

Catalog of the adelgids of the world (Hemiptera, Adelgidae)

Colin Favret¹, Nathan P. Havill², Gary L. Miller³, Masakazu Sano⁴, Benjamin Victor⁵

1 University of Montreal, Biodiversity Centre, 4101 rue Sherbrooke est, Montreal, Quebec, H1X 2B2 Canada
2 USDA Forest Service, Northern Research Station, 51 Mill Pond Road, Hamden, CT 06514, USA **3** USDA-ARS, Systematic Entomology Laboratory, 10300 Baltimore Ave, Bldg. 005, BARC-West, Beltsville, MD 20705, USA **4** Hokkaido University, Graduate School of Agriculture, Systematic Entomology, Kita 9 Nishi 9, Kita-ku, Sapporo 060-8589, Hokkaido, Japan **5** University of Montreal, Classical Studies Centre, 3774 rue Jean-Brillant, Montreal, Quebec, H3T 1P1 Canada

Corresponding author: Colin Favret (ColinFavret@AphidNet.org)

Academic editor: B. Price | Received 2 September 2015 | Accepted 13 October 2015 | Published 11 November 2015

<http://zoobank.org/CA4C9C2D-9573-45B2-B72F-0A156601DC31>

Citation: Favret C, Havill NP, Miller GL, Sano M, Victor B (2015) Catalog of the adelgids of the world (Hemiptera, Adelgidae). ZooKeys 534: 35–54. doi: 10.3897/zookeys.534.6456

Abstract

A taxonomic and nomenclatural Catalogue of the adelgids (Hemiptera: Adelgidae) is presented. Six family-group names are listed, five being synonyms of Adelgidae. Twenty-two genus-group names, of which nine are subjectively valid and in use, are presented with their type species, etymology, and grammatical gender. One hundred and six species-group names are listed, of which 70 are considered subjectively valid.

Keywords

Aphidomorpha, nomenclature, Sternorrhyncha, taxonomy, woolly adelgid

Introduction

Adelgidae is a small family of Hemiptera with 65 species, closely related to Aphididae. They exhibit a two-year life cycle, with some species alternating hosts between spruce (*Picea*) one year and species of another conifer genus (*Abies*, *Larix*, *Pinus*, *Pseudotsuga*,

Tsuga) the next. Other species or populations do not alternate hosts, feeding only on *Picea* or one of the other conifer genera. Like other Aphidomorpha, Adelgidae exhibit cyclical parthenogenesis, although they are oviparous unlike the viviparous Aphididae. Some adelgid species are important forestry pests, most notably the hemlock woolly adelgid, *Adelges tsugae* (Annand) and the balsam woolly adelgid, *Adelges piceae* (Ratzeburg). Havill and Footitt (2007) present a thorough overview of the biology and evolution of the family.

The closest relatives of the Adelgidae are two extinct families, Elektraphididae and Mesozoicaphididae, the three families comprising the superfamily Adelgoidea (Heie and Wegierek 2009). The oldest fossils of the extinct families date to the Cretaceous, whereas the only fossil adelgid, *Adelges balticus* Wegierek, 2003, is Eocene in age. Heie and Wegierek (2011) present a list of the fossil Aphidomorpha, including the one adelgid and the 20 other Adelgoidea species.

Adelgid classification has long been unstable. It was first hampered by the adoption of the genus name *Chermes* Linnaeus, 1758, which had also been used for psyllids and scale insects (Favret et al. 2014). The name was eventually suppressed by the International Commission on Zoological Nomenclature (Evans and China 1965), but not before 137 nominal species had been described in combination with *Chermes*, including 43 Adelgidae (Favret et al. 2014). Towards the end of the 19th Century and in the first half of the 20th Century, several workers described many new species and erected new genera. Most notably, there was little agreement about adelgid taxonomy between the two most prolific adelgid workers, the Russian N.A. Chlodkovsky and the German C. Börner. With the application of molecular data and explicit systematic analyses (Havill et al. 2007, Havill and Footitt 2007), adelgid classification has become more stable. Many researchers have adopted a system with two genera (*Adelges* Annand and *Pineus* Shimer) and several subgenera, although some have preferred to treat the latter as full genera (Binazzi 1984, Zurovcová et al. 2010).

While several world catalogs and species lists of the more diverse Aphididae have been published (Wilson and Vickery 1918, Patch 1938, Hille Ris Lambers and Eastop 1976, Remaudière and Remaudière 1997), a comprehensive catalog of the Adelgidae has never been produced. Perhaps the small size of the family contributed to its neglect, but the relative inaccessibility of the taxonomic literature, written in multiple languages and in often hard-to-find sources, possibly made the task too daunting. We here present a taxonomic and nomenclatural list of the extant adelgid nominal taxa, including six family-group, 22 genus-group, and 106 species-group names. Of these, we list one valid family (Adelgidae), two and seven valid genera and subgenera (not counting nominotypical subgenera), and 65 and five valid species and subspecies (not counting nominotypical subspecies). We include one genus-group nomen dubium, four suppressed genus-group names, three species-group nomina dubia, and two unavailable species-group names; the many such names still in combination with *Chermes* are not listed here (Favret et al. 2014).

Despite having nomenclatural priority, *Coccus laricis* Bouché, 1834 has long been treated as a synonym of *A. laricis* Vallot, 1836 (Börner 1952, Steffan 1972, Eastop and

Hille Ris Lambers 1976). *Coccus laricis* Bouché has not been used as a valid name after 1899, meeting the requirements of nomen oblitum per ICZN Article 23.9.1.1 (International Commission on Zoological Nomenclature 1999). Meanwhile, *Adelges laricis* Vallot has been used frequently. To address ICZN Article 23.9.1.2 and thus consider *A. laricis* Vallot a nomen protectum, we here list 25 works that used the name as valid, published by at least ten authors in the immediately preceding 50 years and encompassing a span of not less than ten years (Carter 1971, Podeur 1971, Steffan 1972, Li and Tsai 1973, Parry 1973, Eichhorn and Carter 1978, Zhang et al. 1980, Fang 1982, Binazzi 1984, Luo 1988, Rohfritsch 1988, Eichhorn 1994, Battisti et al. 1997, Fang and Yan 1997, Szklarzewicz et al. 2000, Wegierek 2002, Rożkowski 2004, Skrzypczyńska 2004, Havill and Foottit 2007, Havill et al. 2007, Zurovcová et al. 2010, Michalik et al. 2012, Sano and Ozaki 2012, Toenshoff et al. 2012, Gavrillov-Zimin et al. 2015).

In order to facilitate future species descriptions, we followed the model of recent aphid genus-group catalogs by including information on etymology and grammatical gender (Favret et al. 2008, 2009, Cortés Gabaudan et al. 2011, Nieto Nafría et al. 2011). In cases where two page numbers are provided for original descriptions, the first number refers to a nomenclaturally valid diagnosis, such as in a dichotomous key, the second references the formal description. Valid names are in bold font, synonyms are preceded by ‘=’. Synonyms of family-group names are presented with their rank-specific endings replaced by ‘__’. Nominal species are listed under their current generic placement with the original genus in parentheses. The taxonomic catalog is followed by an alphabetical index to help find the current placement of each name. It is our hope that this catalog will serve as an initial point of convergence in our understanding of adelgid systematics and a point of departure on which future research will be built. Future updates will be published on Aphid Species File (Aphid.SpeciesFile.org).

