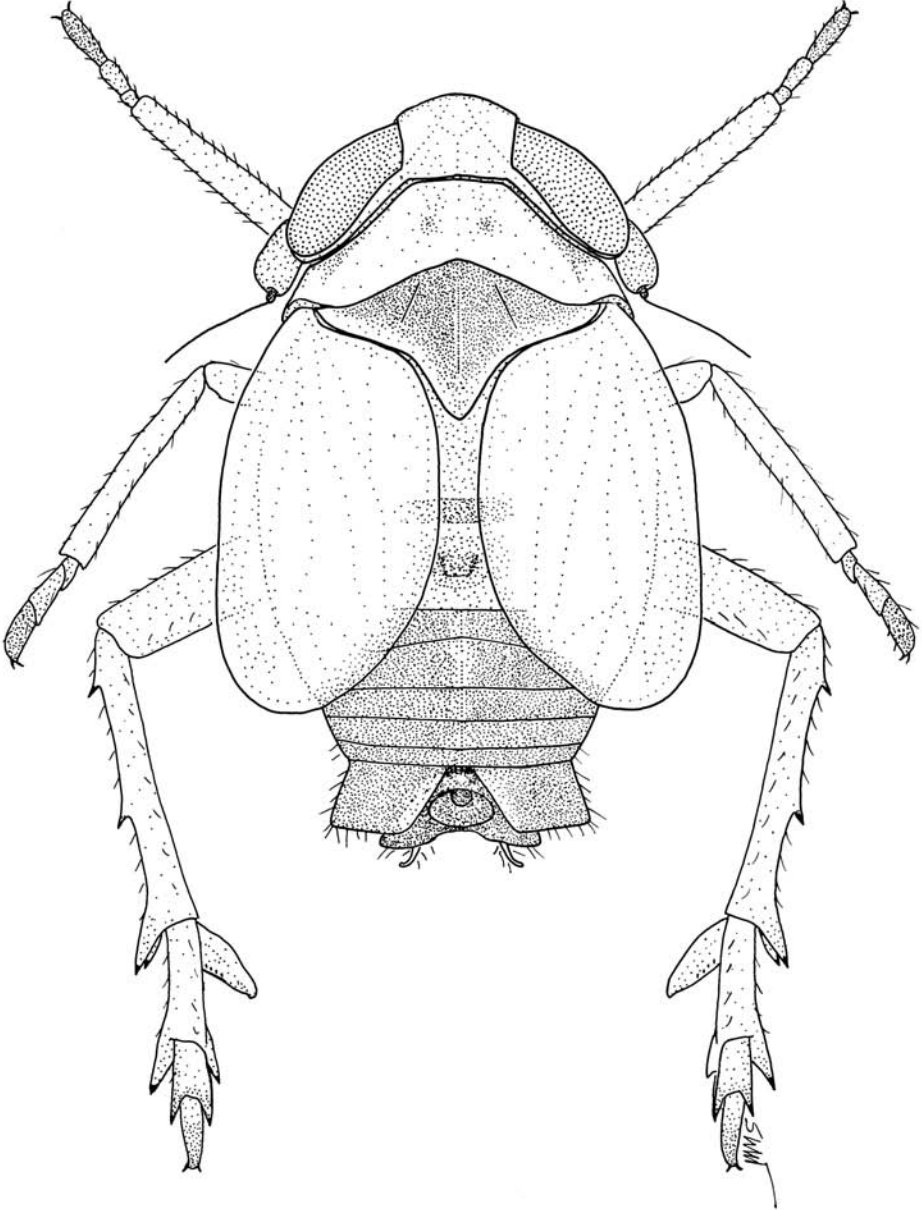


Delphacid planthoppers of the Yukon



FRONTISPIECE. *Yukonodelphax kendallae* Wilson, a brachypterous delphacid planthopper endemic to the Yukon.
Length 1.65 mm.

Delphacid Planthoppers (Homoptera: Fulgoroidea: Delphacidae) of the Yukon

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Abstract. Thirty species of delphacid planthoppers are recorded from the Yukon Territory and an adjacent region of the Northwest Territories. Seventeen species occur in both the Palaearctic and Nearctic regions. Three of these species have an Holarctic distribution, 4 species have a Palaearctic-East Beringian distribution ranging widely throughout the Palaearctic but with a limited distribution in the northwestern Nearctic, 8 species have an East-West Beringian distribution, and 2 species have a Nearctic-West Beringian distribution. Thirteen species are exclusively Nearctic; 5 of these have been found only in the Yukon and/or Northwest Territories.

