> L.	1	PE, a	<i>Anoecia corni</i> (Fabricius 1775)
	1	E	<i>Anoecia cornicola</i> (Walsh 1863)
	0	PE	<i>Aphis cornifoliae</i> Fitch 1851
	1	PE	<i>Aphis helianthi</i> Monell in Riley & Monell 1879
	0	PE	<i>Aphis neogillettei</i> Palmer 1938
	1	P	<i>Aphis maculatae</i> Oestlund 1887
	0	PE	<i>Macrosiphum hamiltoni</i> Robinson 1968
	0	PE	<i>Macrosiphum manitobense</i> Robinson 1965
Crassulaceae			
<i>Hylotelephium telephium</i> (L.) H. Ohba	0	H, a	<i>Aphis sedi</i> Kaltenbach 1843
Dipsacaceae			
<i>Dipsacus fullonum</i> L.	2	H, a	<i>Macrosiphum rosae</i> (Linnaeus 1758)
Elaeagnaceae			
<i>Elaeagnus</i> , <i>Hippophae</i> spp.	1	H, a	<i>Capitophorus hippophaes</i> (Walker 1852)
<i>Elaeagnus angustifolia</i> L.	1	H, a	<i>Capitophorus elaeagni</i> (Del Guercio 1894)
<i>Shepherdia</i> spp.	1	P	<i>Capitophorus hudsonicus</i> Robinson 1979
	1	GPVE	<i>Capitophorus shepherdiae</i> Gillette & Bragg 1916
	1	GPVE	<i>Capitophorus xanthii</i> (Oestlund 1886)
Ericaceae			
<i>Arctostaphylos uva-ursi</i> (L.) Spreng.	0	C	<i>Tamalia coveni</i> (Cockerell 1905)
Fabaceae			
various genera	0	AHPE, a	<i>Acyrtosiphon pisum</i> (Harris 1776)
	2	PVE	<i>Neartaphis crataegifoliae</i> (Fitch 1851)
<i>Astragalus</i> spp.	0	P	<i>Aphis gallowayi</i> Robinson 1991
<i>Astragalus</i> , <i>Hedysarum</i> , <i>Oxytropis</i>	0	P	<i>Aphis astragalina</i> Hille Ris Lambers 1974
<i>Caragana arborescens</i> Lam.	0	H, a	<i>Acyrtosiphon caraganae</i> (Cholodkovsky 1908)
	0	H, a	<i>Therioaphis tenera</i> (Ajzenberg 1956)
<i>Glycine max</i> (L.) Merr.	2	A, a	<i>Aphis glycines</i> Matsumura 1917
<i>Lupinus</i> spp.	0	C	<i>Aphis lupini</i> Gillette & Palmer 1929
	0	H	<i>Macrosiphum albifrons</i> Essig 1911
<i>Medicago</i> , <i>Trifolium</i> spp.	0	A, a	<i>Therioaphis trifolii</i> (Monell 1882)
<i>Melilotus</i> spp.	0	A, a	<i>Therioaphis riehmi</i> (Börner 1949)