Catalogue

ADELGIDAE Annand 1928:31

- Original spelling. Adelginae
- Type genus. *Adelges* Vallot 1836
- =CHERMES__ Herrich-Schaeffer 1854:VIII
- Original spelling. Chermiden
- Type genus. *Chermes* Linnaeus 1758
- Note. Suppressed (Evans and China 1965)
- =CHERMAPH__ Hunter 1901:70
- Original spelling. Chermaphinae
- Type genus. *Chermaphis* Maskell 1884
- =DREYFUSI__ Börner 1930:155
- Original spelling. Dreyfusiini
- Type genus. *Dreyfusia* Börner 1908a
- =PINE__ Nüsslin in Börner 1909c:51

Original spelling. Pineini
 Type genus. *Pineus* Shimer 1869
 =SACCHIPHANT__ Steffan 1968:128
 Original spelling. Sacchiphantini
 Type genus. *Sacchiphantes* Curtis 1844

ADELGES Vallot 1836

Subgenus **ADELGES** Vallot 1836:72

Type species. *Adelges laricis* Vallot 1836, by original monotypy

Etymology. Greek adelos ‘unclear’, ‘secret’ + Greek ge ‘earth’ + -s [concealed in the earth]

Gender. Masculine

=ANISOPHLEBA Koch 1857:320

Type species. *Anisophleba hamadryas* Koch 1857, by subsequent monotypy

Etymology. Greek anisos ‘unequal’ + Greek phleps ‘vein’ + -a

Gender. Feminine

=LARICETHUS Amyot 1847:485

Type species. *Adelges laricis* Hartig 1839, by original monotypy

Etymology. Greek larix ‘larch’ + Greek eth- ‘custom’, ‘habit’ + -us

Gender. Masculine

Note. Suppressed (China 1963)

aenigmaticus Annand 1928:34,73 (*Adelges*)

geniculatus (Ratzeburg 1844:202) (*Chermes*)

isedakii Eichhorn in Eichhorn and Carter 1978:280 (*Adelges*)

japonicus (Monzen 1929:71) (*Chermes*)

karamatsu Inouye 1945:54,86 (variety of *Adelges laricis* Vallot)

lapponicus (Cholodkovsky 1889b:390) (*Chermes*)

=*praecox* (Cholodkovsky 1898:28) (variety of *Chermes lapponicus* Cholodkovsky)

lariciatus (Patch 1909:137) (*Chermes*)

laricis Vallot 1836:72 (*Adelges*) (nomen protectum with respect to *Coccus laricis* Bouché)

subspecies **laricis** Vallot 1836

=*atratus* (Buckton 1883:39) (*Chermes*)

=*coccineus* (Ratzeburg 1843:202) (*Chermes*)

=*consolidatus* (Patch 1909:137) (*Chermes*)

=*hamadryas* (Koch 1857:320) (*Anisophleba*)

=*lariceti* (Altum 1889:279) (*Chermes*)

=*laricis* (Bouché 1834:22) (*Coccus*) (nomen oblitum with respect to *Adelges laricis* Vallot)

=*laricis* (Hartig 1839:644) (*Chermes*)

=*obtectus* (Ratzeburg 1844:200) (*Chermes*)

=*strobilobius* (Kaltenbach 1843:203) (*Chermes*)

subspecies **potaninilaricis** Zhang in Zhang et al. 1980:383 (subspecies of *Adelges laricis* Vallot)

tardoides (Cholodkovsky 1911:175) (variety of *Chermes strobilobius* Kaltenbach)

tardus (Dreyfus 1888:3) (*Chermes*)

=*affinis* (Börner 1908b:167) (*Cnaphalodes*) (Börner 1908a:417 nomen nudum)

=*niger* (Solowiow 1924:41) (*Chermes*)

Subgenus **ANNANDINA** Favret et al. 2015:176

Type species *Adelges tsugae* Annand 1924b, by original designation

Etymology. (Percy Nicol) Annand [American entomologist] + -ina

Gender. Feminine

tsugae Annand 1924b:79 (*Adelges*)

Subgenus **APHRASTASIA** Börner 1909a:1

Type species. *Chermes pectinatae* Cholodkovsky 1888, by original monotypy

Etymology. Greek aphrastós ‘unnoticed’ + -ia

Gender. Feminine

pectinatae (Cholodkovsky 1888:47) (*Chermes*)

subspecies **ishiharai** (Inouye 1936:75) (*Chermes*)

subspecies **pectinatae** (Cholodkovsky 1888)

Subgenus **CHOLODKOVSKYA** Börner 1909b:1

Type species. *Chermes viridanus* Cholodkovsky 1896, by original monotypy

Etymology. (Nikolai Alexandrovitch) Cholodkovsky [Russian entomologist] + -a

Gender. Feminine

oregonensis Annand 1928:34,67 (*Adelges*)

viridanus (Cholodkovsky 1896:39) (*Chermes*)

=*laricicola* (Shinji 1930:151) (*Chermes*)

viridulus (Cholodkovsky 1911:175) (*Chermes*)

Subgenus **DREYFUSIA** Börner 1908a:416

Type species. *Chermes piceae* Ratzeburg 1844, by subsequent designation (Börner 1908b:138)

Etymology. (Ludwig Theodor) Dreyfus [German entomologist] + -ia

Gender. Feminine

abietispiceae (Stebbing 1903:57) (*Chermes*) nomen dubium (Cholodkovsky (1906:49, 1915:60) indicates that the species is probably real but that the description is insufficient to confirm its identity; Schneider-Orelli and Schneider (1954:414) agree that Stebbing’s description provides insufficient morphological information to

compare with their description of *Dreyfusia knucheli* Schneider-Orelli and Schneider. Ghosh (1983:11) considered it a synonym of *Dreyfusia knucheli*, but qualified it with a question mark)

=*himalayensis* (Stebbing 1910:100) (*Chermes*) (unavailable, described in synonymy with *Chermes abietispiceae* Stebbing 1903)

funitectus (Dreyfus 1888:6) (*Chermes*) nomen dubium (Favret et al. 2015)

joshii (Schneider-Orelli and Schneider 1959:260) (*Dreyfusia*)

knucheli (Schneider-Orelli and Schneider 1954:416) (*Dreyfusia*)

merkeri (Eichhorn 1957:312) (*Dreyfusia*)

nebrodensis (Binazzi and Covassi 1991:246) (*Dreyfusia*)

nordmannianae (Eckstein 1890:90) (*Chermes*)

=*nuesslini* (Börner 1908c:739) (*Dreyfusia*)

piceae (Ratzeburg 1844:204) (*Chermes*)

subspecies **canadensis** (Merker and Eichhorn 1956:454) (form of *Dreyfusia piceae* (Ratzeburg))

subspecies **occidentalis** Foottit and Mackauer 1983:302 (subspecies of *Adelges piceae* (Ratzeburg))

subspecies **piceae** (Ratzeburg 1844)

=*bouvieri* (Cholodkovsky 1902:10) (variety of *Chermes piceae* Ratzeburg)

pindrowi Yaseen and Ghani 1971:191,193 (*Adelges*)

prelli (Grosman 1935:822) (*Dreyfusia*)

schneideri (Börner 1931:684) (*Dreyfusia*)

todomatsui (Inouye 1945:73,92) (*Dreyfusia*)

Subgenus **GILLETTEELLA** Börner 1930:157

Type species. *Chermes cooleyi* Gillette 1907, inherited from replaced name

Etymology. (Clarence Preston) Gillette [American entomologist] + -ella [diminutive suffix]

Gender. Feminine

Note. Replacement name for *Gillettea* Börner 1909d

=*GILLETTEA* Börner 1909d:504

Type species. *Chermes cooleyi* Gillette 1907, by original monotypy

Etymology. (Clarence Preston) Gillette [American entomologist] + -a

Gender. Feminine

Note. Junior homonym of *Gillettea* Ashmead 1897:69 (Hymenoptera, Cynipidae)

cooleyi (Gillette 1907:3) (*Chermes*)

coweni (Gillette 1907:10) (variety of *Chermes cooleyi* Gillette)

cummingae (Steffan 1968:10,22,42) (*Gilletteella*) nomen nudum

glandulae (Zhang in Zhang et al. 1980:382) (*Gilletteella*)