Résumé. *Les delphacides (Homoptera: Fulgoroidea: Delphacidae) du Yukon.* Trente espèces de fulgores delphacides ont été récoltées au Yukon et dans la zone adjacente des Territoires du Nord-Ouest. Dix-sept espèces sont à la fois paléarctiques et néarctiques. Trois ont une répartition holarctique, 4 se retrouvent dans la région paléarctique-Béringie orientale, bien répandues dans la zone paléarctique, mais à répartition restreinte dans le nord-ouest néarctique, 8 espèces sont présentes dans toute la Béringie et 2 ont une répartition à la fois néarctique et béringienne occidentale. Treize espèces sont strictement néarctiques, dont 5 ont été trouvées seulement au Yukon et (ou) dans les Territoires du Nord-Ouest.

Introduction

The planthopper family Delphacidae includes approximately 2000 species found in all the earth's biomes including arctic tundra, temperate grasslands, deserts, and tropical forests. All are sap-feeders apparently ingesting nutrients from phloem tissue (O'Brien and Wilson 1985). Almost all delphacids have a very limited hostplant range with 70% of them being monophagous (Wilson et al. 1994). Most species are monocot feeders specializing on members of the plant families Juncaceae, Cyperaceae, and Poaceae, although there are delphacid genera with affinities for some dicot taxa such as the Asteraceae (Wilson et al. 1994). Adults and nymphs typically feed at the bases of their hostplants, which are generally found in moist habitats such as wet meadows, bogs, along the shorelines of lakes or streams, or as shallow aquatic emergents. Females insert eggs into plant tissues using a saw-like ovipositor. The 5 nymphal instars tend to feed at the bases of their hostplants, often within the thatch layer just above the ground. Many species overwinter as nymphs in the thatch beneath their hostplants, while others overwinter as eggs or adults. Voltinism is related to the length of the warm season with high-latitude species tending to be univoltine or bivoltine and low-latitude species polyvoltine (Denno and Roderick 1990). Many species exhibit wing dimorphism. Brachypters are typical of relatively persistent, stable habitats with low-lying vegetation (such as tundra grasses and sedges), whereas macropters are characteristic of temporary, often unstable habitats (such as field crops) or architecturally complex plants (such as trees) (Denno and Roderick 1990). Macroptery can be triggered by increases in nymphal density with associated deterioration of the hostplant (Denno and Roderick 1990).

What little is known of the delphacid fauna of Canada comes from relatively few faunal and revisionary studies. Provancher (1889, 1890) listed 3 species from Quebec. Moore

(1944, 1950) listed 37 additional species in 12 genera from Quebec; but many of his identifications are suspect because Beamer's revisions (e.g. 1946, 1948*b*) apparently were not used. Strickland's (1953) faunal list for Alberta included 21 species in 8 genera; one of his species identifications was incorrect (Scudder 1963) and several others are suspect because they were made without reference to the Palaearctic fauna. Waddell (1952) listed 2 delphacid species from British Columbia. Scudder (1963, 1964) described several new species and provided descriptions, illustrations, and keys in his surveys of 3 Canadian delphacid genera. Several other records were given in a number of revisionary studies (e.g. Morgan and Beamer 1949; Beamer 1955; Kramer 1973). Scudder (1979) noted that 81 species of delphacids are known from Canada and 40 more are undescribed or unrecorded; he did not provide a list of species.

The northern Canadian delphacid fauna (above 60°N) is almost entirely unknown. A few records for the Northwest Territories (Scudder 1963) have been published but there is no published information for delphacids from the Yukon Territory. Wilson (1988) surveyed the Alaskan delphacid fauna and recorded 15 species in 10 genera. Ten of these species also are present in the Palaearctic Region. Surveys of the faunas of Mongolia and Far Eastern Russia included species previously thought to be limited to the Nearctic (Anufriev and Emeljanov 1981, 1988; Anufriev and Averkin 1982).