irruptive

native in western mountains

<i>Trifolium</i> spp.					2	PA
<i>Vicia cracca</i> L.					0	E, a
Fagaceae						
<i>Quercus macrocarpa</i> Michx.						
	<i>Nearctaphis bakeri</i> (Cowen 1895)					
	<i>Aphis craccæ</i> Linnaeus 1758					
	<i>Hoplochaitophorus quercicola</i> (Monell in Riley & Monell 1879)				0	EU
	<i>Lachnus allegheniensis</i> McCook 1877				0	EU
	<i>Myzocallis discolor</i> (Monell in Riley & Monell 1879)				0	EU
	<i>Myzocallis punctatus</i> (Monell in Riley & Monell 1879)				0	EUH
	<i>Neosymydobius mimicus</i> Hottes 1926				0	EU
	<i>Stegophylla quercicola</i> (Monell in Riley & Monell 1879)				0	EU
Geraniaceae						
<i>Geranium</i> spp.	<i>Amphiphora geranii</i> Gillette & Palmer 1929				0	CV
	<i>Amphiphora coloutensis</i> Smith & Knowlton 1983				0	P
	<i>Macrosiphum geranii</i> (Oestlund 1887)				0	E
Grossulariaceae						
<i>Ribes</i> spp.	<i>Aphis manitobensis</i> Robinson & Rojanavongse 1976				1	E
	<i>Aphis mimuli</i> Oestlund 1887				1	E
	<i>Aphis oenotheræ</i> Oestlund 1887				1	E
	<i>Aphis varians</i> Patch 1914				1	P
	<i>Cryptomyzus galeopsidis</i> (Kaltenbach 1843)				1	HP, a
	<i>Cryptomyzus ribis</i> (Linnaeus 1758)				1	HP, a
	<i>Hyperomyzus lactuæ</i> (Linnaeus 1758)				1	AH, a
	<i>Hyperomyzus nabali</i> (Oestlund 1886)				1	E
	<i>Hyperomyzus pallidus</i> Hille Ris Lambers 1935				1	AH, a
	<i>Hyperomyzus ribiellus</i> (J. J. Davis 1919)				1	EP
	<i>Nasonovia cynosbati</i> (Oestlund 1887)				1	P
	<i>Nasonovia houghtonensis similis</i> Heie 1979				1	P
Lamiaceae						
various genera	<i>Cryptomyzus ribis</i> (Linnaeus 1758)				2	HP, a
<i>Galeopsis tetrahit</i> L.	<i>Cryptomyzus galeopsidis</i> (Kaltenbach 1843)				2	HP, a
<i>Monarda fistulosa</i> L.	<i>Aphis neomonardæ</i> Rojanavongse & Robinson 1977				0	E
	<i>Hyalomyzus monardæ</i> (Davis 1912)				2	E
<i>Mentha arvensis</i> L.	<i>Ovatus crataegarius</i> (Walker 1850)				2	H
Lythraceae						
<i>Lythrum salicaria</i> L.	<i>Myzus lythri</i> (Schrank 1801)				2	W, a
Malvaceae						

Host		Cyc	Distribution	Comment
<i>Alcea rosea</i> L.	<i>Uroleucon eoessigi</i> (Knowlton 1947)	0	E	
Myricaceae				
<i>Myrica gale</i> L.	<i>Illinoia canadensis</i> (MacGillivray 1958)	0	E	
Oleaceae				
<i>Fraxinus</i> spp.	<i>Prociphilus americanus</i> (Walker 1852)	1	H[E]	
Onagraceae				
<i>Chamerton angustifolium</i> (L.) Holub	<i>Aphis oenotherae</i> Oestlund 1887	0	E	
	<i>Aphis varians</i> Patch 1914	2	P	
	<i>Macrosiphum valerianae</i> (Clarke 1903)	0	P	
<i>Epilobium</i> spp.	<i>Aphis salicariae</i> Koch 1855	0	P, a	
<i>Oenothera biennis</i> L.	<i>Aphis oenotherae</i> Oestlund 1887	0	P	
	<i>Aphis oestlundii</i> Gillette 1927	2	E	
<i>Oenothera</i> spp.	<i>Anoecia oenotherae</i> Wilson 1911	0	E	
Orobanchaceae				
<i>Castilleja</i> spp.	<i>Nasonovia castelleiae</i> (Sampson 1939)	0	P	
<i>Orthocarpus</i> , <i>Pedicularis</i> spp.	<i>Nasonovia alpina</i> (Gillette & Palmer 1928)	0	P	
Polygonaceae				
<i>Polygonum</i> spp.	<i>Aspidaphis adjuvans</i> (Walker 1848)	0	[P]E, a	
	<i>Capitophorus hippophaes</i> (Walker 1852)	2	H, a	
<i>Rumex</i> spp.	<i>Aphis rumicis</i> Linnaeus 1758	0	EW, a	
Primulaceae				
<i>Lysimachia</i> spp.	<i>Mordwilkoja vagabunda</i> (Walsh 1863)	2	PVE	
Ranunculaceae				
<i>Aquilegia</i> spp.	<i>Nasonovia aquilegiae</i> Essig 1917	0	GP	
<i>Clematis ligusticifolia</i> Nutt.	<i>Illinoia breviararis</i> (Gillette & Palmer 1933)	0	GV	
<i>Delphinium</i> spp.	<i>Brachycaudus rociadae</i> (Cockerell 1903)	0	[G]E	
	<i>Nasonovia wahinkae robinsoni</i> Richards 1958	0	G	
<i>Thalictrum</i> spp.	<i>Nasonovia purpurascens</i> (Oestlund 1887)	0	E[P]	
Rosaceae				
various genera	<i>Macrosiphum pseudorosae</i> Patch 1919	0	PVEH	
<i>Amelanchier alnifolia</i> (Nutt.) Nutt.	<i>Acyrtosiphon macrosiphum</i> (Wilson 1912)	0	PV	
ex M. Roem.	<i>Aphis whiteshellensis</i> Rojanavongse & Robinson 1977	0	E	