Subgenus **SACCHIPHANTES** Curtis 1844:831

Type species. *Chermes abietis* Linnaeus 1758, by original monotypy
 Etymology. Greek sakkos ‘coarse cloth’, ‘sail’ + Greek hyphantēs ‘weaver’
 Gender. Masculine

=*ELATIPTUS* Amyot 1847:484

Type species. *Chermes abietis* Linnaeus 1758, by original monotypy
 Etymology. Greek elatē ‘fir’ + Greek ipt- ‘harm’ + -us
 Gender. Masculine

Note. Suppressed (China 1963) and junior objective synonym of *Sacchiphantes* Curtis 1844

=*PHLOEOPHTHIRIDIUM* van der Hoeven 1849:509

Type species. *Chermes abietis* Linnaeus 1758, by original monotypy
 Etymology. Greek phloios ‘bark’ + Greek phtheir- ‘destroy’ + Greek -idium [diminutive suffix]
 Gender. Neuter

Note. Junior objective synonym of *Sacchiphantes* Curtis 1844

abietis (Linnaeus 1758:454) (*Chermes*)

=*abietislaricis* (Eckstein 1890:88) (*Chermes*) based on Dreyfus’s (1889:82) description of a *Larix*-associated form of *Chermes abietis*

=*alaeviridis* (Solowiow 1924:39) (*Chermes*)

=*gallarumabietis* (De Geer 1773:99) (*Aphis*) nomen dubium

=*laricifoliae* (Fitch 1858:752) (*Chermes*)

diversis Annand 1928:34,69 (*Adelges*)

karafutonis Kono and Inouye 1938:169,170 (*Adelges*)

kitamiensis (Inouye 1963:341) (*Sacchiphantes*)

roseigallis (Li and Tsai 1973:135,141,148) (*Sacchiphantes*)

segregis (Steffan 1961:67) (*Sacchiphantes*)

torii (Eichhorn in Eichhorn and Carter 1978:284) (*Sacchiphantes*)

viridis (Ratzeburg 1843:202) (*Chermes*)

=*occidentalis* (Cholodkovsky 1910:281) (*Chermes*)

CHERMES Linnaeus 1758:453

Type species. None (see Favret et al. 2014)

Etymology. Arabic kirmiz ‘crimson’

Gender. Masculine

Note. Suppressed (Evans and China 1965), see Favret et al. (2014) for list of species-group names described under *Chermes*

GISTELIELLA Strand 1928:46

Type species. *Chermes lapidarius* Fabricius 1803, inherited from replaced name

Etymology. (Johannes) Gistel [German entomologist] + -i + ella [diminutive suffix]

Gender. Feminine

Note. Replacement name for *Aphanus* Gistel 1837, nomen dubium
= *APHANUS* Gistel 1837:111

Type species. *Chermes lapidarius* Fabricius 1803, by original monotypy

Etymology. Greek aphanēs ‘invisible’

Gender. Masculine

Note. Junior homonym of *Aphanus* Laporte 1833:35 (Hemiptera, Lygaeidae)
lapidaria (Fabricius 1803:306) (*Chermes*) nomen dubium (placement unknown)

PINEUS Shimer 1869:383

Subgenus **PINEODES** Börner 1926:240

Type species. *Chermes pinifoliae* Fitch 1858, by original monotypy

Etymology. *Pine(us)* [Hemiptera: Adelgidae] + Greek -ōdēs ‘resembling’

Gender. Masculine

pinifoliae (Fitch 1858:741) (*Chermes*)

= *abieticolens* (Thomas 1879:156) (*Chermes*)

= *armiger* (Annand 1924a:5) (*Chermes*)

= *montanus* (Gillette 1907:14) (*Chermes*)

Subgenus **PINEUS** Shimer 1869:383

Type species. *Coccus pinicorticis* Fitch 1855, by original monotypy

Etymology. Latin pineus ‘of or pertaining to pine’

Gender. Masculine

= *CHERMAPHIS* Maskell 1884:292

Type species. *Kermaphis pini* var. *laevis* Maskell 1885, by subsequent designation (Eastop and Hille Ris Lambers 1976:144)

Etymology. *Cherm(es)* [Hemiptera] + *Aphis* [Hemiptera: Aphididae]

Gender. Feminine

= *CNAPHALODES* Amyot and Audinet Serville 1843:595

Type species. *Chermes pini* Goeze 1778, by original monotypy

Etymology. Greek knaphallon ‘pillow’ + Greek -ōdēs ‘resembling’

Gender. Masculine

= *EOPINEUS* Steffan 1968:11

Type species. *Chermes strobi* Ratzeburg 1844, by subsequent designation (Eastop and Hille Ris Lambers 1976:188)

Etymology. Greek eōs ‘dawn’, ‘early’ + *Pineus* [Hemiptera: Adelgidae]

Gender. Masculine

= *KERMAPHIS* Maskell 1885:19

Type species. *Anisophleba pini* Koch 1857, by subsequent designation (Eastop and Hille Ris Lambers 1976:232)

Etymology. *Kerm(es)* [Hemiptera: Coccoidea] + *Aphis* [Hemiptera: Aphididae]

Gender. Feminine

=*PITYOPSYLLA* Amyot 1847:461

Type species. *Chermes pini* Goeze 1778, by original monotypy

Etymology. Greek pitys 'pine' + *Psylla* [Hemiptera: Psyllidae]

Gender. Feminine

Note. Suppressed (China 1963) and junior objective synonym of *Cnaphalodes*

Amyot and Audinet Serville 1843

abietinus Underwood and Balch 1964:523 (*Pineus*)

armandicola Zhang et al. 1992:360,394 (*Pineus*)

boernerii Annand 1928:34,112 (*Pineus*) (Takahashi (1937:11), Inouye (1945:36), and Ghosh (1983:8) list this species as a synonym of *Pineus laevis* (Maskell), but Maskell's (1885:16) description is insufficient to validate synonymy)

boycei Annand 1928:35,102 (*Pineus*)

cembrae (Cholodkovsky 1888:47) (*Chermes*)

subspecies ***cembrae*** (Cholodkovsky 1888)

=*sibiricus* (Cholodkovsky 1889b:388) (*Chermes*)

subspecies ***pinikoreanus*** Zhang and Fang 1981:15 (subspecies of *Pineus cembrae* (Cholodkovsky))

cladogenous Fang and Sun 1985:3 (*Pineus*)

coloradensis (Gillette 1907:16) (*Chermes*)

cortecicolus Fang and Sun 1985:2 (*Pineus*)

engelmannii Annand 1928:36,130 (*Pineus*)

floccus (Patch 1909:137) (*Chermes*)

ghanii Yaseen and Ghani 1971:191,199 (*Pineus*)

harukawai Inouye 1945:13,21,31,80 (*Pineus*)

havrylenkoi Blanchard 1944:52 (*Pineus*)

hosoyai Inouye 1945:22,32,81 (*Pineus*)

konowashiyai Inouye 1945:13,21,34,81 (*Pineus*)

laevis (Maskell 1885:16) (variety of *Kermaphis pini* (Koch))

matsumurai Inouye 1945:13,22,37,82 (*Pineus*)

orientalis (Dreyfus 1888:3,6) (*Chermes*)

patchae Börner 1926:239 (*Pineus*)

pineoides (Cholodkovsky 1903:263) (variety of *Chermes pini* (Koch))

pini (Goeze 1778:328) (*Chermes*)

=*coniferarum* (Cholodkovsky 1889a:222) (*Chermes*)

=*pini* (Koch 1857:322) (*Anisophleba*)