Annotated List of Species

The following is a brief summary of the Yukon delphacid fauna, based on ca. 600 specimens collected by E. Bijdemast, S.G. and R.J. Cannings, C.S. Guppy and G.G.E. Scudder. Thirty species, included in 13 genera, are represented in these collections. The specimens are housed in the Spencer Entomological Museum, Department of Zoology, University of British Columbia and in the author's collection at the Department of Biology, Central Missouri State University, Warrensburg, and are the sole source of information on Yukon Delphacidae. The present paper was preceded by a detailed taxonomic study of the Yukon Delphacidae (Wilson 1992) in which new taxa (2 new genera, 6 new species) found in these collections were described and illustrated, nomenclature and synonymies discussed, a key for identification of the 30 species provided, and full collecting data and relevant distribution maps presented. In the present paper the collecting data are summarized by Yukon eco-geographic regions (Scudder 1997), and supplemented with information on the overall range of each species. Brief summaries of available biological data are included. Taxa are presented alphabetically by genus and species.

Family Delphacidae

Subfamily Delphacinae

Tribe Delphacini

1. *Acanthodelphax analis* (Crawford)

Nearctic

Distribution: Alaska to Alberta, Wisconsin, New York and North Carolina (Wilson 1988, 1992).

Yukon records: Ogilvie Mountains Region.

Biological information: This species has been collected at elevations above 1050 m in the Yukon; adults have been collected from 9 June–12 July.

2. *Achorotile acuta* Scudder

Northern Nearctic

Distribution: Yukon and Alberta to Quebec (Scudder 1963).

Yukon records: Arctic Coastal Plain, Porcupine Plain, Western Ranges, and Yukon/Tintina Regions.

Biological information: This species has been collected from low arctic and boreal habitats. It has been collected between elevations of 700–800 m in the Yukon; adults have been collected from 1 June–20 July.

3. ***Achorotile stylata* Beamer** Cordilleran
Distribution: Yukon and British Columbia to Wyoming (Beamer 1954; Scudder 1963; Wilson 1992).
Yukon records: Yukon/Tintina, Logan Mountains, and Southern Lakes Regions.
Biological information: This species has been collected from *Poa pratensis* L. (Scudder 1963); adults have been collected in the Yukon from 8 June–30 July.
4. ***Achorotile subarctica* Scudder** East-West Beringian
Distribution: Alaska to Northwest Territories, British Columbia and Alberta; Taymyr Autonomous District to Chukchi Autonomous District, Khabarovsk Territory and Buryat Autonomous Region (Scudder 1963; Anufriev and Emeljanov 1981; Wilson 1988, 1992).
Yukon records: Richardson Mountains Region.
Biological information: This species has been collected in sedge, grass, and shrub dominated tundra habitats in the northern Yukon; adults have been collected from 3–17 July.
5. ***Aschedelphax hochae* Wilson** East Beringian
Distribution: Yukon.
Yukon records: Ogilvie Mountains and Yukon/Tintina Regions.
Biological information: This species has been collected in bogs dominated by *Betula*, *Salix*, *Vaccinium*, and *Eriophorum*; adults have been collected from 6 June–16 July.
6. ***Chilodelphax magnifrons* (Crawford)** Cordilleran
Distribution: Alaska to Northwest Territories, British Columbia, Montana, Wyoming, and Colorado (Wilson 1988, 1992).
Yukon records: Southern Lakes Region.
Biological information: This species has been collected from 4 June–17 July.
7. ***Criomorphus wilhelmi* Anufriev and Averkin** East-West Beringian
Distribution: Alaska to the Yukon; Mongolia to the Magadan and Kamchatka Regions, Amur Region, Primor'ye Territory, Sakhalin Region and the Kurile Islands (Anufriev 1972; Anufriev and Averkin 1982; Wilson 1988, 1992).
Yukon records: Arctic Coastal Plain, Richardson Mountains, and Yukon/Tintina Regions.
Biological information: This species has been collected in sedge, grass, and shrub dominated tundra habitats in the northern Yukon; adults have been collected from 3–20 July.
8. ***Delphacodes anufrievi* Wilson** East Beringian
Distribution: Yukon.
Yukon records: Shakwak Trench Region.
Biological information: This species was described from a single male specimen collected on 1 June (Wilson 1992).
9. ***Delphacodes campestris* (Van Duzee)** Nearctic
Distribution: Yukon and Alberta to Nevada, New Hampshire and Mississippi (DuBose 1960; Giri et al. 1985; Wilson 1992).
Yukon records: Shakwak Trench Region.
Biological information: This species has been collected from 7 species of grasses and a sedge (Wilson et al. 1994) and reared under laboratory conditions (Stoner and Gustin 1980); adults were collected in the Yukon from 30 May–21 July.
10. ***Delphacodes dentipennis* Beamer** Nearctic disjunct
Distribution: Yukon and Wisconsin to Connecticut and Virginia (Beamer 1948*b*; DuBose 1960).
Yukon records: Ogilvie Mountains Region.
Biological information: The single specimen from the Yukon was collected on 10 June.
11. ***Delphacodes emeljanovi* Wilson** East Beringian
Distribution: Yukon and Northwest Territories.
Yukon records: Southern Lakes Region.
Biological information: The 2 specimens from the Yukon and Northwest Territories were collected on 21 and 25 July (Wilson 1992).