<i>Crataegus</i> spp.	<i>Eriosoma americanum</i> (Riley in Riley & Monell 1879)	2	E, P
	<i>Nearctaphis sensoriata</i> (Gillette & Bragg 1918)	1	P
	<i>Prociphilus caryae caryae</i> (Fitch 1856)	1	P
	<i>Ericaphis gentneri</i> (Mason 1947)	0	C
	<i>Eriosoma crataegi</i> (Oestlund 1887)	2	E
	<i>Nearctaphis crataegifoliae</i> (Fitch 1851)	1	PVE
<i>Crataegus, Malus,</i>	<i>Utamphorophora crataegi</i> (Monell in Riley & Monell 1879)	0	C
<i>Cotoneaster</i> spp.	<i>Aphis pomi</i> DeGeer 1773	0	EH, a
	<i>Eriosoma lanigerum</i> (Hausmann 1802)	2	E
	<i>Nearctaphis bakeri</i> (Cowen ex Gillette & Baker 1895)	1	P
	<i>Rhopalosiphum oxyacanthiae</i> (Schrank 1801)	1	PEA
<i>Fragaria</i> spp.	<i>Abstrusomyzus valulitiae</i> (Robinson 1974)	0	PE
	<i>Aphis forbesi</i> Weed 1889	0	E
	<i>Chaetosiphon fragaefolii</i> (Cockerell 1901)	0	PVEH
<i>Potentilla fruticosa</i> L.	<i>Acyrtosiphon assini-boinense</i> Robinson 1973	0	PVE
	<i>Nasonovia williamsi</i> C.F. Smith & Parron 1978	0	E
<i>Prunus</i> spp.	<i>Rhopalosiphum nymphaeae</i> (Linnaeus 1761)	1	PVE, a
	<i>Hysteronera setariae</i> (Thomas 1878)	1	E
<i>Prunus</i> (s.g. <i>Prunophora</i>) spp.	<i>Hyaloapterus pruni</i> (Geoffroy 1762)	1	PE, a
<i>Prunus pensylvanica</i> L.f.	<i>Myzus cerasi</i> (Fabricius 1775)	1	PVE, a
	<i>Myzus lythri</i> (Schrank 1801)	1	E, a
<i>Prunus virginiana</i> L.	<i>Asiphonaphis pruni</i> Wilson 1919	0	(G)PVE
	<i>Rhopalosiphum cerasifoliae</i> (Fitch 1855)	1	PVWE
	<i>Rhopalosiphum padi</i> (Linnaeus 1758)	1	(G)PVA, a
<i>Rosa</i> spp.	<i>Chaetosiphon thomasi</i> Hille Ris Lambers 1953	0	PVH
	<i>Eomacrosiphon nigromaculosum</i> (MacDougall 1926)	0	P
	<i>Ericaphis wakibae</i> (Hottes 1934)	0	P
	<i>Macrosiphum rosae</i> (Linnaeus 1758)	0,1	H, a
	<i>Macrolachnus siphkensi</i> Hille Ris Lambers 1962	0	GP
	<i>Metopolophium dirhodum</i> (Walker 1849)	1	GPVEA, a
	<i>Pseudocercidis rosae</i> Richards 1961	0	PE
<i>Rosa, Fragaria</i> spp.	<i>Wahlgreniella nervata</i> (Gillette 1908)	0	PV
	<i>Chaetosiphon minus</i> (Forbes 1884)	0	EH
	<i>Rhodobium porosum</i> (Sanderson 1900)	0	EH
<i>Rosa, Potentilla</i> spp.	<i>Myzaphis rosarum</i> (Kaltenbach 1843)	0	PEH