=*pinicola* (Cholodkovsky 1915:57) (variety of *Chermes pini* (Koch))

piniyunnanensis Zhang et al. 1992:361,394 (*Pineus*)

sichuananus Zhang in Zhang et al. 1980:381 (*Pineus*)

similis (Gillette 1907:15) (*Chermes*)

simmondsi Yaseen and Ghani 1971:191,195 (*Pineus*)

strobi (Hartig 1839:643) (*Coccus*)

=*corticalis* (Kaltenbach 1843:197) (*Chermes*)

=*pinicortici* (Fitch 1855:871) (*Coccus*)

=*strobi* (Baerensprung 1849:174) (*Coccus*)

=*strobi* (Ratzeburg 1844:203) (*Chermes*)

sylvestris Annand 1928:34,115 (*Pineus*)

wallichianae Yaseen and Ghani 1971:191,202 (*Pineus*)

Index of genus-group and species-group names

ADELGES Vallot 1836

abieticolens Thomas 1879 – synonym of *Pineus* (*Pineodes*) *pinifoliae*

abietinus Underwood and Balch 1964 – *Pineus* (*Pineus*)

abietis Linnaeus 1758 – *Adelges* (*Sacchiphantes*)

abietislaricis Eckstein 1890 – synonym of *Adelges* (*Sacchiphantes*) *abietis*

abietispiceae Stebbing 1903 – *Adelges* (*Dreyfusia*)

aenigmaticus Annand 1928 – *Adelges* (*Adelges*)

affinis Börner 1908b – synonym of *Adelges* (*Adelges*) *tardus*

alaeviridis Solowiow 1924 – synonym of *Adelges* (*Sacchiphantes*) *abietis*

ANISOPHLEBA Koch 1857 – synonym of *Adelges* (*Adelges*)

ANNANDINA Favret et al. 2015 – subgenus of *Adelges*

APHANUS Gistel 1837 – synonym of *Gisteliella*

APHRASTASIA Börner 1909a – subgenus of *Adelges*

armadicola Zhang et al. in Chen 1992 – *Pineus* (*Pineus*)

armiger Annand 1924a – synonym of *Pineus* (*Pineodes*) *pinifoliae*

atratus Buckton 1883 – synonym of *Adelges* (*Adelges*) *laricis larici*

boernerii Annand 1928 – *Pineus* (*Pineus*)

bouvieri Cholodkovsky 1902 – synonym of *Adelges* (*Dreyfusia*) *piceae piceae*

boycei Annand 1928 – *Pineus* (*Pineus*)

canadensis Merker and Eichhorn 1956 – subspecies of *Adelges* (*Dreyfusia*) *piceae*

cembrae Cholodkovsky 1888 – *Pineus* (*Pineus*)

CHERMAPHIS Maskell 1884 – synonym of *Pineus* (*Pineus*)

CHERMES Linnaeus 1758

CHOLODKOVSKYA Börner 1909b – subgenus of *Adelges*

cladogenous Fang and Sun 1985 – *Pineus* (*Pineus*)

CNAPHALODES Amyot and Audinet Serville 1843 – synonym of *Pineus* (*Pineus*)

coccineus Ratzeburg 1843 – synonym of *Adelges* (*Adelges*) *laricis laricis*

coloradensis Gillette 1907 – *Pineus* (*Pineus*)

coniferarum Cholodkovsky 1889a – synonym of *Pineus* (*Pineus*) *pinii*

consolidatus Patch 1909 – synonym of *Adelges* (*Adelges*) *laricis laricis*

cooleyi Gillette 1907 – *Adelges* (*Gilletteella*)

corteciculus Fang and Sun 1985 – *Pineus* (*Pineus*)

corticalis Kaltenbach 1843 – synonym of *Pineus* (*Pineus*) *strobi*

coweni Gillette 1907 – *Adelges* (*Gilletteella*)

cummingae Steffan 1968 – *Adelges* (*Gilletteella*)

- diversis* Annand 1928 – *Adelges* (*Sacchiphantes*)
DREYFUSIA Börner 1908a – subgenus of *Adelges*
ELATIPTUS Amyot 1847 – synonym of *Adelges* (*Sacchiphantes*)
engelmannii Annand 1928 – *Pineus* (*Pineus*)
EOPINEUS Steffan 1968 – synonym of *Pineus* (*Pineus*)
floccus Patch 1909 – *Pineus* (*Pineus*)
funitectus Dreyfus 1888 – *Adelges* (*Dreyfusia*)
gallarumabietis De Geer 1773 – synonym of *Adelges* (*Sacchiphantes*) *abietis*
geniculatus Ratzeburg 1844 – *Adelges* (*Adelges*)
ghanii Yaseen and Ghani 1971 – *Pineus* (*Pineus*)
GILLETTEA Börner 1909d – synonym of *Adelges* (*Gilletteella*)
GILLETTEELLA Börner 1930 – subgenus of *Adelges*
GISTELIELLA Strand 1928
glandulae Zhang in Zhang et al. 1980 – *Adelges* (*Gilletteella*)
hamadryas Koch 1857 – synonym of *Adelges* (*Adelges*) *laricis laricis*
harukawai Inouye 1945 – *Pineus* (*Pineus*)
havrylenkoi Blanchard 1944 – *Pineus* (*Pineus*)
himalayensis Stebbing 1910 – synonym of *Adelges* (*Dreyfusia*) *abietispiceae*
hosoyai Inouye 1945 – *Pineus* (*Pineus*)
isedakii Eichhorn in Eichhorn and Carter 1978 – *Adelges* (*Adelges*)
ishiharai Inouye 1936 – subspecies of *Adelges* (*Aphrastasia*) *pectinatae*
japonicus Monzen 1929 – *Adelges* (*Adelges*)
joshii Schneider-Orelli and Schneider 1959 – *Adelges* (*Dreyfusia*)
karafutonis Kono and Inouye 1938 – *Adelges* (*Sacchiphantes*)
karamatsu Inouye 1945 – *Adelges* (*Adelges*)
KERMAPHIS Maskell 1885 – synonym of *Pineus* (*Pineus*)
kitamiensis Inouye 1963 – *Adelges* (*Sacchiphantes*)
knucheli Schneider-Orelli and Schneider 1954 – *Adelges* (*Dreyfusia*)
konowashiyai Inouye 1945 – *Pineus* (*Pineus*)
laevis Maskell 1885 – *Pineus* (*Pineus*)
lapidaria Fabricius 1803 – *Gisteliella*
lapponicus Cholodkovsky 1889b – *Adelges* (*Adelges*)
LARICETHUS Amyot 1847 – synonym of *Adelges* (*Adelges*)
lariceti Altum 1889 – synonym of *Adelges* (*Adelges*) *laricis laricis*
lariciatus Patch 1909 – *Adelges* (*Adelges*)
laricicola Shinji 1930 – synonym of *Adelges* (*Cholodkovskya*) *viridanus*
laricifoliae Fitch 1858 – synonym of *Adelges* (*Sacchiphantes*) *abietis*
laricis Bouché 1834 – synonym of *Adelges* (*Adelges*) *laricis laricis*
laricis Hartig 1839 – synonym of *Adelges* (*Adelges*) *laricis laricis*
laricis Vallot 1836 – *Adelges* (*Adelges*)
matsumurai Inouye 1945 – *Pineus* (*Pineus*)
merkeri Eichhorn 1957 – *Adelges* (*Dreyfusia*)
montanus Gillette 1907 – synonym of *Pineus* (*Pineodes*) *pinifoliae*