12. ***Javesella beringiaca* Emeljanov** East-West Beringian
Distribution: Yukon; Magadan, Kamchatka, and Sakhalin Regions (Anufriev and Emeljanov 1988; Wilson 1992).
Yukon records: Ogilvie Mountains Region.
Biological information: The single specimen from the Yukon was collected on 11 June.
13. ***Javesella discolor* (Boheman)** Palaeartic-East Beringian
Distribution: Alaska to Northwest Territories; Europe and North Africa to Mongolia and eastern Russia (Wilson 1988, 1992).
Yukon records: Arctic Coastal Plain, Ogilvie Mountains, and Shakwak Trench Regions.
Biological information: This species is a vector of viral pathogens of cereal crops (e.g. *Avena sativa* L.) in Fennoscandia (Wilson and O'Brien 1987); its hostplants are grasses and include 2 species of *Deschampsia*, a *Poa* sp. and a *Holcus* sp. (Wilson et al. 1994). Adults were collected in the Yukon from 9 June–22 July (Wilson 1992).
14. ***Javesella kilmani* (Van Duzee)** Nearctic
Distribution: Yukon to Quebec, Michigan and North Carolina (DuBose 1960; Wilson 1992).
Yukon records: Yukon/Tintina, Eastern Plateaus, Shakwak Trench, and Pelly Mountains Regions.
Biological information: This species has been recorded from *Equisetum* sp. (Wilson et al. 1994); adults were collected in the Yukon from 3 June–19 July (Wilson 1992).
15. ***Javesella lla* Wilson** Nearctic disjunct
Distribution: Yukon and New Hampshire (Wilson 1992).
Yukon records: Shakwak Trench Region.
Biological information: This species has been collected in the Yukon on 22 July.
16. ***Javesella obscurella* (Boheman)** Palaeartic-East Beringian
Distribution: Alaska to coastal Northwest Territories; western Europe to Mongolia and eastern Russia (Wilson 1988, 1992).
Yukon records: Arctic Coastal Plain Region.
Biological information: This species is a vector of viral pathogens of cereal crops such as oats and has been recorded from a grass, *Alopecurus* sp. (Wilson et al. 1994). In Finland it is univoltine, overwinters as nymphs in grass meadows, and develops into adults by early summer; females oviposit in their hostplants (Ossiannilsson 1978). Macropters may leave these meadows and invade fields of cereal crops (Wilson and O'Brien 1987). Adults have been collected in the Yukon from 11–22 July.
17. ***Javesella pellucida* (Fabricius)** Holarctic
Distribution: Alaska to Oregon, Maine and North Carolina; western Europe to north Africa, Mongolia and eastern Russia (Wilson 1988, 1992).
Yukon records: Porcupine Plain, Eagle Plain, Ogilvie Mountains, Yukon/Tintina, and Shakwak Trench Regions.
Biological information: This species is a vector of viral pathogens of several cereals in Fennoscandia (Wilson and O'Brien 1987); the numerous studies of its biology were summarized by Mochida and Kisimoto (1971). It is found in wet habitats, as well as cultivated fields, and is polyphagous on a number of grasses, sedges, and bulrushes including species of *Agropyron*, *Agrostis*, *Avena*, *Bromus*, *Dactylis*, *Deschampsia*, *Festuca*, *Lolium*, *Phleum*, *Sienglingia*, *Carex*, and *Scirpus* (Mochida and Kisimoto 1971; Ossiannilsson 1978; Wilson et al. 1994). In boreal regions, *J. pellucida* is univoltine, overwinters as nymphs, and oviposits in its hostplants (Ossiannilsson 1978); farther south, it is bivoltine (Mochida and Kisimoto 1971). It has been collected in sedge meadows in the Yukon from 15 May–2 August.
18. ***Javesella simillima* (Linnavuori)** Palaeartic-East Beringian
Distribution: Alaska to the Yukon; Finland to eastern Russia (Anufriev and Emeljanov 1988; Wilson 1988, 1992).
Yukon records: Arctic Coastal Plain, British Mountains, Ogilvie Mountains, and Western Ranges Regions.
Biological information: This species' hostplants are *Eriophorum* and *Carex* (Cyperaceae) (Ossiannilsson 1978); it has been collected in the Yukon from 24 June–14 July.