can complete lifecycle on rose

	<i>Pemphigus populiramulorum</i> Riley in Riley & Monell 1879)	1	PV	
	<i>Pemphigus populitransversus</i> Riley in Riley & Monell 1879)	1	PVE	
	<i>Pemphigus tartareus</i> Hottes & Frison 1931	1	PVE	recorded as <i>P. junctisensorientatus</i>
<i>Populus nigra</i> L.	<i>Pemphigus bursarius</i> (Linnaeus 1758)	1	H, a	
	<i>Pemphigus spyrothecae</i> Passerini 1856	0	H, a	
<i>Populus tremulooides</i> Michx.	<i>Chaitophorus neglectus</i> Hottes & Frison 1931	0	CPVUE	
	<i>Pachypappa roseettei</i> (Maxson 1934)	1	P	
	<i>Pachypappa sacculi</i> (Gillette 1914)	1	P	
	<i>Pseudopterocomma canadensis</i> Richards 1966	0	PU	
	<i>Pseudopterocomma hughi</i> (MacGillivray 1963)	0	E	
<i>Salix</i> spp.	<i>Aphis farinosa</i> Gmelin 1790	0	CPVEU	
	<i>Cavariella aegopodii</i> (Scopoli 1763)	1	PVH, a	
	<i>Cavariella aquatica</i> (Gillette & Bragg 1916)	1	E	
	<i>Cavariella digitata</i> Hille Ris Lambers 1969	1	P	
	<i>Cavariella konoii</i> Takahashi 1939	1	P	
	<i>Cavariella pastinacae</i> (Linnaeus 1758)	1	PVH, a	
	<i>Cavariella salicis</i> (Monell in Riley & Monell 1879)	1	CVWE	
	<i>Cavariella theobaldi</i> (Gillette & Bragg 1918)	1	PV	
	<i>Chaitophorus macrostachyae</i> (Essig 1912)	0	(G)PV	
	<i>Chaitophorus macgillivrayae</i> Richards 1972	0	PVH	
	<i>Chaitophorus nigrae</i> Oestlund 1886	0	PV	
	<i>Chaitophorus pusillus</i> Hottes & Frison 1931	0	P	
	<i>Chaitophorus saliciniger</i> (Knowlton 1927)	0	PE	
	<i>Chaitophorus viminalis</i> Monell in Riley & Monell 1879	0	EV	
	<i>Fullawayia</i> sp.	0	VE	
	<i>Macrosiphum californicum</i> (Clarke 1903)	0	P	
	<i>Pterocomma bicolor</i> (Oestlund 1885)	0	PVE	
	<i>Pterocomma salicis</i> (Linnaeus 1758)	0	P, a	
	<i>Pterocomma smithiae</i> (Monell in Riley & Monell 1879)	0	PVE	
	<i>Tuberolachnus salignus</i> (Gmelin 1790)	0	VE	
Sapindaceae				
<i>Acer</i> spp.	<i>Drepanaphis acerifoliae</i> (Thomas 1878)	0	E	
	<i>Drepanaphis spicata</i> C.F. Smith 1941	0	E	
	<i>Periphyllus negundinis</i> (Thomas 1877)	0	CPVE	