nebrodensis Binazzi and Covassi 1991 – *Adelges* (*Dreyfusia*)
niger Solowiow 1924 – synonym of *Adelges* (*Adelges*) *tardus*
nordmannianae Eckstein 1890 – *Adelges* (*Dreyfusia*)
nuesslini Börner 1908c – synonym of *Adelges* (*Dreyfusia*) *nordmannianae*
obtectus Ratzeburg 1844 – synonym of *Adelges* (*Adelges*) *laricis laricis*
occidentalis Cholodkovsky 1910 – synonym of *Adelges* (*Sacchiphantes*) *viridis*
occidentalis Footitt and Mackauer 1983 – subspecies of *Adelges* (*Dreyfusia*) *piceae*
oregonensis Annand 1928 – *Adelges* (*Cholodkovskya*)
orientalis Dreyfus 1888 – *Pineus* (*Pineus*)
patchae Börner 1926 – *Pineus* (*Pineus*)
pectinatae Cholodkovsky 1888 – *Adelges* (*Aphrastasia*)
PHLOEPHTHIRIDIUM van der Hoeven 1849 – synonym of *Adelges* (*Sacchiphantes*)
piceae Ratzeburg 1944 – *Adelges* (*Dreyfusia*)
pindrowi Yaseen and Ghani 1971 – *Adelges* (*Dreyfusia*)
PINEODES Börner 1926 – subgenus of *Pineus*
pineoides Cholodkovsky 1903 – *Pineus* (*Pineus*)
PINEUS Shimer 1869
pini Goeze 1778 – *Pineus* (*Pineus*)
pini Koch 1857 – synonym of *Pineus* (*Pineus*) *pini*
pinicola Cholodkovsky 1915 – synonym of *Pineus* (*Pineus*) *pini*
pinicorticis Fitch 1855 – synonym of *Pineus* (*Pineus*) *strobi*
pinifoliae Fitch 1858 – *Pineus* (*Pineodes*)
pinikoreanus Zhang and Fang 1981 – subspecies of *Pineus* (*Pineus*) *cembrae*
piniyunnanensis Zhang et al. 1992 – *Pineus* (*Pineus*)
PITYOPSYLLA Amyot 1847 – synonym of *Pineus* (*Pineus*)
potaninilaricis Zhang in Zhang et al. 1980 – subspecies of *Adelges* (*Adelges*) *laricis*
praecox Cholodkovsky 1898 – synonym of *Adelges* (*Adelges*) *lapponicus*
prelli Grosmann 1935 – *Adelges* (*Dreyfusia*)
roseigallis Li and Tsai 1973 – *Adelges* (*Sacchiphantes*)
SACCHIPHANTES Curtis 1844 – subgenus of *Adelges*
schneideri Börner 1931 – *Adelges* (*Dreyfusia*)
segregis Steffan 1961 – *Adelges* (*Sacchiphantes*)
sibiricus Cholodkovsky 1889b – synonym of *Pineus* (*Pineus*) *cembrae cembrae*
sichuananus Zhang in Zhang et al. 1980 – *Pineus* (*Pineus*)
similis Gillette 1907 – *Pineus* (*Pineus*)
simmondsi Yaseen and Ghani 1971 – *Pineus* (*Pineus*)
strobi Baerensprung 1849 – synonym of *Pineus* (*Pineus*) *strobi*
strobi Hartig 1839 – *Pineus* (*Pineus*)
strobi Ratzeburg 1844 – synonym of *Pineus* (*Pineus*) *strobi*
strobilobius Kaltenbach 1843 – synonym of *Adelges* (*Adelges*) *laricis laricis*
sylvestris Annand 1928 – *Pineus* (*Pineus*)
tardoides Cholodkovsky 1911 – *Adelges* (*Adelges*)
tardus Dreyfus 1888 – *Adelges* (*Adelges*)

- todomatsui*** Inouye 1945 – *Adelges* (*Dreyfusia*)
torii Eichhorn in Eichhorn and Carter 1978 – *Adelges* (*Sacchiphantes*)
tsugae Annand 1924b – *Adelges* (*Annandina*)
viridanus Cholodkovsky 1896 – *Adelges* (*Cholodkovskya*)
viridis Ratzeburg 1843 – *Adelges* (*Sacchiphantes*)
viridulus Cholodkovsky 1911 – *Adelges* (*Cholodkovskya*)
wallichianae Yaseen and Ghani 1971 – *Pineus* (*Pineus*)

Acknowledgments

We thank Andrew Carmichael (USDA Systematic Entomology Laboratory) for literature research, Juan Manuel Nieto Nafria (University of León, Spain) for expert opinion and a meticulous cross-referencing of taxon names and bibliographic citations, Ed Jarzembowski (Nanjing Institute of Geology and Palaeontology, China) for help with etymologies, and Shalva Barjadze (Agricultural University of Georgia) for translating certain Russian texts. We also thank external reviewers Anders Albrecht and Rimantas Rakauskas and editor Benjamin Price for their time handling our manuscript. Nomenclature work has become much easier with the availability of digital historical literature. We would like especially to acknowledge the Biodiversity Heritage Library and Google Books for making available valuable literature resources. That which was not available online was available through interlibrary loan. Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the USDA; USDA is an equal opportunity provider and employer.

References

- Altum B (1889) Waldbeschädigungen durch Thiere und Gegenmittel. Julius Springer, Berlin, 285 pp. doi: 10.1007/978-3-642-50828-8
- Amyot CJB (1847) Entomologie française. Rhynchotes (Suite) (1). Annales de la Société Entomologique de France. Deuxième Série 5: 453–506.
- Amyot CJB, Audinet Serville JG (1843) Histoire Naturelle des Insectes. Hémiptères. Librairie encyclopédique de Roret, Paris, 675 pp.
- Annand PN (1924a) A new *Chermes* from pine (Hemiptera Aphidae). Canadian Entomologist 56(1): 5–6. doi: 10.4039/Ent565-1
- Annand PN (1924b) A new species of *Adelges* (Hemiptera, Phylloxeridae). Pan-Pacific Entomologist 1(2): 79–82.
- Annand PN (1928) A contribution toward a monograph of the Adelginae (Phylloxeridae) of North America. Stanford University Publication, University Series, Biological Sciences 6(1): 1–146.
- Ashmead WH (1897) Description of some new genera in the family Cynipidae. Psyche 8(253): 67–69. doi: 10.1155/1897/60546