19. ***Kusnezoviella macleani* Wilson** East-West Beringian
Distribution: Alaska to the Yukon; Magadan Region and Khabarovsk Territory (Anufriev and Emeljanov 1988; Wilson 1988, 1992).
Yukon records: Porcupine Plain, Ogilvie Mountains, Yukon/Tintina, Eastern Plateaus, and Shakwak Trench Regions.
Biological information: This species has been collected in the Yukon from 30 May–27 July.
20. ***Megamelus flavus* Crawford** Nearctic-West Beringian
Distribution: Alaska and Northwest Territories to Quebec, Wyoming, and Colorado; Mongolia to Kamchatka Region, Khabarovsk Territory, Sakhalin Region and Kurile Islands (Beamer 1955; Scudder 1964; Anufriev and Emeljanov 1988; Wilson 1988, 1992).
Yukon records: Eagle Plain Region.
Biological information: This species has been collected in the Yukon from 8–10 August.
21. ***Nothodelphax albocarinata* (Stål)** Holarctic
Distribution: Yukon, Illinois and Kansas; northern and central Europe to Mongolia and the Amur Region (Nast 1972; Anufriev and Emeljanov 1988; Wilson 1992).
Yukon records: Arctic Coastal Plain, Ogilvie Mountains, and Shakwak Trench Regions.
Biological information: This species feeds on *Eriophorum* sp. and overwinters as nymphs in Fennoscandia (Ossiannilsson 1978). It has been collected in sedge meadows in the Yukon from 20 June–4 July.
22. ***Nothodelphax eburneocarinata* (Anufriev)** East-West Beringian
Distribution: Alaska to Northwest Territories; Mongolia to Yakut Autonomous Republic, Tuva Autonomous Republic, Magadan and Kamchatka Regions, and Primor'ye Territory (Anufriev and Emeljanov 1988; Wilson 1988, 1992).
Yukon records: Arctic Coastal Plain, Richardson Mountains, and Ogilvie Mountains Regions.
Biological information: This species has been collected in sedge-, grass-, and shrub-dominated tundra habitats in the Yukon from 25 June–14 July.
23. ***Nothodelphax glacia* Wilson** East Beringian
Distribution: Yukon.
Yukon records: Shakwak Trench and Southern Lakes Regions.
Biological information: This species has been collected from 25 May–25 June (Wilson 1992).
24. ***Nothodelphax guentheri* (Dlabola)** East-West Beringian
Distribution: Yukon; Mongolia to Taymyr Autonomous District and Altay Territory (Anufriev and Emeljanov 1988; Wilson 1992).
Yukon records: Arctic Coastal Plain.
Biological information: The single specimen from the Yukon was collected on 29 June (Wilson 1992).
25. ***Nothodelphax tshaunica* Anufriev** East-West Beringian
Distribution: Yukon; Chukchi Autonomous District and Magadan Region (Anufriev and Emeljanov 1988; Wilson 1992).
Yukon records: Richardson Mountains Region.
Biological information: The single specimen from the Yukon was collected on 20 July (Wilson 1992).
26. ***Nothodelphax umbrata* Emeljanov** East-West Beringian
Distribution: Yukon; Mongolia to Magadan Region, Kamchatka Region and Yakut Autonomous Republic (Anufriev and Emeljanov 1988; Wilson 1992).
Yukon records: Shakwak Trench Region.
Biological information: This species has been collected in the Yukon from 31 May–20 June (Wilson 1992).
27. ***Paradelphacodes litoralis* (Reuter)** Holarctic
Distribution: Yukon and Newfoundland; Scotland, Finland, Buryat Autonomous Region, and Yakut Autonomous Republic (Nast 1972; Anufriev and Emeljanov 1988; Wilson 1992).
Yukon records: Porcupine Plain and Shakwak Trench Regions.
Biological information: This species' hostplants are *Helocharis* and *Phragmites* (Ossiannilsson 1978); it has been collected in the Yukon from 31 May–10 July (Wilson 1992).