Host	Cyc	Distribution	Comment
Saxifragaceae			
<i>Saxifraga</i> sp.	0	E	<i>Nasonovia vockerothi</i> (Richards 1963)
Tiliaceae			
<i>Tilia ×europaea</i> L.	0	H, a	<i>Eucallipterus tiliatae</i> (Linnaeus 1758)
Ulmaceae			
<i>Ulmus</i> spp.	1	E	<i>Eriosoma mimicum</i> Hottes & Frison 1961
	0	E	<i>Eriosoma rileyi</i> Thomas 1877
	1	H, a	<i>Tetraneura ulmi</i> (Linnaeus 1758)
<i>Ulmus</i> L.	1	EVH	<i>Eriosoma americanum</i> (Riley in Riley & Monell 1879)
	1	EH	<i>Eriosoma crataegi</i> (Oestlund 1887)
	1	EH	<i>Eriosoma lanigerum</i> (Hausmann 1802)
	1	E	<i>Colopha ulmicola</i> (Fitch 1859)
	1	E	<i>Colopha graminis</i> (Monell 1882)
	0	E	<i>Tinocallis ulmifolii</i> (Monell in Riley & Monell 1879)
Urticaceae			
<i>Urtica gracilis</i> Aiton	0	P	<i>Amphorophora urticae</i> Essig 1942
	0	P	<i>Microlophium carnosum</i> (Buckton 1876)
Monocots			
Asparagaceae			
<i>Asparagus officinalis</i> L.	0	H, a	<i>Brachycorynella asparagi</i> (Mordvilko 1929)
<i>Maianthemum stellatum</i> L.	0	PVE[U]	<i>Illinoia wahnaga</i> (Hottes 1952)
Link <i>Convallaria majalis</i> L.			
<i>Polygonatum biflorum</i> (Walter) Elliott	0	E	<i>Catamerigus kickapoo</i> (Hottes & Frison 1931)
Cyperaceae			
various genera, not <i>Carex</i>	2	PVEW	<i>Rhopalosiphum cerasifoliae</i> (Fitch 1855)
<i>Carex</i> spp.	2	E	<i>Carolinaia howardii</i> (Wilson 1911)
	2	PV	<i>Ceruraphis viburnicola</i> (Gillette 1909)
	0	E[G], a?	<i>Iziphya spenceri</i> Richards 1958
	0	GPEU	<i>Iziphya flabella</i> (Sanborn 1904)
	0	E	<i>Iziphya vittata</i> Richards 1958
	0	[G]	[<i>Subiziphya clauseni</i> Quednau 1990]
	0	PE	<i>Thripsaphis balli</i> (Gillette 1908)
	0	E[P]	<i>Thripsaphis cyperii</i> (Walker 1848)

The European species, *P. glandulosus* (Kaltenbach), widely introduced elsewhere in North America, was recorded from Alberta by Harper and Bradley (1987), but no supporting material has been located. Species of the genus *Macrosiphoniella* also feed on *Artemisia* and related Asteraceae. This genus is most diverse in the Palearctic region, but several species are indigenous to North America and several others are adventive from Eurasia. Three native and two adventive species of *Macrosiphoniella* are found in the southern Prairie Provinces. *Misturaphis shiloensis* is known only from Shilo, Manitoba, on *Artemisia campestris* ssp. *caudata*. The chenopodiaceous shrub *Sarcobatus vermiculatus*, common on saline flats, is host to *Brachyunguis bonnevillensis*. Although not yet collected in Canada, this aphid is found from Arizona to Montana and may be expected to occur in southern Alberta and Saskatchewan. Protected depressions and slopes within the grasslands harbour

Table 3. Summary of number of indigenous and adventive aphid species with various host and ecological associations and with different life cycle types.

Category	Number of Species ⁴	
	Native ¹	Adventive ¹
Host group		
Mosses	4	0
Ferns	2	0
Conifers	27	0
Dicot trees and shrubs ²	144	38
Dicot forbs ²	118	45
Grasses	12	18
Other monocots	10	3
Habitat/region		
Grasslands	47	20
River valley forests	61	14
Parkland	133	31
Eastern parkland/long-grass prairie	163	36
Eastern uplands	25	1
Cypress Hills	24	0
Wetlands	4	5
Agricultural fields	6	29
Horticultural plantings	29	49
Life cycle type		
Non-alternating	210	44
Host alternating	65	31
Asexual ³	1	6
Total species	276 ⁴	81

¹ Original distribution of some widespread aphids is unclear. Species that may be naturally Holarctic (such as some moss-feeding aphids) are counted as "native." Species native elsewhere in North America, but present in the Prairies Ecozone as a result of recent floristic changes arising from European settlement, are also counted as native.

² "Shrub" is used to indicate upright woody perennial "bushy" plants and includes such plants as *Rubus* species with biennial woody above-ground growth. On the other hand, low-growing plants with persistent woody crowns or stem bases (such as *Artemisia frigida*) are grouped with "forbs."

³ Includes species that are host alternating in their native range, but persist asexually in the absence of their primary host (e.g., members of tribe Fordini with sexual forms on pistachio in the Mediterranean region).