- Baerensprung FV (1849) Beobachtungen über einige einheimische Arten aus der Familie der Coccinen. Zeitung für Zoologie, Zootomie und Palaeozoologie 1(22): 173–176.
- Battisti A, Binazzi A, Gourou A, Khomentovsky P, Roques A (1997) A survey of conifer aphids from Siberia and Kamchatka (Homoptera Aphidoidea). Redia 80: 131–145.
- Binazzi A (1984) Chiave per le specie afidiche più note delle conifere in Europa. Redia 67(appendix): 547–571.
- Binazzi A, Covassi M (1991) Contributi alla conoscenza degli afidi delle conifere XII. Il gen. *Dreyfusia* Boerner in Italia con la descrizione di una specie nuova (Homoptera Adelgidae). Redia 74(1): 233–299.
- Blanchard EE (1944) Descripciones y anotaciones de afidoideos argentinos. Acta Zoologica Lilloana 2: 15–62.
- Börner C (1908a) [1907] Systematik und Biologie der Chermiden. Zoologischer Anzeiger 32(14): 413–428.
- Börner C (1908b) Eine monographische Studie über die Chermiden. Arbeiten aus der Kaiserlichen Biologischen Anstalt für Land- und Forstwirtschaft 6(2): 81–320.
- Börner C (1908c) Über Chermesiden IV. *Dreyfusia piceae* und *nüsslini* nov. spec. Zoologischer Anzeiger 33 (22/23): 737–750.
- Börner C (1909a) *Aphrastasia pectinatae* (Chol.) CB. Self-published, Sankt Julian bei Metz, 1 pp.
- Börner C (1909b) *Cholodkovskya viridana* (Chol.) CB. Self-published, Sankt Julian bei Metz, 2 pp.
- Börner C (1909c) Untersuchungen über die Chermiden. Mitteilungen aus der Kaiserlichen Biologischen Anstalt für Land- und Forstwirtschaft 8: 50–60.
- Börner C (1909d) Über Chermesiden VI. *Cholodkovskya*, *Aphrastasia* und *Gillettea*. Zoologischer Anzeiger 34(16/17): 498–511.
- Börner C (1926) Zuchtung der Homopteren. In: Abderhalden E (Ed.) Handbuch der biologischen Arbeitsmethoden. 9 part 1(2). Urban & Schwarzenberg, Berlin & Wien, 215–270.
- Börner C (1930) Beiträge zu einem neuen System der Blattläuse. Archiv für klassifikatorische und phylogenetische Entomologie 1(2): 115–180.
- Börner C (1931) Aphidoidea, Blattläuse. Sorauer Handbuch der Pflanzenkrankheiten [offprint]. [See Nieto Nafria et al. 2007: 54]
- Börner C (1952) Europae centralis Aphides. Die Blattläuse Mitteleuropas. Namen, Synonyme, Wirtspflanzen, Generationszyklen. Mitteilungen der Thüringischen Botanischen Gesellschaft, Supplement 3: 1–259.
- Bouché PF (1834) Naturgeschichte der Insekten, besonders in Hinsicht ihrer ersten Zustände als Larven und Puppen. Nicolaischen Buchhandlung, Berlin, 216 pp.
- Buckton GB (1883) Monograph of British Aphides. Volume 4. Ray Society, London, 228 pp.
- Carter CI (1971) Conifer woolly aphids (Adelgidae) in Britain. Forestry Commission Bulletin 42: 1–51.
- China WE (Ed.) (1963) Opinion 686. Amyot, Méthode mononymique: placed on the official index of rejected and invalid works in zoological nomenclature. Bulletin of Zoological Nomenclature 20(6): 423.
- Cholodkovsky NA (1888) Über einige *Chermes*-Arten. Zoologischer Anzeiger 11(270): 45–48.
- Cholodkovsky NA (1889a) Weiteres zur Kenntnis der *Chermes*-Arten. Zoologischer Anzeiger 12(305): 218–223.

- Cholodkovsky NA (1889b) Neue Mittheilungen zur Lebensgeschichte der Gattung *Chermes* L. Zoologischer Anzeiger 12(312): 387–391.
- Cholodkovsky NA (1896) Zur Biologie der Lärchen-*Chermes*-Arten. Zoologischer Anzeiger 19(494): 37–40.
- Cholodkovsky NA (1898) Beiträge zu einer Monographie der Coniferen-Läuse. Trudy Vsesojuznogo Entomologičeskogo Obsčestva 31: 1–61.
- Cholodkovsky NA (1902) Second annotated catalogue of aphid (Aphidae) collections in Zoological Cabinet of St. Petersburg Institute of Forestry. Izvestiya S-Peterburgskogo Lesnogo Instituta 8(2): 1–11.
- Cholodkovsky NA (1903) Aphidologische Mittheilungen. Zoologischer Anzeiger. 26(693): 258–263.
- Cholodkovsky NA (1906) *Chermes* injurious to coniferous trees. Department of Agriculture, St. Petersburg, 60 pp.
- Cholodkovsky NA (1910) Aphidologische Mittheilungen. Zoologischer Anzeiger 35(9/10): 279–284.
- Cholodkovsky NA (1911) Aphidologische Mittheilungen. Zoologischer Anzeiger 37(8/9): 172–178.
- Cholodkovsky NA (1915) *Chermes* injurious to coniferous trees (2). Department of Agriculture, Petrograd, 89 pp.
- Cortés Gabaudan F, Nieto Nafría JM, Favret C, Barbagallo S, Sano M, Stekolshchikov AV (2011) Etymology and gender of genus-group names. In: Nieto Nafría JM, Favret C (Eds) Registers of Family-Group and Genus-Group Taxa of Aphidoidea (Hemiptera Sternorrhyncha). Universidad de León, León, 405–463.
- Curtis J (1844) The spruce-cone Gall *Aphis* – (*Sacchiphantes Abietis*). The Gardeners' Chronicle and Agricultural Gazette 50: 831.
- De Geer C (1773) Mémoires pour Servir à l'Histoire des Insectes. Volume 3. Pierre Hesselberg, Stockholm, 696 pp.
- Dreyfus LT (1888) Über neue Beobachtungen bei den Gattungen *Chermes* und *Phylloxera*. Versammlung deutscher Naturforscher und Ärzte zu Köln 61: 1–10.
- Dreyfus LT (1889) Ueber Phylloxerinen. J.F. Bergman, Wiesbaden, 88 pp. doi: 10.5962/bhl.title.8560
- Eastop VF, Hille Ris Lambers D (1976) Survey of the World's Aphids. Dr. W. Junk, The Hague, 573 pp.
- Eckstein K (1890) Zur Biologie der Gattung *Chermes* L. Zoologischer Anzeiger 13(328): 86–90.
- Eichhorn O, Carter CI (1978) Investigation into conifer woolly aphids (Hemiptera: Adelgidae) in Japan, with the description of two new species. Zeitschrift für angewandte Entomologie 86: 273–289. doi: 10.1111/j.1439-0418.1978.tb01934.x
- Eichhorn O (1957) Eine neue Tannenlaus der Gattung *Dreyfusia* (*Dreyfusia merkeri* nov. spec.). Zeitschrift für Angewandte Zoologie 44(3): 303–348.
- Eichhorn O (1994) Numerical research upon the types and rates of offspring produced by the parthenogenetic generations of *Adelges laricis* Vall. (Hom., Adelgidae). Journal of Applied Entomology 117(1–5): 344–352. doi: 10.1111/j.1439-0418.1994.tb00745.x
- Evans GO, China WE (Eds) (1965) Opinion 731. *Psylla* Geoffroy, 1762 (Insecta, Hemiptera): validated under the plenary powers with suppression of *Chermes* Linnaeus, 1758. Bulletin of Zoological Nomenclature 22(2): 86–87.