28. ***Ribautodelphax albostrata* (Fieber)** Palaeartic-East Beringian
Distribution: Alaska and Yukon; northern and central Europe and north Africa to Mongolia and eastern Russia (Anufriev and Emeljanov 1988; Wilson 1988, 1992).
Yukon records: Ogilvie Mountains and Yukon/Tintina Regions.
Biological information: This species has been recorded from dry grass fields in western Europe (Ossiannilsson 1978); it has been collected in the Yukon from 28 June–4 July (Wilson 1992).
29. ***Ribautodelphax pusilla* Emeljanov** Nearctic-West Beringian
Distribution: Yukon and Michigan; Mongolia, Altay Territory, Chita Region to Yakut Autonomous Republic and Khabarovsk Territory (Anufriev and Emeljanov 1988; Wilson 1992).
Yukon records: Porcupine Plain, Yukon/Tintina, Shakwak Trench, Southern Lakes, and Liard Plain Regions.
Biological information: This species has been collected in the Yukon from 29 May–27 July (Wilson 1992).
30. ***Yukonodelphax kendallae* Wilson** East Beringian
Distribution: Yukon.
Yukon records: Shakwak Trench Region.
Biological information: This species has been collected from 30 May–12 June (Wilson 1992).
Taxonomic notes: This species may have reached the Yukon from the south as its only known congeners are *Y. pediforma* (Beamer) from Washington and *Y. stramineosa* (Beamer) from the northeastern United States (Beamer 1947, 1948a; Wilson 1992).

Analysis and Summary

The ranges of most of the delphacid planthoppers found in the Yukon are inadequately known and suggestions regarding distribution patterns should be regarded as very tentative. Most species belong mainly to the boreal zone, with a significant number reaching arctic areas in northern Alaska, Yukon, or the western Northwest Territories. Several species do extend far into temperate areas in eastern and southern Canada and the United States.

Seventeen of the 30 species recorded from the Yukon occur in the Palaeartic as well as the Nearctic region. Three of the 17 species are Holarctic. *J. pellucida* (17) has a wide distribution in both the Palaeartic and Nearctic regions and is a vector of viral pathogens of cereal crops in Fennoscandia (Wilson and O'Brien 1987). *N. albocarinata* (21) has a more northern Palaeartic distribution and an apparently wide range in the Nearctic. *P. litoralis* (27) appears to have a far northern circumpolar range.

Four of the 17 species have a Palaeartic-East Beringian distribution. *J. discolor* (13) and *J. obscurella* (16) have broad Palaeartic ranges and a limited eastern Beringian distribution in the Nearctic. These 2 *Javesella* species are also vectors of viral pathogens of cereal crops in northern Europe (Wilson and O'Brien 1987). *J. simillima* (18) and *R. albostrata* (28) have distinctive far northern distributions in both the Palaeartic and Nearctic.

Eight species have an East-West Beringian distribution. Their Palaeartic ranges differ considerably, from a broad eastern Asiatic range in *A. subarctica* (4), *C. wilhelmi* (7), and *N. eburneocarinata* (22) to a very restricted West Beringian range in *K. macleani* (19). Four species have been recorded only from the Yukon Territory in the Nearctic portion of their ranges: *J. beringiaca* (12), *N. guentheri* (24), *N. tshaunica* (25), and *N. umbrata* (26).

Two species, *M. flavus* (20) and *R. pusilla* (29), have a Nearctic-West Beringian distribution in which they have a rather restricted range in the Palaeartic and a relatively broad range in the Nearctic.

Thirteen of the 30 Yukon species are known only from the Nearctic. Three of these species, *A. analis* (1), *A. acuta* (2) and *J. kilmani* (14), are predominantly boreal but extend

also into more southerly habitats across the continent; *A. acuta* reaches northward into the tundra of the Arctic Coastal Plain. Two species, *A. stylata* (3) and *C. magnifrons* (6), have a Cordilleran distribution, ranging from the Yukon southward to Wyoming or Colorado. *D. campestris* (9) is widely distributed throughout the eastern two-thirds of the Nearctic and is found on grasses and sedges in coniferous and temperate forests as well as prairies. *D. dentipennis* (10) and perhaps *J. lla* (15) could be considered as Nearctic disjuncts occurring in the Yukon and northeastern portion of the Nearctic.

The 5 remaining Nearctic species, *A. hochae* (5), *D. anufrievi* (8), *D. emeljanovi* (11), *N. glacia* (23) and *Y. kendallae* (30), are known only from the Yukon Territory or Yukon and adjacent Northwest Territories. These species may represent a small northwestern fauna characteristic of East Beringia.