⁴ Includes five species expected in the Prairies Ecozone but not yet collected.

a number of other shrubby plants and their associated aphids, such as the aphid *Aphthargelia symphoricarpi* on *Symphoricarpos occidentalis*, *Maculolachnus sijkkensi* on *Rosa*, *Asiphonaphis pruni* on *Prunus virginiana*, and several *Capitophorus* species on *Shepherdia*.

Although a number of aphid genera contain grass specialists, the number of such species in the Nearctic grasslands is low, in contrast, for example, to the African savanna, where the genus *Sitobion* in particular has radiated extensively (Eastop 1961). The few native Nearctic aphids on grasses are infrequently collected and their distributions are unknown. *Cryptaphis bromi* is known from Winnipeg, Manitoba; Athabasca, Alberta; and Penticton, British Columbia. It is quite cryptic in its habits (a small brown aphid apparently feeding at the base of the grass plant among the dried remains of the leaf sheaths) (Robinson 1967) and may be much more common than its known incidence suggests. *Sipha agropyronensis* is currently confirmed only from Colorado, but may be more widespread. *Anoecia graminis* feeds on grass roots in Colorado, and a very similar aphid has been found at Winnipeg and at Kinsella, Alberta (Newton *et al.* 2011). Three aphid species (*Forda formicaria*, *F. marginata*, *Geoica utricularia*) of Mediterranean origin have been collected on the roots of native grasses at a number of sites in the grassland areas of the Prairie Provinces. The other grass-feeding aphids in the area are usually encountered on grain crops and are discussed below with other aphids of agricultural systems.

Among other herbaceous plants of the grasslands, *Grindelia squarrosa* is notable in that it supports three specific aphids: *Atarsos grindeliae* (which overcomes the stickiness of its host plant by lacking tarsi), *Illinoia richardsi*, and *Uroleucon grindeliae*. *Subizyphia clauseni* is known only from a collection in 1908 in the mixedgrass region of eastern Montana (Quednau 1990) and a recent collection by the authors in the Kootenay Plains (Alberta) on a dryland *Carex* species (likely *C. duriuscula* or *C. obtusata*). It probably occurs in the intervening area.

Parkland and River Valley Forests

Species of *Populus* are the most obvious floral element of the parkland and of the major river valleys and constitute the primary (overwintering) host for a number of gall-forming, host-alternating aphids, as well as several non-alternating aphid species. Floate (2010) treated 14 species of native and two species of introduced aphids forming galls on cottonwoods. An additional poplar-gall aphid, *Clydesmithia canadensis*, previously unrecognized east of Waterton Lakes National Park, is now known from recent collections by the authors to occur as far east as Ninette, Manitoba. Two other species (*Pachypappa rosettei* and *P. sacculi*) form pseudogalls (gall-like distortions of host tissue that are not completely closed) on trembling aspen. Among non-galling aphids, *Aphis maculatae* uses various *Populus* species as summer hosts (the winter host is *Cornus sericea*). Fourteen non-alternating species (in genera *Chaitophorus*, *Fullawaya*, *Pterocomma*, and *Pseudopterocomma*) feed on *Populus* species in this area.

Other aphids are associated with other trees and shrubs in river valleys. *Acer negundo* is host to *Periphyllus negundinis*; *Amelanchier alnifolia* to *Acyrtosiphon macrosiphum* and, where *Amelanchier* co-occurs with elm, to *Eriosoma americanum*; *Crataegus* species to *Nearctaphis bakeri* and *N. crataegifolii*; *Cornus sericea* to *Aphis* (three species) and *Macrosiphum* (two species); *Lonicera involucrata* and *L. dioica* to *Rhopalomyzus* species and *Gypsoaphis oestlundii*, respectively; *Potentilla fruticosa* to *Acyrtosiphon assiniboinensis*, *Myzaphis rosarum*, and *Nasonovia williamsi*; *Prunus virginiana* to *Asiphonaphis pruni*, *Rhopalosiphum cerasifoliae*, and *R. padi*; *Ribes* species to several species of *Aphis*,

Hyperomyzus (subgenus *Neonasonovia*), and *Nasonovia* (subgenus *Kakimia*); and *Rosa* and *Chaetosiphon* species, and, in shaded locations, to *Eomacrosiphon nigromaculosum* and *Pseudocercidius rosae*.