- Fabricius JC (1803) *Systema Rhynctorum. Secundum Ordines, Genera, Species. Adiectis Synonymis, Locis, Observationibus, Descriptionibus.* Carolum Reichard, Brunsvigae (Brunswick), 314 pp. doi: 10.5962/bhl.title.11644
- Fang SY (1982) Biological statistical information on wing vein patterns of six aphids in the Xiaoxinanlin area. *Journal of North-East Forestry University* 6: 24–26.
- Fang SY, Yan SC (1997) The conifer woolly aphids (Adelgidae) in China. *Journal of Forestry Research* 8(1): 30–32. doi: 10.1007/BF02864936
- Fang SY, Sun JH (1985) Study of Korean pine adelgids in Northeast China, with descriptions of two new species. *Journal of North-East Forestry University* 13(3): 1–7.
- Favret C, Miller GL, Nieto Nafria JM, Cortés Gabaudan F (2008) [2007] Catalog of the aphid genera described from the New World. *Transactions of the American Entomological Society* 133(3–4): 363–412.
- Favret C, Miller GL, Nieto Nafria JM, Cortés Gabaudan F (2009) [2008]. Corrections and additions to the catalog of the aphid genera described from the New World. *Transactions of the American Entomological Society* 134(3–4): 275–282.
- Favret C, Ouvrard D, Williams DJ (2014) Annotated list of the species-group taxa described in combination with *Chermes* Linnaeus 1758 (Hemiptera: Sternorrhyncha). *Transactions of the American Entomological Society* 140: 67–81. doi: 10.3157/061.140.0104
- Favret C, Blackman RL, Stekolshchikov AV (2015) *Chermes funitectus* Dreyfus and the hemlock woolly adelgid (Hemiptera: Adelgidae). *Entomological News* 125(3): 174–178. doi: 10.3157/021.125.0304
- Fitch A (1855) [1854]. Report on the noxious, beneficial, and other insects of the state of New York. *Transactions of the New York State Agricultural Society* 14: 691–880.
- Fitch A (1858) [1857]. Fourth report on the noxious and other insects of the State of New York. *Transactions of the New York State Agricultural Society* 17: 687–814.
- Footitt R, Mackauer M (1983) Subspecies of the balsam woolly aphid, *Adelges piceae* (Homoptera: Adelgidae), in North America. *Annals of the Entomological Society of America* 76(2): 299–304. doi: 10.1093/aesa/76.2.299
- Gavrilov-Zimin IA, Stekolshchikov AV, Gautam DC (2015) General trends of chromosomal evolution in Aphidococca (Insecta, Homoptera, Aphidinea + Coccinea). *Comparative Cytogenetics* 9(3): 335–422. doi: 10.3897/CompCytogen.v9i3.4930
- Ghosh AK (1983) A review of the family Adelgidae from the Indian subregion (Homoptera: Aphidoidea). *Oriental Insects* 17(1): 1–34. doi: 10.1080/00305316.1983.10433690
- Gillette CP (1907) *Chermes* of Colorado conifers. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 54(1): 3–22.
- Gistel J (1837) Systematische Uebersicht der Wanzen und Cicaden der Umgebung von München. *Faunus. Zeitschrift für Zoologie und vergleichende Anatomie* 21: 98–111.
- Goeze JAE (1778) *Entomologische Beyträge zu des Ritter Linné Zwölften Ausgabe des Natursystems.* Volume 2. Weidmann Erben und Reich, Leipzig, 352 pp.
- Grosmann H (1935) Über eine neue Tannenlaus (*Dreyfusia Prelli* nov. spec.). *Tharandter Forstliches Jahrbuch* 86: 816–826.
- Hartig T (1839) Jahresberichte Über die Fortschritte der Firstwissenschaft und forstlichen Naturkunde im Jahre 1836 und 1837 nebst Original-Abhandlungen aus dem Gebiete dieser Wissenschaften 1(4): 489–646.

- Havill NP, Footitt RG (2007) Biology and evolution of Adelgidae. *Annual Review of Entomology* 52: 325–349. doi: 10.1146/annurev.ento.52.110405.091303
- Havill NP, Footitt RG, von Dohlen CD (2007) Evolution of host specialization in the Adelgidae (Insecta: Hemiptera) inferred from molecular phylogenetics. *Molecular Phylogenetics and Evolution* 44: 357–370. doi: 10.1016/j.ympev.2006.11.008
- Heie OE, Wegierek P (2009) A classification of the Aphidomorpha (Hemiptera Sternorrhyncha) under consideration of the fossil taxa. *Redia* 92: 69–77.
- Heie OE, Wegierek P (2011) A list of fossil aphids (Hemiptera, Sternorrhyncha, Aphidomorpha). *Monographs of the Upper Silesian Museum* 6, 82 pp.
- Herrich-Schaeffer D (1854) Vorwort des Herausgebers. In: Koch CL, Die Pflanzenläuse Aphiden getreu nach dem Leben abgebildet und beschrieben. J.L. Lotzbeck, Nürnberg. Volume 1: III–VIII.
- Hunter WD (1901) The Aphididae of North America. *Bulletin of the Iowa Agricultural Experiment Station* 60: 63–138.
- Inouye M (1936) Eine neue *Chermes*- Art (Adelgiden) auf Hokkaido. *Insecta Matsumurana* 11(1–2): 75–80.
- Inouye M (1945) Monographische Studie über die Japanischen Koniferen-Gallenläuse (Adelgidae). *Bulletin of the Hokkaido Forestry Experiment Station* 15, 105 pp.
- Inouye M (1963) Eine neue *Sacchiphantes*-Art von Adeligen, Schädlinge an Japanlärchen in Japan. *Journal of the Japanese Forestry Society* 45(10): 340–344.
- International Commission on Zoological Nomenclature (ICZN) (1999) International Code of Zoological Nomenclature, Fourth Edition. International Trust for Zoological Nomenclature, London, 306 pp.
- Kaltenbach JH (1843) Monographie der Familien der Pflanzenläuse (Phytophthires). P. Fagot, Aachen, 222 pp. doi: 10.5962/bhl.title.51483
- Koch CL (1857) Die Pflanzenläuse Aphiden getreu nach dem Leben abgebildet und beschrieben. J.L. Lotzbeck, Nürnberg. Volume 9: 275–335.
- Kono H, Inouye M (1938) Die Adelgiden, schädlich an Ezofichten und Akaezofichten in Japan. *Insecta Matsumurana* 12(4): 169–173.
- Laporte FL (1833) [1832] Essai d'une classification systématique de l'ordre des Hémiptères (Hémiptères Héteroptyères, Latr.). *Magasin de Zoologie* 2: 1–88.
- Li CL, Tsai PH (1973) Studies on the larch adelgids in northeast China with description of a new species. *Acta Entomologica Sinica* 16(2): 133–153.
- Linnaeus C (1758) *Systema naturae per regna tri naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Editio Decima, Reformata*. Volume 1. Laurentii Salvii, Holmiae (Stockholm), 824 pp.
- Luo Y (1988) Life cycle and control of *Adelges laricis* Vall in the forestry areas of Liupan mountains. *Ningxia Journal of Agro-forestry Science and Technology (China)* 4: 23–24.
- Maskell WM (1884) On an aphidian insect infesting pine trees. *New Zealand Journal of Science* 2(6): 291–292.
- Maskell WM (1885) Note on an aphidian insect infesting pine trees, with observations on the name "*Chermes*" or "*Kermes*". *Transactions of the New Zealand Institute* 17: 13–19.
- Merker E, Eichhorn O (1956) Die Formenkreise der gefährlichen Tannenläuse Gattung *Dreyfusia* (*Adelges*). *Naturwissenschaften* 19(43): 453–454. doi: 10.1007/BF00629526