The small number of specimens available for study precludes a detailed discussion of distributions within the Yukon Territory. Eleven of the species do extend into the low-arctic regions in the Yukon, Northwest Territories, and Alaska (*A. acuta*, *A. subarctica*, *C. wilhelmi*, *D. emeljanovi*, *J. discolor*, *J. obscurella*, *J. simillima*, *N. albocarinata*, *N. eburneocarinata*, *N. guentheri*, *N. tshaunica*). *A. acuta* has been collected on Herschel Island and most records for *N. eburneocarinata* are from arctic areas (see Wilson 1992). The genera *Javesella* and *Nothodelphax* are well represented in far northern areas.

Twelve of the 15 species of delphacids found in Alaska (Wilson 1988) are recorded from the Yukon. The 2 faunas are probably very similar but collecting in Alaska, especially the southeastern ("panhandle") section of the state, has been very limited. Of the 3 species not found in the Yukon, *J. arcanastyla* (Beamer) and *J. atrata* (Osborn) were recorded from southeastern Alaska which appears to be the extreme northwestern limit of their ranges. *Unkanodes excisa* (Melichar) has a wide Palaearctic distribution and was recorded from one western Alaskan coastal site. It might also occur in the Yukon.

The few specimens that had information regarding habitats indicate that those Yukon delphacids are found in wet sites, probably associated with grasses or sedges. This corresponds to the pattern exhibited by the relatively well-studied Fennoscandian delphacid fauna (Ossiannilsson 1978).

Most Yukon delphacids examined were brachypters (92% of males, 94% of females; $N_m = 337$, $N_f = 230$). Only one species, *J. pellucida*, a polyphagous species known to be a crop pest, had a significant proportion of macropters (54% brachypters; $N_m = 37$). The wing-form proportions of brachypters correspond to those for delphacids found in relatively stable marsh habitats (Denno 1978).

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References

- Anufriev, G.A. 1972. New and little known leaf-hoppers from the family Delphacidae (Homoptera) from the Maritime District. *Zool. Zh.* 51:612–615.
- Anufriev, G.A. and A.M. Averkin. 1982. Cicadinea of the family Delphacidae (Homoptera, Auchenorrhyncha) from the Sokhondo Reserve (Transbaicalia). *Insects Mongolia* 8:123–139.
- Anufriev, G.A. and A.F. Emeljanov. 1981. The genus *Achorotile* Fieb. (Homoptera, Delphacidae) and its systematics in the Palaearctic Region. *Ent. Rev.* 59:87–97.