Compared with those of the grasslands, a larger number of herbaceous plants of the parkland and river valley forests serve as aphid hosts. For example, about 20 species of *Uroleucon* occur on various composites, especially asters and goldenrods. Most of the poplar gall-forming species and many of the shrub-feeding species (particularly those on *Ribes*) mentioned above use herbaceous plants as summer hosts. The summer hosts of some of the poplar-gall species include roots of crop plants such as sugarbeet and potentially canola (known secondary hosts of *Pemphigus populitransversus* are cruciferous plants). The secondary hosts of *Rhopalomyzus* species are grasses.

Eastern Forest Elements

Southern Manitoba and southeastern Saskatchewan, in addition to their grassland and parkland components, are characterized by the presence of plants that are more predominant in eastern North America. For example, *Quercus macrocarpa* (with *Hoplochaitophorus quercicola*, *Lachnus allegheniensis*, *Neosymydobius mimicus*, *Myzocallis* species, and *Stegophylla querci*) and *Ulmus americana* (with *Eriosoma* species and *Tinocallis ulmifolii*) occur naturally in this area. Boreal Plains species such as white spruce (host to *Mindarus obliquus* and several *Cinara* species) and birches (host to species of *Calaphis*, *Euceraaphis*, and *Symydobius*) occur in higher areas, such as Spruce Woods Provincial Park in Manitoba and Moose Mountain in Saskatchewan. *Hysteroneura setariae*, which alternates between *Prunus* and grasses in eastern North America (and is widespread in the tropics as completely asexual populations on grasses), has been collected in eastern Manitoba and occasionally recorded from grain crops (Robinson and Hsu 1963; Gavloski and Meers 2011).

Cypress Hills

The aphids present in the transition from the surrounding grasslands to the higher elevations of the Cypress Hills are similar to those in the transition from the grasslands to parkland, although the transition is more abrupt. In addition, typical boreal species may be found, such as several *Cinara* species, *Mindarus obliquus*, and adelgid species on *Picea glauca*, as well as *Tamalia coweni* on *Arctostaphylos uva-ursi*. Several aphid species normally found in montane regions are also present. These include *Cinara nigra* and *Essigella knowltoni* (on *Pinus contorta*), *Ericaphis gentneri* (on *Crataegus* sp.), and *Aphis lupini* (on *Lupinus* sp.). Also found on *Crataegus* sp. is the eastern North American species *Utamphorophora crataegi*.

Wetlands

The willows (*Salix*), sedges (*Carex*), rushes (*Juncus*), bulrushes (*Scirpus*), and cattails (*Typha*) of stream banks and persistent wetlands, including those occurring within the grassland area, are hosts to a number of aphid species. *Aphis farinosa*, *Macrosiphum californicum*, and several species of *Chaitophorus* and *Pterocomma* occur on willows. *Cavariella* species use willows as overwintering hosts and various umbelliferous plants as summer hosts. *Rhopalosiphum enigmae* lives within the leaf sheath at the base of cattail plants and *Thripsaphis* species feed on *Carex*.

Adventive Aphids of Agricultural and Horticultural Systems

The substantial adventive aphid fauna of North America has been documented by Footitt *et al.* (2006). The cosmopolitan polyphagous aphids, *Myzus persicae* and *Aphis fabae*, occur commonly on a number of agricultural and horticultural crops, as well as on various weeds and native plants. *Macrosiphum euphorbiae*, apparently native to eastern North America, is now found worldwide. It uses *Rosa* as a winter host, but accepts a wide range of plants as summer hosts, including many ornamental and dicot crop plants.