- Michalik A, Szklarzewicz T, Wegierek P, Wieczorek K (2013) The ovaries of aphids (Hemiptera, Sternorrhyncha, Aphidoidea): morphology and phylogenetic implications. *Invertebrate Biology* 132(3): 226–240. doi: /10.1111/ivb.12026
- Monzen K (1929) Studies on some gall producing aphids and their galls. Saito Ho-on Kai (The Saito Gratitude Foundation) Monographs 1. The General Department of Scientific Research, Saito Ho-on Kai, Sendai, Japan, 80 pp.
- Nieto Nafria JM, Favret C, Akimoto S, Barbagallo S, Chakrabarti S, Mier Durante MP, Miller GL, Qiao GX, Sano M, Pérez Hidalgo N, Stekolshchikov AV, Wegierek P (2011) Register of genus-group taxa of Aphidoidea. In: Nieto Nafria JM, Favret C (Eds) Registers of Family-Group and Genus-Group Taxa of Aphidoidea (Hemiptera Sternorrhyncha). Universidad de León, León, 81–404.
- Nieto Nafria JM, Pérez Hidalgo N, Mier Durante MP (2007) New synonyms and several nomenclatural clarifications on family-group names in the Aphididae (Hemiptera Sternorrhyncha). *Zootaxa* 1629:51–55.
- Parry WH (1973) Observations on the flight periods of aphids in a Sitka spruce plantation in north-eastern Scotland. *Bulletin of Entomological Research* 62(3): 391–399. doi: 10.1017/S0007485300003904
- Patch EM (1909) *Chermes* of Maine spruces. *Psyche* 16: 136–137. doi: 10.1155/1909/942383
- Patch EM (1938) Food-plant catalogue of the aphids of the world including the Phylloxeridae. Maine Agricultural Experiment Station Bulletin 393: 36–431.
- Podeur G (1971) Contributions to the study of the diapause of certain Adelgidae (Homoptera: Aphidoidea) in the Lorraine region. *Bulletin de l'École Nationale Supérieure Agronomique de Nancy* 13: 50–54.
- Ratzeburg JTC (1843) Bericht über einige neue, den Waldbäumen schädliche Rhynchoten. *Entomologische Zeitung* 4(7): 201–204.
- Ratzeburg JTC (1844) Die Forst-Insecten oder Abbildung und Beschreibung der in den wäldern Preussens und der Nachbarstaaten als schädlich oder nützlich bekannt gewordenen Insecten: Im systematischer Folge und mit besonderer Rücksicht auf die Vertilgung der Schädlichen. Volume 3. Nicolaische buchhandlung, Berlin, 314 pp.
- Remaudière G, Remaudière M (1997) Catalogue of the World's Aphididae. INRA, Paris, 473 pp.
- Rohfritsch O (1988) A resistance response of *Picea excelsa* to the aphid, (Homoptera: Aphidoidea) *Adelges abietis*. In: Mattson WJ, Levieux J, Bernard-Daga C (Eds) Mechanisms of Woody Plant Defenses Against Insects. Springer, New York, 253–266. doi: 10.1007/978-1-4612-3828-7_16
- Rozkowski R (2004) Breeding value of Norway spruce (*Picea abies* [L.] Karst.) from the Klodzko Forest District (SW Poland). *Journal of Forest Science* 50(1): 17–23.
- Sano M, Ozaki K (2012) Variation and evolution of the complex life cycle in Adelgidae (Hemiptera). *Entomological Science* 15: 13–22. doi: 10.1111/j.1479-8298.2011.00483.x
- Schneider-Orelli O, Schneider F (1954) *Dreyfusia*-Befall an *Abies pindrow* im Nordwesthimalaya. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 27(4): 413–422.
- Schneider-Orelli O, Schneider F (1959) Weitere Untersuchungen über *Dreyfusia*-Befall im Nordwesthimalaya (Homopt. Adelgidae). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 32(2–3): 258–270.

- Shimer H (1869) [1868] Notes on *Chermes pinicorticis*. Transactions of the American Entomological Society 2(1): 383–385.
- Shinji GO (1930) Some new Aphidids from North Eastern Japan. Lansania 2(20): 151–160.
- Skrzypczyńska M (2004) Relationships between the number of dwarf shoots of *Larix decidua* Mill. damaged by different insect species in the Ojców National Park in southern Poland. Journal of Pest Science 77(3): 173–177. doi: 10.1007/s10340-004-0051-8
- Solowiow P (1924) Beobachtungen über neue Arten der Gattung Chermes: *Chermes alaeviridis* n. sp. und *Chermes niger* n. sp. (Rhynchota, Phytophthires, Aphidae, Phylloxeridae). Zoologischer Anzeiger 60: 38–49.
- Stebbing EP (1903) [1904] On the acquisition of alar appendages by the spruce form of *Chermes abeitis-piceae* MS. in the N.-W. Himalayas. Journal of the Asiatic Society of Bengal 72(2): 57–60.
- Stebbing EP (1910) On the life-history of *Chermes himalayensis*, Steb., on the spruce (*Picea morinda*) and silver fir (*Abies webbiana*). Transactions of the Linnean Society of London. Second series 11(Part 6): 99–124.
- Steffan AW (1961) Die Stammes- und Siedlungsgeschichte des Artenkreises *Sacchiphantes viridis* (Ratzeburg 1843) (Adelgidae, Aphidoidea). Zoologica: Original Abhandlungen aus dem Gesamtgebiete der Zoologie 109, 113 pp.
- Steffan AW (1968) Evolution und Systematik der Adelgidae (Homoptera: Aphidina). Eine Verwandtschaftsanalyse auf vorwiegend ethologischer, zytologischer und kardiologischer Grundlage. Zoologica, Original-Abhandlungen aus dem Gesamtgebiete der Zoologie. 40(lieferung 5 heft 115), 139 pp.
- Steffan AW (1972) Unterordnung Aphidina, Blattläuse. In: Schwenke W (Ed.) Die Forstschädlinge Europas. Volume 1. Paul Parey, Hamburg, 162–386.
- Strand E (1928) [1926] Miscellanea nomenclatorica zoologica et palaeontologica. I-II. Archiv für Naturgeschichte 92(A-8): 30–75.
- Szklarzewicz T, Wnęk A, Biliński SM (2000) Structure of ovarioles in *Adelges laricis*, a representative of the primitive aphid family Adelgidae. Acta Zoologica 81(4): 307–313. doi: 10.1046/j.1463-6395.2000.00061.x
- Takahashi R (1937) Phylloxeridae of Formosa (Hemiptera). Transactions of the Natural History Society of Formosa 27(160): 11–14.
- Thomas C (1879) Third annual report by Cyrus Thomas. Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois, 8th report, 212 pp.
- Toenshoff ER, Daniela G, Horn M (2012) Co-evolution and symbiont replacement shaped the symbiosis between adelgids (Hemiptera: Adelgidae) and their bacterial symbionts. Environmental Microbiology 14(5): 1284–1295. doi: 10.1111/j.1462-2920.2012.02712.x
- Underwood GR, Balch RE (1964) A new species of *Pineus* (Homoptera: Adelgidae) on *Abies*. Canadian Entomologist 96(3): 522–528. doi: 10.4039/Ent96522-3
- Vallot JN (1836) Observations sur deux insectes hémiptères qui vivent, l'un sur le mélèze et l'autre sur le cafer. Comptes rendus hebdomadaires des Séances de l'Académie des Sciences 3: 72–73.
- van der Hoeven J (1849) Handboek der Dierkunde. Volume 1. C.G. Sulpke, Amsterdam, 791 pp.
- Wegierek P (2002) Relationships within Aphidomorpha on the basis of thorax morphology. University of Silesia, Katowice, Poland, 107 pp.

- Wegierek P (2003) Apterous Phylloxeroidea (Homoptera, Sternorrhyncha) from Baltic amber. *Acta Zoologica Cracoviensia* 46(fossil insects): 277–283.
- Wilson HF, Vickery RA (1918) A species list of the Aphididae of the world and their recorded food plants. *Transactions of the Wisconsin Academy of Sciences, Arts, and Letters* 19: 22–352.
- Yaseen M, Ghani MA (1971) Descriptions, and notes on the biology, of four new species of Adelgidae from West Pakistan. *Bulletin of Entomological Research* 61: 191–205. doi: 10.1017/S0007485300057722
- Zhang GX, Fang SY (1981) A description of *Pineus cembrae pinikoreanus* Zhang et Fang, subsp. nov. (Homoptera: Adelgidae). *Journal of North-East Forestry University* 12(4): 15–18.
- Zhang GX, Zhong TS, Tian ZJ (1980) Two new species and a new subspecies of Adelgidae from Sichuan China (Homoptera, Adelgidae). *Zoological Research* 1(3): 381–388.
- Zhang GX, Zhong TS, Zhang WY (1992) Homoptera: Aphidoidea. In: Chen SX (Ed.) *Insects of the Hengduan Mountains Region*. Volume 1. Science Press, Beijing, 360–403.
- Zurovcová M, Havelka J, Starý P, Věchtová P, Chundelová D, Jarošová A, Kučerová L (2010) “DNA barcoding” is of limited value for identifying adelgids (Homoptera: Adelgidae) but supports traditional morphological taxonomy. *European Journal of Entomology* 107: 147–156. doi: 10.14411/eje.2010.020