- 1988. Suborder Cicadinea (Auchenorrhyncha) - Leafhoppers. pp. 12–495 in P.A. Lera (Ed.), Identification Guide to the Insects of the Far Eastern USSR, vol. 2. Homoptera and Hemiptera (In Russian). Nauka, Leningrad. 972 pp.
- Beamer, R.H. 1946. The genus *Stenocranus* in America north of Mexico (Homoptera-Fulgoridae-Delphacinae). *J. Kans. ent. Soc.* 19:1–11.
- 1947. Some new species of *Delphacodes* (Continued) with two old ones (Homoptera, Fulgoridae, Delphacinae). *J. Kans. ent. Soc.* 20:58–71.
- 1948a. Some new species of *Delphacodes* (Continued) (Homoptera, Fulgoridae, Delphacinae) Part III. *J. Kans. ent. Soc.* 21:1–10.
- 1948b. Some new species of *Delphacodes* (Homoptera, Fulgoridae, Delphacinae) Part IV. *J. Kans. ent. Soc.* 21:96–110.
- 1954. A revision of the genus *Achorotile* in America north of Mexico (Homoptera: Fulgoridae, Delphacinae). *J. Kans. ent. Soc.* 27:143–147.
- 1955. A revision of the genus *Megamelus* in America north of Mexico (Homoptera: Fulgoridae, Delphacinae). *J. Kans. ent. Soc.* 28:29–46.
- Denno, R.F. 1978. The optimum population strategy for planthoppers (Homoptera: Delphacidae) in stable marsh habitats. *Can. Ent.* 110:135–142.
- Denno, R.F. and G.K. Roderick. 1990. Population biology of planthoppers. *A. Rev. Ent.* 35:489–520.
- DuBose, W.P. 1960. The genus *Delphacodes* Fieber in North Carolina (Homoptera: Delphacidae). *J. Elisha Mitchell Sci. Soc.* 76:36–63.
- Giri, H.K., P.H. Freytag, and K.V. Yeargan. 1985. Field studies of delphacid planthopper populations (Homoptera: Delphacidae), with notes on their dryinid parasites (Hymenoptera: Dryinidae). *J. Kans. ent. Soc.* 58:69–74.
- Kramer, J.P. 1973. Revision of the American planthoppers of the genus *Stobaera* (Homoptera: Delphacidae) with new distributional data and host plant records. *Proc. ent. Soc. Wash.* 75:379–402.
- Mochida, O. and R. Kisimoto. 1971. A review of the studies on *Javesella pellucida* (F.) (Hom., Delphacidae) and associated subjects. *Rev. Plant Prot. Res.* 4:1–57.
- Moore, G.A. 1944. A list of Hemiptera taken at Hudson Heights, Quebec. *Can. Ent.* 76:40–44.
- 1950. Check-list of Hemiptera of the Province of Quebec. *Contr. Inst. Biol. Univ. Montréal* 26. 49 pp.
- Morgan, L.W. and R.H. Beamer. 1949. A revision of three genera of delphacine fulgorids from America north of Mexico (Homoptera-Fulgoridae-Delphacinae). *J. Kans. ent. Soc.* 22:97–142.
- Nast, J. 1972. Palaearctic Auchenorrhyncha (Homoptera), an Annotated Check List. Polish Acad. Sci., Polish Scientific Publishers, Warsaw. 550 pp.
- O'Brien, L.B. and S.W. Wilson. 1985. Planthopper systematics and external morphology. pp. 61–102 in L.R. Nault and J.G. Rodriguez (Eds.), The Leafhoppers and Planthoppers. John Wiley and Sons, New York. 500 pp.
- Ossiannilsson, F. 1978. The Auchenorrhyncha (Homoptera) of Fennoscandia and Denmark. Part 1: Introduction, infraorder Fulgoromorpha. *Fauna ent. scand.* 7:5–222.
- Provancher, L. 1889. Petite faune entomologique du Canada et particulièrement de la Province de Québec. Vol. III. Cinquième Ordre, Les Hemiptères, pp. 207–283.
- 1890. Petite faune entomologique du Canada et particulièrement de la Province de Québec. Vol. III. Cinquième Ordre, Les Hemiptères, pp. 284–340.
- Scudder, G.G.E. 1963. Studies on the Canadian and Alaskan Fulgoromorpha (Hemiptera). I. The genera *Achrotile* Fieber and *Laccocera* Van Duzee (Delphacidae). *Can. Ent.* 95:167–177.
- 1964. Studies on the Canadian and Alaskan Fulgoromorpha (Hemiptera). II. The genus *Megamelus* Fieber (Delphacidae). *Can. Ent.* 96:813–820.
- 1979. Hemiptera. pp. 329–348 in H.V. Danks (Ed.), Canada and its Insect Fauna. *Mem. ent. Soc. Can.* 108. 573 pp.
- 1997. Environment of the Yukon. pp. 13–57 in H.V. Danks and J.A. Downes (Eds.), Insects of the Yukon. Biological Survey of Canada (Terrestrial Arthropods), Ottawa.
- Stoner, W.N. and R.D. Gustin. 1980. Biology of *Delphacodes campestris* (Homoptera: Delphacidae). *Ann. ent. Soc. Am.* 73:372–374.
- Strickland, E.H. 1953. An annotated list of the Hemiptera (S. L.) of Alberta. *Can. Ent.* 85:193–214.
- Waddell, D.B. 1952. A preliminary list of the Hemiptera of the Kootenay Valley. *Proc. ent. Soc. Br. Columb.* 48:93–96.
- Wilson, S.W. 1988. Delphacidae of Alaska (Homoptera: Fulgoroidea). *Gt Basin Nat. Mem.* 12:335–343.
- 1992. The Delphacidae of Yukon Territory, Canada (Homoptera: Fulgoroidea). *Insecta Mundi* 6:79–100.
- Wilson, S.W., C. Mitter, R.F. Denno, and M.R. Wilson. 1994. Evolutionary patterns of host plant use by delphacid planthoppers and their relatives. pp. 7–113 in R.F. Denno and T.J. Perfect (Eds.), Planthoppers: Their Ecology and Management. Chapman and Hall, New York. 799 pp.
- Wilson, S.W. and L.B. O'Brien. 1987. A survey of planthopper pests of economically important plants (Homoptera: Fulgoroidea). *Proc. 2nd Int. Workshop on Leafhoppers and Planthoppers of Econ. Importance:* 343–360.