Gavloski and Meers (2011) summarized the aphid fauna associated with grain crops. The cosmopolitan species *Rhopalosiphum padi*, the bird cherry-oat aphid (using chokecherry as overwintering host), and *Metopolophium dirhodum* (with rose as overwintering host) are among the most abundant species in most trap samples. *Sitobion avenae*, the English grain aphid, is found in both north and south temperate areas of the world. It is common in moist areas, where it occurs on species of various plants, mainly graminoid monocots, but as its name implies, it is also common on grain crops. *Diuraphis tritici* was described from North America, but may be of East Asian origin (Blackman and Eastop 2006). *Diuraphis frequens* and *D. noxia* (Russian wheat aphid) originate in Europe and central Asia, respectively. *Rhopalosiphum maidis* and *Schizaphis graminum* do not overwinter in the Canadian Prairies, but in some years, migration from more southern regions results in economically significant outbreaks. *Sipha elegans* (= *S. agropyrella*) and *S. glyceriae* are common throughout the northern hemisphere and *S. flava* is broadly distributed in the United States and South America. There are several records of *S. elegans* from various localities in the Prairies Ecozone, and the other two *Sipha* species have been found in southern Manitoba.

Aphids also feed on various dicot crops. *Lipaphis pseudobrassicae* and *Brevicoryne brassicae* occur on both cultivated (Gavloski *et al.* 2011) and weedy crucifers (Brassicaceae), including native species. Soroka and Otani (2011) include the aphids *Acyrtosiphon pisum*, *Therioaphis trifolii* (including form *maculata*), *T. riehmii*, and *Nearctaphis bakeri* in their discussion of insects on legume forage crops. The soybean aphid, *Aphis glycines*, was first recorded in North America in 2000 (Hunt *et al.* 2003) and is now distributed through most of the soybean-growing areas of the continent, including southern Manitoba.

Two drought-tolerant central Asian shrub species, extensively planted across the prairies as ornamentals and in windbreaks, and persisting at sites of abandoned farmsteads, have associated aphid species: *Acyrtosiphon caraganae*, *Therioaphis tenera* (on *Caragana arborescens*), and *Hyadaphis tataricae* (on *Lonicera tartarica*). Although *T. tenera* was only recently recognized in North America (in Quebec; Quednau 2003), it was found by the authors to be widely distributed in Alberta and Saskatchewan in 2009 and 2010. *Artemisia* species introduced by early settlers for medicinal and culinary purposes, and now naturalized in many areas, brought with them several species of *Coloradoa*, a Palearctic genus of inconspicuous aphids specializing on wormwoods and other anthemids.

Urban Forests

Planting of trees in urban areas and as windbreaks has resulted in the extension of the range of several species of aphid found in the boreal or eastern forests. In particular, several *Cinara* species feeding on spruce are now widely distributed across the region, *Eriosoma* species occur on elm wherever it is planted, and several aphids species are found (or are expected) on ornamental birches.

Biogeographical Aspects

The aphids associated strictly with grassland habitat are primarily a northern extension of the ranges of species occurring in the Great Plains and Great Basin of the United States. The largest proportion of the species in the Prairies Ecozone occurs in areas of transition on plants that are also found in the Boreal Plains and eastern deciduous forest. A few western montane species occur in the Cypress Hills. Because of the transformation of the region by agriculture, the most prominent species in terms of numbers are those that came from Eurasia with their crop and weed hosts.

Research Priorities

Most aphid-collecting efforts in the Prairies Ecozone have been focused on agricultural (A.M. Harper) and forestry (G.A. Bradley) needs. The aphid fauna of southern Manitoba is well-known because of the work of A.G. Robinson. However, the distribution and abundance of most of the species found in the drier grasslands has been little studied. For example, Canadian records of many of the *Artemisia*-feeding species are based on only a few collections made by the authors in 2009 and 2010. Root aphids are a substantially unstudied component of the fauna. The few collections available contain specimens that do not fit within the known variation of described species (Newton *et al.* 2011). The secondary (summer) hosts for poplar-gall forming species are roots of various plants, but the specific associations for most species are unclear or unknown.

The lack of collections available for many species (both within Canada and in the broader range of these species) has resulted in a poor understanding of the range of variation in characters among and within taxa. Analysis of this variation would aid in the resolution of boundaries and more robust definitions of species, especially in speciose genera such as *Uroleucon* and *Pleotrichophorus*.

Even among more extensively collected taxa, there is need for more detailed analysis to delimit morphologically cryptic species. The application of DNA sequence data is a useful tool in identifying cryptic taxa. For example, a recent DNA analysis of sugarbeet root aphid showed that samples identified as *Pemphigus betae* based on gall morphology in fact belong to three species, one of which is undescribed (Foottit *et al.* 2010).

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